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# FAMILY, SCHOOL, AND MIGRATION EFFECTS ON ACADEMIC ACHIEVEMENT IN CHINA 

A Dissertation in<br>Education Theory and Policy<br>by<br>Minda Tan<br>(C) 2020 Minda Tan<br>Submitted in Partial Fulfillment of the Requirements for the Degree of<br>Doctor of Philosophy

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#### Abstract

Family and school-related factors are the primary contributors to students' school performance. Although the well-known Coleman Report suggested that the family background accounts for more variation in educational outcomes than the school quality, the arguments on the relative importance have never been fully resolved. Different characteristics rooted in diverse socioeconomic factors and educational systems may generate a distinct conclusion. In the context of China, geographically unbalanced development rapidly increased educational investment, and massive internal migration further complicates the factors shaping children's school success.

Using the nationally representative data from the China Education Panel Survey (CEPS), this study examined the relationships between factors influencing the academic achievement of  versus school factors differed by specific subjects. Migrant and left-behind children can enjoy improved material and educational resources, but they faced academic challenges derived from unstable social networks and parental absence. Family SES is positively related to students' school performance. However, students with higher cultural capital achieved lower test scores at school. Social capital favours educational returns in a way characterized by Chinese culture. The boarding school program and supplementary education have the potential to be policy tools to promote education equity in China. Both migrant and left-behind students performed no worse than their regular cohorts while holding the other characteristics as constant. A supportive school climate contributes to students' academic achievement.

The positive effects of family capital, learning attitudes, and school location are moderated by student migration in China. Solo parental migration exposes children to considerable psychological pressure. As such, left-behind children get lower advantage from


higher parental expectations and studying in urban schools than the otherwise similar regular students.

This dissertation contributes to the theory and practice concerning students' academic achievement in the context of China. In the theoretical aspect, the current study develops a new model for explaining Chinese students' academic performance in mathematics, Chinese, and English reading. In the practical aspect, this dissertation describes the patterns and tendencies of factors influencing students' educational outcomes, which fill the current research gap.

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## Chapter 1

## Introduction

Since the transition to a market-based economy in 1978, China has experienced dramatic economic development. According to the World Bank, Chinese Gross Domestic Product (GDP), accounting for $15.16 \%$ of global nominal GDP, has ranked just second to the United States in 2017. With the increased economic power, the Chinese government can invest more in education, especially public schools, which enables it to better serve as a channel of social mobility. Nevertheless, family characteristics (i.e., socioeconomic status) also have a high impact on children's school attendance and outcome, which hinders disadvantaged students from achieving success in school (Kearney \& Levine, 2016; Wendelspiess Chávez, 2015). Such a paradox put forward a critical question: what factors possess substantial predictive magnitude on academic outcomes in the case of China?

Coleman Report (1966) suggested that there is a more considerable variation in the family background than in the school quality that is associated with children's academic performance. Given this widely acknowledged finding stems from the U.S. case, different characteristics rooted in diverse socioeconomic factors and educational systems may generate a distinct conclusion (Chudgar \& Luschei, 2009). In the 1980s, Heyneman and Loxley proposed a theory that a country's wealth and level of development shape the relative importance of school versus home for students' academic achievement. Specifically, in low-income countries, school factors have stronger effects on students' academic performance. Conversely, family socioeconomic status is more influential in high-income countries (Heyneman \& Loxley, 1983). Based on the criterion of the World Bank, China has been among the upper-middle-income countries. It is an empirical question about whether school factors play a weaker role in determining academic success compared to individual and family factors.

In the context of China, a great wave of internal migration may further complicate the working conditions of background factors. Chinese internal migration is triggered by unbalanced development.

According to the data from The National Bureau of Statistics of China (China NBS), five out of ten fastest-growing provinces were in East China from 2013 to 2017. The disparity of governmental expenditures on compulsory education between urban and rural schools was 201.5 billion yuan (29.2 billion dollars) in 2007, which had been experiencing a yearly increase of more than $16 \%$ since then. These numbers display an increasingly severe regional inequality in China. For benefiting from better resources, a considerable number of individuals and families tend to internally migrate from Middle and West to East China, or from rural to urban areas in the last three decades.

As Chinese residents, all children should have enjoyed equal educational opportunities in either migrant origins or destinations. However, owing to the household registration system, namely "Hukou System", Chinese residents can only receive public services and welfare in specific county-level administrative districts according to their Hukou. Given the pressure faced by destination governments, migrant children, as "unqualified" residents, are challenging to enter public schools or receive equivalent education as local children, which makes their circumstances more similar to undocumented international migrants in western societies (Lu \& Zhou, 2013; Roberts, 1997). Additionally, migrant parents are often overworked, and it is challenging for them to find a residence qualifying for enrolling their children in local public schools. Therefore, such circumstances may prevent parents from migrating together with their children, creating a sub-population of "left behind" children (Ge, Song, Clancy, \& Qin, 2019).

In contrast with regular students whose parents are living with them in the residences registered in Hukou, the children influenced by parental migration in China can be categorised into two groups: migrant children and left-behind children. In China, migrant children are the ones whose parents bring them together to live in a place without local Hukou (Lu \& Zhou, 2013). Left-behind children are put into this situation when their parents move to a city for better professional or financial opportunities but cannot take their children with them because of restricted educational services or financial constraints (Tang et al., 2018). Official statistics indicate that approximately 34 million children are migrating with parents, and 69 million children are left behind in original domiciles (UNICEF, 2017).

The primary reason for migration is to get better economic returns for the families (Lu, 2012). Given the Hukou system and parental absence, it is also unknown whether migrant or left-behind children can benefit from the educational resources matching with their improved family economic status. Without considering the circumstances of internal migration, it is impossible to draw an accurate conclusion on the relationships between background characteristics and children's academic achievement in China.

Due to the lack of nationally representative data, few existing empirical studies have systematically investigated the academic effects of background characteristics and the relative influence of school versus family factors on students' performance in China. Even fewer considered the potential variation among student groups based on migrant status. From the practical perspective, the undisclosed relationships pose formidable obstacles for policy-makers and educators to promote education equity in China. Therefore, this dissertation aims at filling the research gap by answering the following research questions:
(1) What are the relative effects of family versus school on academic achievement in China?
(2) How do students' academic achievement and background characteristics vary by migration status, i.e. among migrant, left-behind and regular students?
(3) To what extent are students' and family characteristics, including SES, cultural capital, and students' educational expectations, associated with the academic success of students?
(4) To what extent do school resources, including infrastructure and teachers' characteristics, affect students' academic performance?
(5) Whether and to what extent does migrant status moderate the effects of family and school factors on academic performance?

## Chapter 2

## Theoretical Background

Grounded in the literature focusing on factors influencing academic success, this dissertation is guided by a theoretical framework, as shown in Figure 1. The first part of this section introduces the specific factors affecting students' academic performance, which can be categorised into the student and family level, and the school level. Socioeconomic status, cultural capital, and social capital are the core factors at the student and family level. Campus climate, human resources, and organisational resources are the nucleus of school-level elements. The relative importance and working mechanisms of such factors are altered by the national economic development level and socio-demographic factors, like student migrant status. Thus, the second part reviews previous studies on the Heyneman-Loxley Effect that explored how the national economic development level formed the relative importance of family versus school factors on school performance. Finally, the third part surveys the prior research on the interaction between academic influencing factors and student migrant status, including student migration and left-behind.


Figure 2-1: The Conceptual Framework of Factors Associated with Chinese Students' Academic Achievement

## Factors Influencing Students' Academic Achievement

It is widely acknowledged that schooling is a foundation for success in meritocratic societies (Parcel \& Dufur, 2001). Many studies have explored the factors influencing academic achievement and suggested that family and school background are the primary contributors to students' school performance (J. S. Coleman, 1968; James S Coleman, 1988; Davis-Kean, 2005; Dufur, Parcel, \& Troutman, 2013; Parcel \& Dufur, 2001). Informed by their contributions, the conceptual model of this study is constructed and shown in the middle part of Figure 1. Specifically, SES, cultural capital, and social capital, on the first layer, are the components of family background. The dimensions of school climate represent school characteristics. On the second layer, family and school, as two interrelated parties, are directly associated with children's school performance. The following sections detailedly review the concept and related research of each factor from either family-level or school-level. They pave the way for the current study to explore further and extend the process model of academic achievement.

## Socioeconomic status (SES)

Coleman et al. (1966) claimed that the socioeconomic composition of the student body is highly related to achievement. Since then, researchers have studied the effect of socioeconomic position on students' achievement (van Ewijk \& Sleegers, 2010). Duncan, Featherman, and Ducan (1972) put forward a fundamental and widely accepted definition that SES consists of parental income, parental education, and parental occupation, which is also known as the "Trinity Model". Although some scholars worried that there are high correlations among the three factors, many empirical studies pointed out that such components respectively represent a separate aspect of SES (Sirin, 2005). Previous research generally agreed that family SES is strongly related to children's educational performance. Highly
educated parents can provide children with various resources that contribute to their school success. Parents can stimulate children's learning with higher expectation, provide them with instructional enhancements, and enable them to understand the purpose of study at an early stage (S. Lee \& Shouse, 2011; J. Li, Yamamoto, Luo, Batchelor, \& Bresnahan, 2010; Luo \& Zhang, 2017; McDonough, 1997; Roksa \& Potter, 2011; Schultz, 1993). Additionally, high SES parents tend to have more meaningful and in-depth conversations with their children and often supply children with learning materials or chances for engaging in educational events (Bradley \& Corwyn, 2002). As such, those children are more comfortable to acquire vital information about how to rationally set and realise their academic goals. By contrast, students from less advantaged families do not benefit similarly to high aspirations (Alexander, Entwisle, \& Bedinger, 1994). Because they lack the essential resources to bridge their aims and efforts that they should contribute (Alexander et al., 1994; Davis-Kean, 2005).

High SES families possess more resources that facilitate their children's education (B. P. An, 2013; Luo \& Zhang, 2017; Walpole, 2003). For instance, more affluent and better-educated parents are more likely to enrol them in supplementary schools, scheduling structured extracurricular activities for them, and investing in residence within high-performing school districts (Covay \& Carbonaro, 2010; S. Lee \& Shouse, 2011; J. Li et al., 2010; Roksa \& Potter, 2011; Sirin, 2005; van Ewijk \& Sleegers, 2010). Low-SES parents, on the other hand, are unable to provide material and intangible resources necessary to facilitate children's development (Bradley \& Corwyn, 2002; Letourneau, Duffett-Leger, Levac, Watson, \& Young-Morris, 2013). Additionally, parents under chronic financial stress tend to have low mental health that leads to their less responsive and less patient parental behaviours, which negatively affect children's successful development (Letourneau et al., 2013; McLoyd \& Wilson, 1990).

Children from high-SES families are living and studying in a relatively more supportive environment (McLoyd \& Wilson, 1990). Because of limited financial resources, children from lowincome families face conditions such as inadequate housing and unsafe neighbourhoods every day that enlarges their chances to encounter adverse life events, including eviction and violence (McLoyd \& Wilson, 1990). By studying South African children, Barbarin and Richter (2001) found that ambient
community danger is associated with children's anxiety depression that is inversely correlated to academic motivation. Cooley-Quille and her colleagues (2001) confirmed similar results in their research on American inner-city high school students.

However, there are still disputes concerning the predictive power of SES on academic achievement (Sirin, 2005; van Ewijk \& Sleegers, 2010). Sirin did a meta-analysis to review studies on academic effects of SES published between 1999 and 2000. He found that the SES-achievement connection shows a slightly lower average correlation than White's results in 1982 (Sirin, 2005). According to Sirin's explanation, this variance is caused by different components of the SES construct and different ethnic or cultural background (Sirin, 2005). Following this theory, scholars repeated these studies by adding other control variables or in a single cultural context. Marks (2009; 2016), who did studies in Australia, contended that the effect of socioeconomic inequity on academic achievement is declining over time. By further including students' cognitive skills and prior academic outcome into the models, he claimed that the SES effect can be attributed to those two factors (Marks, 2017). This conclusion was supported by other studies conducted by Giani, who also focused on postsecondary students, and Batterjee, who studied Sudan's and Saudi Arabia's cases (Batterjee, 2013, 2017; Giani, 2015). As a response, some scholars pointed that current disparities on SES are mainly due to the measurement approaches they used, which also leads to dramatic differences among the results of various studies (Rutkowski \& Rutkowski, 2013; Sirin, 2005; van Ewijk \& Sleegers, 2010). Specifically, Sirin (2005) pointed out that the components used to measure SES may artificially restrict the range of family SES that disobey its nature as a continuous variable. The artificial range reduces the magnitude of the association between family socioeconomic status and students' school performance. A smaller range may lead to a relatively more substantial reduction in the correlations (Sirin, 2005).

In addition to the varied contentions of the predictive power, a line of studies argued the limitations of using SES to predict students' academic achievement (Gutiérrez, 2008; Martin, 2010; Torres \& Moran, 2014). Scholars holding this point contended that emphasising socioeconomic background may cover the real reason of low-achievement of students from low-SES families, for
example, lacking prior knowledge (Martin, 2010). Furthermore, it also constructs deficit thinking and negative images of disadvantaged students from minorities and working-class families, which encourages educators to tag such students as "struggling" or "low-achievement" (Gutiérrez, 2008; Martin, 2010; Torres \& Moran, 2014). Although it does not change the essential position of SES, the critical voice supplies a perspective that we should consider more factors in analysing students' academic performance.

## Cultural capital

According to Bourdieu, cultural capital is a kind of instrument for the appropriation of symbolic wealth that equips possessors with specific knowledge to adapt to the social system and get rewards from institutional gatekeepers and peers (Bourdieu, 2011; DiMaggio, 1982; Jæger, 2011). Individuals from different levels of social hierarchies utilise cultural capital to either promote relative social advantage or gain economic or social resources (Jæger, 2011). Cultural capital divides individuals into strata based on their knowledge of institutionalised cultural signals, which exclude lower class members from a higher class circle (Lamont \& Lareau, 1988).

Ever since the emergence of this concept, researchers have investigated the relationship between cultural consumption and school performance in different contexts (Andersen \& Jæger, 2015; Kraaykamp \& Nieuwbeerta, 2000; van Hek \& Kraaykamp, 2013). They explained the influencing mechanism that individuals with specific cultural capital are familiar with cultural codes inscribed in a society that facilitates their academic success by giving them a sense of "the rules of the game" in the educational system (Andersen \& Jæger, 2015; Bourdieu, 2011; van Hek \& Kraaykamp, 2013). Further, such a sense can be reproduced by education (Bourdieu, 1984). Thus, like SES, cultural capital assists advantaged students in persisting with their social strata more unconsciously.

Given the vagueness of Bourdieu's definition of cultural capital (Jæger, 2011), scholars have employed various ways to capture its construct. DiMaggio (1982) used self-reports of involvement in art, music, and literature to represent high school students' cultural capital. This approach was employed in
several quantitative studies. However, some researchers argued that this method is too narrow and is only applicable to elitist and classics-oriented educational systems (Bodovski, Jeon, \& Byun, 2017; Lareau \& Weininger, 2003). Instead, they broadened the concept of cultural capital by including the indicators of soft skills, ways of communication in the family, home linguistic patterns, reading habits, and educational resources at home (Bodovski et al., 2017; Lareau \& Weininger, 2003).

Many studies focused on the role of cultural capital in predicting students' academic success but markedly varied in their results (Bodovski et al., 2017; Byun, Schofer, \& Kim, 2012; Cheng \& Kaplowitz, 2016; Gaddis, 2013). One of the essential reasons is attributed to different cultural and social contexts. Bodovski et al. (2017) confirmed a positive relationship between SES, cultural capital, and reading achievement in both five post-socialist Eastern European countries and three Western benchmarking countries. In the context of Taiwan, Su and Hwang (2009) contended that sufficient cultural capital improves students' performance by constructing a positive teacher-student relationship. However, Byun et al. (2012), in their study on the Korean case, asserted that the effect of cultural capital on school performance is negative. They explained this divergence by the fact that high-stakes tests in Korea are closely related to the standard curriculum rather than to students' highbrow cultural knowledge (Byun et al., 2012). Bodovski et al. (2019) found that none of the cultural capital variables predicts a change in Russian high school students' mathematics or reading performance.

Additionally, a substantial body of research has discussed whether cultural capital promotes social mobility or plays a role in social reproduction. Many scholars consider it as a mechanism to reproduce social structures and activities that are used to persist in individuals' social positions between generations. Based on this assumption, cultural capital does not benefit school functioning above students' family socioeconomic status. Bourdieu (2011) argued that cultural capital is the most hidden way for the elites to transmit their privileges. Due to the familiarity with the internal logic of school, students with sizeable cultural capital tend to achieve success in the educational system (Andersen \& Jæger, 2015). By contrast, students from lower-class families must acquire cultural cues through schooling, which leads to their academic disadvantages (Lamont \& Lareau, 1988). Thus, school, as a
social institution that reflected the experiences of the dominant class (Lamont \& Lareau, 1988), is a medium for cultural capital to realise social reproduction.

Some scholars also pointed out that cultural capital may perform social reproduction through shaping parenting practices. Lareau (2011) suggested that parents may adopt different cultivation modes depending on their cultural capital. High cultural capital parents from middle and upper-class tend to adopt concerted education by scheduling structured extracurricular activities for their children and thinking highly of cultivating children's cultural taste (Bourdieu, 1984; Covay \& Carbonaro, 2010; Lareau, 2002, 2011). By contrast, working-class families prefer to apply the approach of natural growth. Due to such differences, children from middle and upper-class families are more natural to be successful in schools (Lareau, 2011). Additionally, parents in middle and upper-class families are educated to use more appropriate skills to educate and get along with their children, which also assist their success at school (Bodovski et al., 2017; Lareau \& Weininger, 2003).

This theoretical hypothesis has drawn considerable support from existing studies, which argued that students with high family economic status tend to have substantial cultural capital and academically benefit from cultural capital (Bodovski et al., 2017; Cheng \& Kaplowitz, 2016; Jæger, 2011). However, Dimaggio (1982) proposed a cultural mobility theory indicating that relatively disadvantaged children have an extra incentive to acquire cultural capital, which offered them higher educational returns. This theory also got reliable support from empirical studies. For example, Dimaggio (1982) argued that cultural capital is less tied to parental background traits in the context of the United States, and it has a significant impact on high school students' grades. By analysing a panel data of American individuals and their families, Roksa and Potter (2011) agreed to cultural mobility theory by finding that individuals can gain cultural capital over their life courses, and this process is not limited within their families. However, this theory does not supply an analytic tool for explaining the occupational status of cultural capital in a downwardly mobiled family (Roksa \& Potter, 2011). Andersen and Jæger (2015) asserted that returns to cultural capital tend to be higher for low-SES students by studying the data of Canada, Germany, and

Sweden. Based on those findings, cultural capital, de facto, promotes social mobility by facilitating educational success in a low-SES environment rather than simply reproduce the social structure.

## Social capital

The concept of social capital was respectively proposed in the works of Bourdieu and Coleman (Bourdieu, 2011; James S Coleman, 1988). Bourdieu (2011) defined it as the aggregate of actual or potential resources linked to a durable interpersonal network, which supplies its members with the backing of the collectivity-owned capital. Social capital can be understood as social obligations originating from private social networks (Richardson, 1986). Thus, the quantity of an individual's social capital depends on the size of connections he can mobilise and the volume of capital possessed by the network members to whom he is connected (Bourdieu, 2011).

Similar to Boudieu, Coleman (1988) described social capital as a variety of entities that commonly consist of some aspects of social structures and facilitate certain actions of members within the structure. However, where Bourdieu considered social capital as a way to transmit acquired privileges between generations, Coleman, from the perspective of economists, pointed out that the value of social capital is conditional and individuals invest in it based on their interests (James S Coleman, 1988). Further, Coleman discussed the role played by social capital in the creation of human capital in the rising generation. He argued that highly educated parents and sizable family wealth are insufficient to determine an advantaged family environment that benefits children's academic achievement (James S Coleman, 1988). The social capital of family, which is the relations between children and parents, plays an essential role in aiding children's learning (James S Coleman, 1988). Parents must adopt specific practices to invest in their children's development and engage in children's educational activities to ensure the intergenerational transmission of their knowledge (Dufur et al., 2013). If parental resources are not complemented by social capital embodied in family ties, they cannot transit into children's academic advantages (James S Coleman, 1988).

Existing studies have made efforts to investigate the academic impact of social capital in various contexts. Dufur and her colleagues (2013) investigated the relationship between social capital at the family level and children's test scores by analysing the data from the National Education Longitudinal Study. They found that the indicators of social capital in the family, including parental trust in children and parent-child communication, are significantly and positively associated with children's academic performance. Jeynes $(2007,2015)$ reported that the association between parental involvement in children's educational processes and their educational outcomes is statistically significant. Scholars have tested this conclusion in different contexts. A study on students of Hong Kong contended that parental involvement plays a vital role in children's academic achievement (Phillipson \& Phillipson, 2012). DavisKean (2005) claimed that SES is connected to children's academic achievement via parents' beliefs and behaviours in the U.S. Hayes (2012) focused on the African American ethnic group and asserted that home-based involvement is the only significant predictor of academic outcome. By analysing the nationally representative sample of the U.S., Dufur et al. (2013) also supported that parental engagement in children's educational process facilitates their test performance. Through analysing all relative metaanalysis, Wilder (2014) summarised that the magnitude of parental involvement in educational processes can be generalised across different grades and ethnic groups.

## School climate

As an essential subject in children's educational processes, the school also possesses economic resources, cultural climate, and social capital like family does. Therefore, previous research assumed that school factors affect student outcome in an analogous way to the family background (Cohen, McCabe, Michelli, \& Pickeral, 2009; Dufur et al., 2013; Parcel \& Dufur, 2001). Some scholars used the concept of school climate to refer to spheres of school life and larger organisational patterns. In the 1970s, Brookover defined school climate as a complex of norms and expectations of stakeholders within this school (Brookover et al., 1978). Since the 1990s, scholars have started to regard school climate as a
multilevel conception. They suggested that school climate should be described as shared beliefs, values, and attitudes that shape interactions between students, teachers, and administrators (Koth, Bradshaw, \& Leaf, 2008; Zullig, Koopman, Patton, \& Ubbes, 2010). For further clarifying this concept, National School Climate Council (2007) recommended a definition that school climate is "based on patterns of people's experiences of school life and reflects norms, goals, values, interpersonal relationships, teaching and learning practices, and organizational structures" (Cohen et al., 2009; Thapa, Cohen, Guffey, \& Higgins-D’Alessandro, 2013).

In summary, the school climate is a complex concept, which shapes students' outcome through three essential dimensions.

The first dimension is the campus disciplinary climate. Students may feel safe physically and psychologically when schools have reliable plans to keep violence from campus. Such a positive attitude of school can improve students' concentration on academic studies rather than often worry about violation from others (Devine \& Cohen, 2007). Otherwise, the school may experience high-level absenteeism and decreased overall academic performance (Astor, Benbenishty, \& Estrada, 2009).

The second dimension is teaching and learning. Teaching consists of academic and ethical instruction, which aims at enabling students to feel the sense of both academic efficacy and the citizen's responsibilities (Thapa et al., 2013). Learning concerns the schooling process for students to study both academic knowledge and social values and norms (Finnan, Schnepel, \& Anderson, 2003; Kerr, Ireland, Lopes, Craig, \& Cleaver Elizabeth, 2004). Furthermore, it also includes teachers' professional improvement. Systematic and ongoing professional improvement is helpful to a favourable school climate (Thapa et al., 2013).

The last dimension is the organisational resources. Similar to SES at the personal level, this factor refers to school resources, including adequate space and materials, and the structure of economically and socially diversified students (Cohen et al., 2009). Sirin (2005), in his meta-analysis, suggested scholars should focus more on school-level SES data to understand individual-level studying process by using multilevel modelling techniques. Although researchers always used different terminologies, including
"contextual effect" and "school mix effect", to describe this connection, they all pointed to the magnitude effect of school resources on the academic outcome (van Ewijk \& Sleegers, 2010).

The existing studies generally chose one or two dimensions to investigate the academic effect of school climate (Ramelow, Currie, \& Felder-Puig, 2015). MacNeil et al. (2009), in the context of America, emphasised the importance of principals' leadership because a principal with particular ability can develop and maintain a stable, supportive, and effective learning environment. In other words, faculty satisfaction with the school environment is essential to the academic performance of the whole school. Koth et al. (2008) asserted that using only group-level indicators of school climate neglects variation within a school, such as a variance among teachers, students, and school administrators. By using twolevel indicators to analyse a large-scale American data, they found larger magnitude in a classroom environment, including teachers' teaching length and class size, than in school leadership for improving school climate (Koth et al., 2008). Using the data from the National Longitudinal Survey of Youth, Parcel and Dufur (2001) suggested that the associations between school climate dimensions and academic performance may depend on different subjects. They found that the disciplinary campus climate, like rarely happened criminal and high-risk activities, has significant and positive effects on students' math scores. However, this factor does not benefit students' reading achievement (Parcel \& Dufur, 2001).

Previous studies have not reached an agreement on the effect of school human and financial resources. Based on a meta-analysis on 60 relevant studies in the context of the United States, Greenwald, Hedges, and Laine (1996) confirmed the positive relationship between school resources and student academic achievement, and claimed that a moderate extra investment in school is associated with significant increases in school performance. However, Hanushek (1997) suggested that there is no consistent relationship between school resources and student performance by reviewing 400 relevant studies concerning the relationship between student performance and school resources. According to the findings of Parcel and Dufur, although school human and financial resources can benefit students math achievement moderately, higher per-student expenditure is significantly and negatively associated with their reading scores (Parcel \& Dufur, 2001). Based on American national data from Prospects Study,

Borman and Overman (2018) supported Hanushek' conclusion by contending that students' feelings of a supportive school community, including safe and orderly environment as well as positive teacher-student relations, strongly predict students' resilience status rather than school resources. Using School Consensus data of Sri Lanka in 2016, Abayasekara and Arunatilake (2018) found that better school-level resources like high-quality teacher and principals have a positive impact on student achievement.

To sum up, the indicators of school climate, including campus environment, teaching quality, opportunities to learn, and school resources, are proved to be positively related to students' academic performance. However, some scholars suggested that school characteristics may play a less critical role in shaping students' educational processes than family background that has started to intervene students' educational processes since an early stage (J. S. Coleman, 1968; Dufur et al., 2013; Heckman, 2008; Parcel \& Dufur, 2001). One of the plausible reason for this result is that it is challenging for researchers to utilise a proper indicator at the school level to represent accurate information. For example, some studies used class size to measure a school's human and financial resources. Whereas, small class size may be due to low enrolment rather than affluent educational resources (Hanushek \& Luque, 2003). In this condition, the small class size does not represent high teaching quality. Another possible reason is that school-level resources in developing countries may be in short supply. This situation improves the magnitude of the interaction between school quality indicators and academic performance in developing countries like Sri Lanka (Abayasekara \& Arunatilake, 2018). By contrast, allocated school resources may already exceed student demand in some developed countries. Studies focusing on those countries cannot confirm the positive effect of better school resources, especially human capital.

## The Heyneman-Loxley Effect

Although scholars agreed that family and school background characteristics play a vital role in promoting students' school success, early studies did not discuss the relative importance of family versus school factors (Dufur et al., 2013; Heyneman \& Loxley, 1983; Parcel \& Dufur, 2001). Chudgar and

Luschei (2009) pointed out that such discrepancies may stem from different research context, including economic background and income inequality levels. By analysing 1970s data from 28 countries, Heyneman and Loxley (1983) put forward a theory to describe the dynamics between national income level and the relative importance of family versus school factors. Specifically, with diminishing per capita income, the proportion of variance explained by school quality variables increased (Chudgar \& Luschei, 2009).

Educational resources are usually in scarcity and unequally distributed in low-income countries, where school achievement has a more substantial effect on students' occupational success (Heyneman, 1980; Heyneman \& Loxley, 1983). By understanding this situation, parents with various socioeconomic status compete for placing their children in high-quality schools, which further motivates those children to perform well in high-stakes examinations (Heyneman \& Loxley, 1983). As such, school-level variables are more closely associated with students' achievement. By contrast, the family background may play a more critical role in shaping students' academic performance in a country with limited variation in school material resources and teacher quality (Gamoran and Long 2007). This conclusion challenges the finding that school quality only has modest academic effects in an educational system (Baker, Goesling, \& Letendre, 2002; James S Coleman, 1988; Hanushek \& Luque, 2003).

Since the proposal of the Heyneman-Loxley Effect, scholars tried to replicate their findings by examing the data collected from different samples or contexts. Fuller and Clarke (1994) supported the conclusion of Heyneman and Loxley and claimed that instructional time, studying materials, and teachers' education, are closely related to students' academic performance. Hanushek also argued that teacher quality and school infrastructure are essential to students' learning (Carnoy, 1995). To sum up, those studies concluded that school-level educational resources make a relatively more substantial contribution to students' learning outcome in contexts that have low per capita income.

However, two studies consistently found that school contributions to student learning are diminishing in low-income countries by investigating the 1994-1995 data from the Third International Mathematics and Science Study (TIMSS) (Baker et al., 2002; Hanushek \& Luque, 2003). Implementing
various tests on the data from 32 countries, Harris (2007) also rejected the hypothesis that the diminishing marginal returns to school inputs. Concerning the discrepancies between the current and prior findings, Baker et al. (2002) explained that the Heyneman-Loxley Effect is based on the scarcity of educational resources in low-income countries. Developing nations have dramatically increased the governmental investment in mass schooling since 1985, which, to some extent, relieves the scarcity of school resources in developing countries. Due to the narrowed variance in school qualities, home factors acquire greater relative importance for affecting children's academic performance. Additionally, parents may also recognise the importance of children's education and are willing to invest more resources on it. It strengthens the tie between family factors and schooling outcome (Baker et al., 2002).

The more recent multicountry studies have tried to figure out the specific scope to generalise the HL effect. Summarising international research on educational returns to school inputs, Gamoran and Long (2007) found a threshold of $\$ 16,000$ (in 1990 dollars) in per capita income through plotting the relationship between national income and percentage variance explained with the results of Heyneman and Loxley (1983), Baker et al.'s (2002), and Long's (2006). They pointed out that the HL effect can be only applied appropriately when the countries are sampled based on this threshold. Chudgar and Luschei (2009) put forward that, without considering the level of inequality in a country, conclusions regarding the HL effect might be inaccurate. They further contended that despite the development level, the importance of school quality might be lower in more equal countries because of the relatively equivalent access to educational resources (Chudgar \& Luschei, 2009). By contrast, educational returns should be higher in unequal regions.

In the context of China, two different factors complicate the conclusion on school effects. On the one hand, according to the data from the World Bank, the per capita income of China was 9770.85 dollars in 2018. Considering the inflation rate, China should be far below the threshold that is $\$ 16,000$ (in 1990 dollars). On the other hand, internal migration in China breaks the original allocation of economic and educational resources, which, to some extent, promotes a part of high-quality resources to flow to less
developed areas. As such, it is essential to include students' migrant status into the model that estimates the factors influencing academic success of Chinese students.

## Migrant Status and Its Academic Effects

Given the unbalanced development in China, the massive wave of migrant labours has created approximately 34 million migrant children and 69 million left-behind children (UNICEF, 2017). The existence of the two child-groups breaches the balance between the allocated financial resources and educational resources. Although parental migration can bring higher economic returns to families, their children may not enjoy corresponding educational services because of Hukou restrictions or parental absence. Therefore, despite the factors discussed in the above sections, migrant and left-behind students face unique dilemmas, respectively.

Parental migration is an attempt to sacrifice a healthy family environment for improved economic resources, and exchange part of the marginal increase into educational resources for children (Ge et al., 2019). Based on the extent to which the migrant parents can, or are willing to, trade financial resources for educational resources, their children turn into migrant children and left-behind children. Previous studies have continuously investigated the trade-offs between parental absence and children's educational returns. This section summarises migrant and left-behind students' characteristics. Then, based on previous research on migrant and left-behind educational experience, this section discusses the difficulties of both student groups.

## Studies on Migrant Students

Migrant students are the children who migrate with their families to a new location for economic or other reasons (A. Chang, 2013; Mincer, 1978). In China's context, migrants are people living and working in a place without local Hukou. If they bring children, who are aged from 0-17 years, to migrate
with them, these children are so-called migrant children (Lu \& Zhou, 2013; UNICEF, 2017). Because of the Hukou system, migrant children have limited access to public education in migrant destinations. As a result, the dilemma faced by internal migrant students in China is more similar to undocumented international migrant students in western societies (Lu \& Zhou, 2013; Roberts, 1997). Based on a critical review of the relevant research, this section summarised the following unique academic challenges faced by migrant students.

First, Chinese internal migrant labours usually take heavy workloads occupations and live in crowded residences in migrant destinations without getting adequate payment (Wen \& Lin, 2012; Ye \& Lu, 2011). Such high-level exploitation of their labour may result in the relatively low SES of migrant families comparing to otherwise similar local families. Students from those low-income families rarely move to high-quality school districts, which lowers their academic expectation (Park \& Kyei, 2010; Wu \& Huang, 2017). Additionally, due to the economic restrictions, they are challenging to benefit from supplementary schools as their higher SES cohorts (Buchmann, Condron, \& Roscigno, 2010).

Second, migrant students in China communicate less with their parents, which negatively relates to their academic performance, social functioning and mental health (Wang \& Mesman, 2015). Migrant workers, especially those with less education, have to take labour-intensive and low-paying jobs. Socioeconomic stress prevents migrant parents from providing their children with direct help and emotional support after school (Wang \& Mesman, 2015).

Third, migrant students feel less school support in local schools (A. Chang, 2013; Lanfranchi, 2014; Mireles-Rios \& Romo, 2010; Wang \& Mesman, 2015). Previous research contended that school supports, including educational resources and perceived teachers' care, can improve migrant students' academic performance (Mireles-Rios \& Romo, 2010). In China, being easily identified as outsiders, because of the Hukou system, makes migrant students hard to blend in local schools. Therefore, social rejection is still there to potentially hurt migrant students' self-esteem, which may harm children's functioning in both school and society (Wang \& Mesman, 2015).

Fourth, comparing to long-stay families, for newly arrived migrant families it is more challenging to supply proper educational resources to their children because of the economy and social network deficits in migrant destinations (Dustmann, 1993; Lu, Ruan, \& Lai, 2013). Therefore, they lack the capacity to invest their children's education, which leads to lower academic returns from children (Glick \& Sahn, 2010). In China, the attendance to specific compulsory schools depends on whether the family residences are within corresponding districts. If migrant families arrive in destinations right before the time of school registration, they have little chance to enrol their children in high-quality schools than otherwise similar long-stay families.

Based on the unique migrant dilemmas, researchers have suggested that the school should increase communication between teachers and migrant parents. Proper interactions between migrant children and teachers should make children feel cared for, which would contribute to their educational success (Mireles-Rios \& Romo, 2010). Further, teachers and parents should help migrant students to understand their advantages and assist them in dealing with risk factors (Chang, 2013). Regarding policy tools, the scholars agreed that governments should re-estimate and suspend the current special education programs that segregate migrant students from locals (Hosp \& Reschly, 2003; Lanfranchi, 2014; Lu \& Zhou, 2013; Wang \& Mesman, 2015). For instance, migrant schools in China created segregation between migrant and local students. Students in such schools reported greater loneliness, which was harmful to their academic performance and psychological well-being (Lu \& Zhou, 2013). Meanwhile, some targeted treatments should be given to migrant students to help them better adapt to the new educational system. For example, in the case of Switzerland, Lanfranchi (2014) found that school psychologists can help to reduce in-school discrimination against migrant students and implement a more equitable education system. Through conducting a field trial study in German, Stanat and her colleagues indicated that after-school programs, like summer camps, can improve immigrant children's proficiency in the second language and have a long-term positive effect on their reading performance (Stanat, Becker, Baumert, Lüdtke, \& Eckhardt, 2012).

## Studies on Left-behind Students

Given the restrictions of temporary occupations and residential environment (Wen \& Lin, 2012; Ye \& Lu, 2011), many children are left-behind in original domiciles living with single-parents or other relatives (UNICEF, 2017). Such children at school age are so-called left-behind students. Although there is an increasing number of school-aged children migrating with parents, single person migration remains the primary pattern in China's internal migratory flow (Wen \& Lin, 2012).

The social phenomenon of left-behind students in China has been accompanying the massive movement of surplus labourers from less-developed areas to more-developed areas in the 1980s (Ye \& Lu, 2011). However, little scholarly attention has been focused on this student group until 2005. Existing studies investigated this phenomenon mainly through three paradigms: 1) the diagnostic approach, which focused on psychological and physical health of left-behind students; 2) the advanced diagnostic approach, which further considered the influence of more social factors on this subpopulation; 3) the sociologically oriented approach, which used a macro perspective to explore the orientation of leftbehind children (Ge et al., 2019). Based on the previous findings, this section concludes the unique academic dilemmas faced by left-behind students as follows:

The research concerning students' health conditions has summarised that left-behind students in China show higher-level social anxiety, more prevalent depression, lower self-esteem, and an elevated level of victimisation (Chen, Liang, \& Ostertag, 2017; Janson \& Fakulteten för hälsa, 2014; Tang et al., 2018). Such symptoms are attributed mainly to the effects of child-parent separation (Ge et al., 2019). Researchers also agreed that those psychological and physical problems faced by left-behind students are negatively associated with school performance (Davis et al., 2018; Sideridis, 2005; Wang \& Mesman, 2015).

The scholars focusing on left-behind students' daily lives, like Chang et al. (2011), contended that due to the migration of young household members, Chinese left-behind children have to undertake more domestic work. Thus, their study time has to be shrunk, which not only negatively affects left-behind
students' academic performance, but also increase their possibility of dropping out of school (H. Chang et al., 2011). Additionally, left-behind students suffer from little study tutoring and supervision because of parental absence and inability of surrogate caregivers, which also decrease their school functioning (Ye \& Lu, 2011).

Previous studies have also concluded that the magnitude of the left-behind effect depends on students' genders (H. Chang et al., 2011; Janson \& Fakulteten för hälsa, 2014; F. Zhao \& Yu, 2016). Through studying time use patterns of left-behind children, Chang et al. (2011) claimed that left-behind girls spend more time on domestic work than boys in the context of China. Moreover, girls suffer from higher levels of anxiety and other mental health problems than left-behind boys (Janson \& Fakulteten för hälsa, 2014; F. Zhao \& Yu, 2016). As such, left-behind girls tend to be in a more disadvantaged position in school work.

Although scholars put forward various solutions dealing with left-behind students' difficulties, none of them has solved these issues. For example, one of the core problems faced by left-behind children is that parents hardly create a stable family environment for their children because of the physical distance. New communication technologies seem to solve the separation problem by using mobile phones to reconnect migrant parents and left-behind children. However, part of left-behind children disagrees that those new-technologies facilitate a meaningful relationship with their mothers (Madianou \& Miller, 2011). The other core problem is that most migrant residences do not allow labours to migrate with children. Some scholars suggested that employers in migrant destinations should arrange suitable housing and educational resources to enable migrant parents to bring their children along (Janson \& Fakulteten för hälsa, 2014). Nevertheless, this solution is complicated to be adopted in China, considering the prohibitive cost added to employers.

## Limitations of Previous Research

The effects of the student and family level and school-level factors have been repeatedly observed in previous studies on students' academic success. However, it is still unclear whether the academic influencing factors shaping Chinese students' achievement in a similar way to the findings in prior studies conducted in western contexts; whether family-level factors play a more prominent role in affecting students' performance; and whether those effects are moderated by family migrant status. Pointedly, prior studies on the associations between background characteristics and school performance ignored the magnitude of different cultural contexts and social mobility mechanisms (Schneeweis, 2015; Sirin, 2005). Even fewer existing studies have compared migrant and left-behind children with their counterparts from regular families (Janson \& Fakulteten för hälsa, 2014). For example, focusing on factors affecting students' achievement, existing studies, including Luo and Zhang (2017), Mireles-Rios and Romo (2010), and Ledwith and Reilly (2013), did not detect the moderation effects of migrant status. As such, the current study will bridge the knowledge gap and supply reference for developing future policies.

Moreover, most of the prior studies on migrant status just focused on international migration rather than internal migration $(\mathrm{Lu}, 2012)$. This limitation is mainly attributed to the lack of data regarding Chinese students and their families. Wang and Mesman (2015), in their meta-analysis, indicated that some critical moderators, like SES, cannot be investigated in extant studies on Chinese migrant students due to the insufficient data. As a result, we have to generalise the conventional view that parental migration overall results in educational disadvantages of the children (Ge et al., 2019; Wang \& Mesman, 2015), without clearly understanding their specific characteristics altered by migrant behaviours in China.

Furthermore, few empirical studies, especially quantitative ones, have been conducted in the context of China through using a nationally representative database. This condition reduced the external validity of relevant studies. For example, Lu and Zhou (2013) just studied a sample of migrant students in Beijing. Wen and Lin (2012) investigated the development of left-behind children with the data only
collected in Hunan province. Therefore, it is mostly unknown to what extent the migrant status affects students' educational process in China.

Finally, suggestions based on prior findings lack applicability. For example, Janson and Fakulteten för hälsa (2014) put forward that the destination employers should supply qualified residence within school districts to migrant parents. Considering a large portion of migrant parents are not highlyeducated labourers, this solution will create an insufferable extra cost for employers that may force them to reject labourers without local Hukou. Some scholars focused on the schooling process instead and suggested that teachers should enable those students to feel supported in the school environment and learn their academic advantages as cultural brokers and bilingualism (A. Chang, 2013; Mireles-Rios \& Romo, 2010). However, application of such a policy will lead to the fact that migrant and left-behind students are separately treated at school, which has been proved to be harmful to students' development (Hosp \& Reschly, 2003; Lanfranchi, 2014; Lu \& Zhou, 2013; Wang \& Mesman, 2015). From the parental perspective, some migrant parents regard communication technologies as a solution to child-parent separation, which does not receive robust empirical support from the research on mobile phone parenting of Filipina migrant mothers (Madianou \& Miller, 2011).

China, as one of the countries experiencing massive internal migration, lacks systematic research on the educational process of students based on a nationally representative survey. As such, scholars and educators have to use the conclusion of prior studies based on western contexts and international immigrant students to depict a whole picture of the learning process of Chinese students. This situation impedes scholars to generate or test theoretical assumptions on the schooling of Chinese students. Further, it prevents the population from forming a proper social construction, which may negatively impact the design of an effective policy on those students. For example, it is still unclear to educators and parents whether the improved family capital is beneficial to children's school performance; whether the high-quality school resources have an advantage on students over the supportive family environment; whether the academic influencing factors work differently among students with different migrant status. Therefore, this dissertation examined the factors that influence students' academic
achievement, which is categorised into two levels, individual level (student and family level) and school level. This study aims to fill the gaps mentioned in this section and contribute to theories regarding school performance of Chinese students from different migrant groups. The findings also highlight implications for future directions of policies concerning different student groups in China.

## Chapter 3

## The Research Context in China

This chapter first introduces the context of the Chinese educational system. Then, it discusses policies regarding educational issues surrounding migrant and left-behind students. Finally, it summarises the research situation in China that serves as a foundation for the present study.

## The Chinese Educational System

Chinese compulsory education requires each school-aged child to receive nine years of schooling, which includes primary (Grade 1-6) and middle (Grade 7-9) school level. Currently, some provinces have extended compulsory education to 12 years. Public education at this stage has been entirely free since 2008. After accepting the statutory length of schooling, most of the middle school graduates choose to take high-school entrance examinations, which are developed and administrated by city-level governments under the guidance and requirements of the Chinese Ministry of Education. Relatively highperforming students tend to enrol in high schools (Grade 10-12) and prepare for college entrance examinations. Both entrance examinations are high-stakes tests in China, which means the test scores can determine students' enrolment in schools of the next level. By contrast, students with relatively low performance in either entrance examinations may choose to attend vocational education for specific training.

The Chinese educational system employs hierarchical administration on primary and secondary (middle and high) schools. County-level governments perform essential responsibilities, including certificating teachers and examining and supervising both private and public schools. The Law on Compulsory Education stipulates the principle of nearby enrolment for public primary and middle schools. Specifically, each county is divided into several districts. Only if a student's residential address
in Hukou is within the qualified district, he can enrol in the specific school. Generally, there is no way for students or parents to choose public schools in other districts. Given the decentralised fiscal system and restrictions on migration, unwealthy counties cannot afford to provide good services to the residents, and low-income households cannot afford the high private costs of improving public services that they currently enjoy (Dollar, 2007). This situation rises educational inequality and creates the schooling dilemma faced by low-SES, migrant, and left-behind students. As a result, the Chinese Central Government has implemented various policies in recent years to deal with those issues.

## Policies on Narrowing Educational Inequality

## Upgrading educational facilities in rural schools

Educational inequality exists between Chinese rural and urban areas, which is reflected in the fact that fewer rural students outperform their urban cohorts and get access to top-tier universities (Postiglione, Ailei, Jung, \& Yanbi, 2017). One reason is attributed to that rural parents may migrate solo for working opportunities, which directly reduced family support supplied to rural students comparing to otherwise similar urban students (Janson \& Fakulteten för hälsa, 2014; Wen \& Lin, 2012; G. Zhao, Ye, Li, \& Xue, 2017). The other reason is that human resources and educational facilities are generally in short among rural schools in China (Dollar, 2007). Students from high-income families may transfer to urban or suburban schools or use outside school educational resources to compensate for their disadvantages from studying in rural schools. However, their low-income cohorts hardly get those support from families.

For further promoting education equity, the General Office of the State Council of China published the Guidance on Strengthening the Construction of Small-scale Rural Schools and Township Boarding Schools in 2018. "Boarding school" is an educational institution where students can study and live either for part or the entire school year, which solves students' difficulties in transportation between
home and school (Ainsworth, 2013). According to this policy, the local governments should equip schools with proper and necessary educational facilities based on the national standards of constructing and running a school, which should allow students to board at school. The local governments are also required to improve rural infrastructure to guarantee students' traffic safety and a supportive school environment. Furthermore, local governments need to ensure rural schools having adequate supplies of teachers, improve teachers' treatment, and provide them with proper training.

With the implementation of this policy, a more balanced investment strategy should be employed across rural and urban regions, which may further benefit rural students' academic achievement. Additionally, boarding school can separate children from the unwanted influence of their sometimes disadvantaged home and community situations, which promote education equity in China. However, all those policy measures required improved investment from central and local governments. Although the central government supplies counterpart funding, given geographically unbalanced development in China, local governments cannot fill the rural-urban resource gap in a short time.

## Forbidding shadow education on enrichment purposes

In the last two decades, shadow education or supplementary tutoring has rapidly grown popular in China (Bray, 2013; G. Zhao, 2015). This situation triggers increasing public concerns about whether shadow education merely benefited advantaged children, and whether it imposed an intolerable academic and financial burden on students and their parents. Meanwhile, shadow education suppliers create anxiety among students and their parents by propagandising the importance and urgency of engaging in out-ofschool tutoring, which disturbs the order of school education (Dawson, 2010). Facing this condition, the State Council of China published the Opinions on Regulating Supplementary Schools (ORSS) in 2018, which prohibited shadow education for enrichment purposes.

This new policy defined shadow education as a supplement to formal education rather than enriching it. As a result, supplementary schools could not design curriculums that contained more
complicated or advanced contents than the knowledge taught in local schools. For its effective implementation, the new policy authorized local governments to establish the specific criteria based on the principles that 1) the curriculums of supplementary schools have to follow the guidance of the National Curriculum Standards; 2) supplementary schools should report and transparentize their curriculum outlines, enrolment targets, teaching schedule, and time of classes to local educational administration and the public, respectively; 3) supplementary schools cannot leave homework to students.

The ORSS is designed to relieve the burden and anxiety of Chinese students and their families through cooling down the keen competition on using private funding to derive out-of-school educational resources. From a positive perspective, this policy avoids discouraging students characterised with low family SES from attending school by increasing the importance of school resources. However, there have been few studies investigating the relationship between shadow education and student's school performance in China, which become an obstacle for evaluating the performance of this policy properly.

## Policies on Chinese Migrant Students

In China, the availability of public services in a particular region depends on the place registered by Hukou of the residents. Thus, the policy predicament related to "migrant student" always concerns who has jurisdiction over them, either the origin or the destination governments. Given this situation, framing the history of migrant education policies needs to answer two crucial questions. First, which level of government should be responsible for supplying compulsory public education to migrant students? Second, which level of government should pay for migrant students' education cost?

Based on the sequence of solving these problems, this study divides the history of migrant students' policy into four periods. During the first period from 1986 to 2000, the issues around migrant students began to appear in public discourse. Although the Central Government required destination governments to be responsible for supplying qualified migrant students with educational services, the specific policies implemented in this period discriminated against their civil rights. For example, the
definition of "qualified migrant students" was over strict, and the services supplied to "unqualified migrant students" were distinctly inferior to regular public education. Therefore, this period can be named as "refugee period".

During the second period, from 2001 to 2007, the educational policies from the Central Government granted migrant students the right of enjoying equal education as local students. However, it was a vague promise without necessary practical supports. Therefore, this period can be named as "guest period" because the "host" did not want to treat migrants as well as locals by paying the extra cost.

The third period is from 2008 to 2014. The policies designed in this period focused on clarifying the financial responsibilities belonging to destination governments. Whereas, destination governments negatively implemented those policies because they did not get any subsidies for extra educational cost on migrant students from the Central Government. Consequently, "migrant students" were only treated as "quasi-citizens" in migrant destinations.

Since 2015, the new published policies, during the fourth period, stipulated that the educational funds for students could migrate with them to destination regions, which addressed the financial worry of the destination government. Additionally, the segregation between migrant and local students was officially abolished. As a result, the identity of migrant students in the destination regions formally transited into "citizen" in the aspect of education.

## Policies on Chinese Left-behind Students

Left-behind students are not limited to rural children in China. Urban parents from cities in less developed provinces may also migrate to more developed areas for better job opportunities. If their jobs do not allow them to bring school-aged children to migrate together, such children become urban leftbehind students.

Although the emergence of this phenomenon accompanied the great migrant wave started in the 1980s, it did not draw enough attention from policy-makers until 2005. The lately arrived focus is
unsurprising because the rates of school attendance and completion of compulsory education among rural left-behind students are better than the other rural students (UNICEF, 2017). Moreover, the public thought the migration behaviour was based on personal choice (for better financial returns). Public resources should not supply additional supports for left-behind children. However, such an attitude neglects the economic contribution made by migrant labours and the unique difficulties faced by the children left behind, which includes increased psychological burdens and lacking academic support (Janson \& Fakulteten för hälsa, 2014; Wen \& Lin, 2012).

The transition of this attitude has experienced three phases: in the beginning (before 2009), the policy target, left-behind students, was only constructed as the cost of migrant decisions made by rational economic men. Then, from 2013 to 2015, the policy-makers realised that left-behind students should be categorised into a particular demographical group because they were facing unique and severe difficulties varied from otherwise similar children. Policies enacted in this phase assigned responsibilities respectively to local governments, schools, and the society, which directed against the specific issues faced by left-behind students. In the last phase started in 2016, left-behind students were constructed as the byproduct of current economic development mode that needed to be improved. The Central Government began to deal with this problem from a macro perspective through enhancing the economic development in the primary migrant origins.

## The Research Situation in China

The policies discussed above seem to put low-SES, migrant, and left-behind students behind the same starting line. However, few studies have provided a systematic investigation of their academic performance. In China, empirical research on students and schools is not a new topic. However, among about 3000 published academic papers detected on the China National Knowledge Infrastructure (CNKI)
by using＂middle school＂${ }^{1}$ and＂academic performance＂＂as keywords，only 20 of them investigated specific academic influencing factors with the nationally representative data．This contrast is attributed to two primary reasons：1）both examination scores and school information of students are confidential to researchers；2）few databases containing students＇test scores have been published for academic analysis． Therefore，the effect size of students＇background characteristics on academic performance is still vague in the context of China．

Although left－behind students have received less attention from policy－makers than migrant students，they have aroused more academic interests of scholars．By respectively using＂left－behind children＂and＂migrant children＂as the keywords，roughly 400 studies concerned educational issues of left－behind children，and about 200 published papers focused on migrant students＇educational problems． Most of them employed qualitative methods or analysed regional data．Only 5 of them used national data to examine the educational conditions and returns of students with specific migrant status in China．None of them systematically investigates the academic influencing factors and the consistency of the academic effects among students from different migrant groups．As such，an empirical，mainly quantitative，study based on a nationally representative database is not only crucial to academia concerning Chinese education issues but also helpful to supply a reference to policymakers．

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## Chapter 4

## Research Method and Design

This dissertation investigates a large dataset from the China Education Panel Survey (CEPS) by employing descriptive and regression analysis. This chapter begins with an overview of the data and the sample used in the analytic process. Then, the next section discusses the specific measures of the variables of interest. This section describes and explains the criteria of variable selection and the method adopted to generate index variables from a large set of measured variables. The last section introduces and explains the analytical strategy and models of the current dissertation, which helps answer the research questions and supply empirical evidence to the new conceptual framework. I used OLS (Ordinary Least Squares) models with and without a school fixed-effect variable to figure out the relative importance of school versus family effects on students' school achievement. Following that, I employed HLM (Hierarchical Linear Modeling) models to investigate the academic influencing factors and the moderation effect of migrant status.

## Data and Analytical Sample

The data used in this study are the China Education Panel Survey (CEPS) administered by the National Survey Research Center at Renmin University of China (NSCR). This database is designed to investigate the influence of family, school, and community on individuals' educational outcomes. The CEPS chose 2013-2014 academic year as the baseline to examine two middle school students' groups, which are 7th grade and 9th grade. This survey adopted a three-stage sampling method. The first stage used stratified sampling by considering variables of the regional average educational level and the ratio of migration to the local population to sample 28 county-level units
throughout China as Primary Sampling Unit (PSU). Then, in the second stage, four schools possessing 7th and 9th grade were sampled from PSU as Secondary Sampling Unit (SSU). In the third stage, two classes for each grade were sampled from SSU as Third Sampling Unit (TSU). All students, parents, teachers, class advisors, and school administrators in TSU commonly constructed the basic units of this database.

As China is a vast country with imbalanced development, both outmigrant and immigrant areas possess sizeable portions of within-group variance. Therefore, the sampling frame for PSU was divided into three sections: The first section included 2,870 counties in China except for Shanghai, and 15 counties were sampled in this frame. The second section was 18 counties of Shanghai, where a large number of migrants concentrate for better economic resources, and three counties were sampled there. At last, 120 counties with the most substantial number of migrants throughout China composed the third section. In this section, ten counties were sampled as supplement samples. The measurement tools in this survey consisted of the student questionnaire, parent questionnaire, class advisor questionnaire, teacher questionnaire, school administrator questionnaire, and cognitive skill scale.

Currently, the available data were collected during the 2013-2014 (baseline) and 2014-2015 (follow-up) academic year. Considering the follow-up dataset have not published the complete dataset, this study mainly used the baseline dataset for analysis. The analytic sample of this study consisted of $9,1167^{\text {th }}$-grade students and $7,8999^{\text {th }}$-grade students. Given part of the sample missed values in some variables, this dissertation employed pairwise deletion of missing data while analysing corresponding models. Additionally, considering the school factor, namely "total number of teachers", could not change rapidly within one year, I used the follow-up dataset to supplement missing values of this variable.

## Measures

## Dependent variables

The CEPS supply students' mid-term examination scores for each observation. As China employs a centralized educational system, the content of each curriculum is guided by the National Curriculum Standards of Compulsory Education. It regulates the knowledge and skills a student should acquire from Grade 1 to Grade 9 . Thus, the difficulty level of tests in the stage of compulsory education in China should be similar in different provinces, which means students' academic achievement can be comparable in this database. This dissertation used Math, Chinese reading, and English reading test scores recorded in the CEPS to represent students' academic achievement, the outcome variables.

Considering that some schools designed the full marks to be 120 or 150 points, I converted the test scores of those schools based on the hundred mark system. For example, the highest $7^{\text {th }}$ grade mathematics test score of School A is 147 points in the raw data. After conversion, the highest score in School A should be 98 points.

## Independent variables

The independent variables included predictors from student (personal and family) level and school level. Given some of the variables were not measured directly, I performed Principal Component Analysis (PCA) on the correlation matrix to investigate the component relationships. I only keep the principal components with eigenvalue over 1 . The values of all variables created by PCA increase with their components. Table 4-1 presents all the predictors used in this dissertation. Some of the particular interests are explicitly introduced as follows:

Socioeconomic Status-The existent studies created SES indicators based on Duncan's
"Trinity Model" through compositing parental or family highest education level, occupation and income (Batterjee, 2013, 2017; Marks, 2017; Milne \& Plourde, 2006; Trask-Tate \& Cunningham, 2010; Walpole, 2003). The variable of SES created in this dissertation also followed this model. In the CEPS, students rated their family economic status. Parents reported their education levels and occupations. For making family economic conditions comparable, I added auxiliary indicators into PCA on SES, including the type of housing, having tap water at home, having a separate toilet, and the type of toilet, which were also reported by students. I accumulated students' home possessions (dichotomous variables) and standardised the values. Moreover, I constructed the scales of parental education and occupation levels according to "International Standard Classification of Education 1997" ${ }^{1}$ and "International Standardized Classification of Occupations 2008" ${ }^{2}$, respectively. Then, I used PCA to reduce these components to just one variable representing family socioeconomic status.

In the new variable, the range of value is from -4.39 to 4.90 . The lowest family SES means that the highest degree achieved in this family is primary school diploma. The economic status of this family is in the lowest rank. The family's residence is not a separate apartment, which has none of flashing toilet, separate toilet, or tap water. The highest value indicates that a family's socioeconomic condition is on the other extreme.

Cultural Capital-Many previous studies have measured students' cultural capital by self-reported involvement in art, music, and literature (Aschaffenburg \& Maas, 1997; DiMaggio,
${ }^{1}$ After recoded, " 1 " is for primary education; " 2 " is for lower secondary education; " 3 " is for upper secondary education; " 4 " is for post-secondary non-tertiary education; " 5 " is for the first stage of tertiary education; " 6 " is for the second stage of tertiary education.
${ }^{2}$ After recoded, " 1 " is for armed forces occupations and unoccupied labours; " 2 " is for selfemployed workers, trade workers, and skilled workers; " 3 " is for technicians and associate professionals; " 4 " is for professionals; " 5 " is for managers.

1982; van Hek \& Kraaykamp, 2013; Wildhagen, 2009). Lareau et al. (2003) pointed out this index should also include indicators of reading habits and educational resources at home (Andersen \& Jæger, 2015; Covay \& Carbonaro, 2010; Jæger, 2011). This dissertation created the variable of cultural capital based on Lareau's theory. In the CEPS, students rated how frequently they participated in highbrow cultural activities with parents and how much they agreed with the description of the quantities of books in their homes by 5-point Likert scales. " 1 " indicates "never" and "strongly disagree that you have many books at home". By contrast, " 5 " means "very frequent" and "strongly agree that you have many books at home". The high-brow cultural activities in this dataset include reading with parents, doing sports, watching games and shows, and visit museums and zoos. Through PCA, cultural capital generated in this study reflected parental efforts in cultivating children's cultural tastes that had a weak direct relationship with students' schooling. The lowest value of cultural capital suggests that a student has never done any high-brow cultural activities with his parents and his family only has very few books at home.

Boarding Status-The CEPS collected students' information about whether they were boarding on campus during weekdays. Based on their answers, I generated a dichotomous variable of boarding status. The value of boarding status was " 1 " when the students claimed that they resided on campus at schooldays. The value was equal to " 0 " if students claimed that they commuted between school and home on school days.

Negative Experiences of Schooling-Students reported how they would agree that the teachers frequently criticized them and informed parents concerning their poor performance at school. They also answered whether they played truant and was late for school always. Based on the above indicators, I created a new variable by PCA to represent students' Negative Experiences of Schooling.

Parenting Practices-Parenting practices include parental control on students' daily and school lives, parental expectations, and parent-child communication. The various parenting practice may turn into motivation or pressure of children, which affect their performance at school.

Therefore, I, respectively, created those variables by PCA. The details are shown in Table 1. Moreover, I employed the criterion designed by International Standard Classification of Education 1997 (ISCED-97) to generated a variable categorizing parental educational expectations on their children.

Migrant Status-Students reported their migrant status and conditions of parental absence. If the Hukou address of a student differed from his local residence, he was defined as a migrant student in this study. If a student claimed that he was a local student but lived with no parent, he was defined as a left-behind student in the current research. Finally, a student who was neither a migrant nor a left-behind student was categorised into regular students in the current study.

Residential Length-Students also reported their age when they arrived in the current locations. Based on students' migration age, I measured whether the students arrived in the current districts before entering middle school. I controlled this variable when estimating the association between the migrant status and students' academic achievement. Because, if a student arrived in current residence after 11 years old, his parents would only have several months (<9) to find an acceptable school for him and handle the complicated procedures for schooling as a migrant student. Thus, this school might not match his family socioeconomic position. Controlling this variable allows the models to isolate the unique effects of accumulated social capital brought by early migration.

Middle-Class Neighborhood-Students' guardians reported the occupations of the people living in the same community as them. Based on their answers, I generated a dichotomous variable to indicate whether the neighbours belong to the middle class or above. This variable was equal to " 1 " if most of their neighbour were occupied in the jobs that supplied decent economic and social returns, like professors, doctors, senior executives in enterprises, and governmental officials. The value of " 0 " indicated that their neighbours belonged to working-class.

School Educational Infrastructures-Cohen et al. (2009) asserted that school resources, including adequate space and materials, reflect school-level SES. Only with enough financial
capacity, a school is able to invest in infrastructures that provide a more comfortable and helpful environment for teachers and students. I used the index of educational infrastructures to represent school resources by analysing the indicators of organizational resources supplied in this database. The specific contents are shown in Table 1. All the indicators used to generate these variables were dichotomous variables.

School Human Resources-As an educational institution, human resources are critical to a school for fulfilling its function for the reason that it is closely related to the instruction quality. Thus, this study used the Ratio of Senior Teachers to indicate human resources of a school. The school-level variables supplied by the CEPS includes the total number of teachers, the total number of male teachers, and the total number of teachers achieved a senior professional level. In the baseline dataset, a school reported that the total of male teachers was larger than of all teachers. Therefore, I used the value this school reported in follow-up dataset to substitute.

Both the total numbers of teachers and senior teachers cannot represent school human capital independently. On the one hand, the Chinese government has merged scattered rural primary and middles schools into centre schools to concentrate rural educational resources since 2001. It is reasonable to assume that rural centre schools have relatively large numbers of teachers. However, not all of the teachers are high-quality. On the other hand, the number of senior teachers is possibly higher in a larger school. Whereas, it does not mean the average teacher quality is also high in this school. As a result, I generated the Ratio of Senior Teachers at school to represent school human capital.

Classrooms Supplied for Study After School-Through attending organised "self-study" after school, students can get access to extra tutoring on studies and more consistent study time, which benefits their academic achievement (Seo, 2018). In the CEPS dataset, school administrators were asked whether their schools supplied classrooms for studying after school. Almost everyone answered this question. However, half of the observations lost in the question "whether your school organized self-study after school?" It is possibly due to the policy restriction that schools cannot
require students to participate in "self-study" after school. Thus, those respondents rejected to answer this question. Considering Chinese schools are responsible for accidents that happened to students at school, the administrators would not supply classrooms for students' self-study without arranging teachers to tutor and administrate them. I employed Classrooms Supplied for Study After School to indicate whether a school organized "self-study".

Table 4-1: Independent variables of student personal, family, and school characteristics

| Variable | Description | Source |
| :---: | :---: | :---: |
| Personal and Family Level |  |  |
| SES | An index generated by PCA indicating family socioeconomic status. | PCA components: <br> - Family economic status <br> - Highest education <br> - Highest occupation <br> - Home possessions |
| Cultural Capital | An index generated by PCA indicating participation in high-brow cultural activities. | PCA components: <br> - Doing reading with parents <br> - Doing sports with parents <br> - Visiting cultural/scientific facilities with parents <br> - Watching movies/shows/ games with parents |
| Living with Both Parents | Showing whether the student lives with both parents. | Directly drawn from CEPS |
| Having Sibling(s) | Showing whether the student has at least one sibling. | Directly drawn from CEPS |
| Negative Experiences of Schooling | An index indicating whether the student is frustrated at school and | PCA components: <br> - Criticized by teachers <br> - Informing parents about |

choose negative responses to schooling.
poor performance at school

- Playing truant
- Being late for school

Showing whether the student is

Student Educational Expectations
Attitudes on
Learning

Friends at School

Communication with Mothers

Parental Control on Studying
boarding at school at weekdays.

Indicating students' internal motivation in studying (5 levels).
\# of friends the student having at school. This indicator reflects the student's social network at school.

An index generated by PCA measuring the frequency and quality of parent-child communication.

An index indicating the strictness of parental control on the student's school activities.

Directly drawn from CEPS

Recategorized based on ISCED-97

Directly drawn from CEPS

Directly drawn from CEPS

PCA components:

- Affairs at school
- Relationship with friends
- Relationship with teachers
- Discussing my mood
- Discussing my worries

PCA components:

- Homework
- Performance at school
- Time for heading to school
- Time for returning home

|  |  | PCA components: |
| :--- | :--- | :--- |
| Parental Control on | An index indicating the strictness of | - Friends |
| Daily Life | parental control on the student's <br> daily life. | - Dressing |
|  |  | - Time for the internet |
|  | - Time for watching TV |  |

Parental Educational
Expectations

Indicating the educational level that parents want their children to achieve.

Recategorized based on
ISCED-97

Directly drawn from CEPS occupations.

Directly drawn from CEPS old.

Gender (1=Male) Showing the gender of the student. Directly drawn from CEPS

Health Condition
Demonstrating the health condition of the student.

| School Level |  |  |
| :--- | :--- | :--- |
| School Location | Indicating whether the school is <br> located in an urban or suburban area. | Directly drawn from CEPS |

Academic
Infrastructure

An index measuring the educational resources in the school.

PCA components:

- Lab
- Computer lab
- Library
- Music classroom
- Activity room
- Psychological consultation room
$\left.\begin{array}{lll}\text { Ratio of Senior } \\ \text { Teachers }\end{array} \quad \begin{array}{l}\text { Indicating the human resources in } \\ \text { the school. }\end{array} \quad \begin{array}{l}\text { Generated by the function: } \\ \text { \# of senior teachers / \# of } \\ \text { teachers }\end{array}\right\}$


## Analytical Strategy and Models

According to the theory of Heyneman \& Loxley, family characteristics should play a relatively more important role in estimating students' academic performance in developed countries. Further, Chudgar and Luschei (2009) pointed out that the relative importance of school versus home for students' academic achievement may vary depending on the country's inequality level. Given the large size of labour migration influence the inequality condition in China, this dissertation first investigated what the relative sizes of school versus family effects were in China.

This study employed two steps to compare the relevant academic effects of family background and school quality. First, it investigated how much the variance of students' academic
performance was attributable to variation in students' family characteristics in China. Second, this study constructed a model to analyse how much the variance could be explained by both family and school characteristics. The second model included a separate variable indicating school fixed effects rather than incorporated predictors representing school characteristics to investigate the change in adjusted R $^{2}$. The same kind of estimation models reported by Heyneman and Loxley (1983), Baker et al. (2002), and Chudgar and Luschei (2009) are constructed as follows:

$$
\begin{gather*}
A C_{i}=\partial_{0}+\partial_{1} \text { Family }_{i}+\partial_{2} \text { Student }_{i}+\mathrm{e}_{i}  \tag{1}\\
A C_{i}=\partial_{0}+\partial_{1} \text { Family }_{i}++\partial_{2} \text { Student }_{i}+u_{i}+\mathrm{e}_{i} \tag{2}
\end{gather*}
$$

where $A C_{i}$ indicates the academic achievement of student i. Family ${ }_{i}$ is a vector of variables representing students' family characteristics. $u_{i}$ denotes the school fixed effects that are independent across individuals. Additionally, student gender and age are controlled in both equations, which is Student ${ }_{i}$.

The adjusted $\mathrm{R}^{2}$ of Model (1) is the variance explained by family characteristics. The differences between the adjusted $\mathrm{R}^{2}$ of $\operatorname{Model}$ (2) and (1) are the variance attributable to observed and unobserved school characteristics. Then, the comparison between the estimates of the variance in academic achievement as $\left(R_{2}^{2}-R_{1}^{2}\right) / R_{2}^{2}$ provides the relative importance of family versus school in China.

Then, this dissertation used descriptive statistics to investigate whether students' academic achievement and background characteristics varied among different migrant groups, including migrant, left-behind and local students. One-way ANOVA and Tukey's HSD were employed to compare the variable means among three student groups.

Further, the current study examined to what extent the individual- and school-level factors affected students' academic performance. Two-level HLM models were designed in this study to answer this question. The Level 1 model, which is the individual level (including student and family factors), is:

$$
\begin{equation*}
\text { Level 1: } A C_{i k}=\beta_{0 k}+\beta_{1 k} \text { Individual }_{i k}+\beta_{2 k} \text { Migrant }_{i k}+\beta_{3 k} C O_{i k}+e_{i k} \tag{3}
\end{equation*}
$$

where $A C_{i k}$ indicates the academic achievement of student i at school k . Individual ${ }_{i k}$ is a vector of variables indicating student and family characteristics, including SES, cultural capital, parenting practices, etc. of student i at school k . Furthermore, Migrant $_{i k}$ is categorical variable indicating students' migrant status, including regular, migrant, and left-behind. Considering the variance among demographic characteristics, a vector of observable variables $\mathrm{CO}_{i k}$, including gender, health conditions, migrant length, the region of current residence, etc., is controlled in this model. Finally, $\mathrm{e}_{i k}$ is the error term of the Level 1 model.

Owing to the school-level factors do not directly affect student and family factors, the varying-intercept model of Level 2 is:

$$
\begin{equation*}
\text { Level 2: } \beta_{0 j \mathrm{k}}=\gamma_{00 \mathrm{k}}+\gamma_{01 \mathrm{k}} \text { School }_{k}+\mathrm{u}_{0 \mathrm{k}} \tag{4}
\end{equation*}
$$

where $\mathrm{School}_{k}$ is a vector of variables consisting of school infrastructures and teacher quantity and quality at school k . The independent error term at Level 2 is $\mathrm{u}_{0 \mathrm{k}}$.

In sum, the full estimation equation of the hierarchical model can be written as:

$$
\begin{gather*}
A C_{i k}=\gamma_{00}+\gamma_{01} \text { School }_{k}+\beta_{1 \mathrm{k}} \text { Individual }_{i k}+\beta_{2} \text { Migrant }_{i k} \\
+\beta_{3 \mathrm{k}} \mathrm{CO}_{i k}+\mathrm{e}_{i k}+\mathrm{u}_{0 \mathrm{k}} \tag{5}
\end{gather*}
$$

Given the internal migration in China complicates family characteristics and the availability of educational resources for students, the general picture depicted by the two-level HLM models may neglect the variation among different migrant groups. Therefore, the following question is: whether and to what extent migrant status moderates the effects of family and school factors on academic performance? For answering this question, the two-level HLM models with interaction terms between migrant status (migrant and left-behind) and significant factors were estimated as follows:

$$
\begin{gather*}
A C_{i k}=\gamma_{00}+\gamma_{01} \text { School }_{k}+\beta_{1 \mathrm{k}} \text { Individual }_{i k}+\beta_{2} \text { Migrant }_{i k} \\
+\beta_{3 \mathrm{k}} \mathrm{CO}_{i k}+\beta_{4 \mathrm{k}} \text { Inter }_{i k}+\mathrm{e}_{i k}+\mathrm{u}_{0 \mathrm{k}} \tag{6}
\end{gather*}
$$

In the equation above, Inter $_{i k}$ indicates interaction terms of student i at school k . Interaction terms in this model allow for examining whether the effect of the significant factors on students' academic achievement depends on migrant status.

## Chapter 5

## Results

This chapter first briefly describes the characteristics of the analytic sample. Then, it digs into the relative importance of family versus school factors to students' academic achievement. Further, this chapter compares the student-level (personal and family level) and school-level characteristics of students from different demographical groups. Finally, it presents the estimated effects of those factors and interaction terms on Chinese students' academic achievement, respectively.

## Descriptive Statistics of The Analytic Sample

Table 5-1 and Table 5-2 display descriptive statistics of the variables used in this study. Migrant students consisted of $21 \%$ and $15 \%$ of the full sample of students in Grade $7(\mathrm{~N}=10,278)$ and Grade $9(\mathrm{~N}=9,206)$, respectively. Left-behind students accounted for $10 \%$ and $9 \%$ of the analytic sample in the two grades. Concerning student characteristics, around $20 \%$ of regular and migrant students attended mathematics and English tutoring after school, while only about $10 \%$ of left-behind students used such kinds of supplementary education. More than $80 \%$ of regular and migrant students lived with both parents. Over half of the left-behind students were boarding students. Meanwhile, only around $16 \%$ and $22 \%$ of migrant students from $7^{\text {th }}$ - and $9^{\text {th }}$-grade chose to board on campus. Both students and their parents expected them to accept higher education on average. Comparing to the two migrant groups, regular students' parents tended to adopt stricter parenting style and communicate more frequently with them. Among migrant students, $79 \%$ in $7^{\text {th }}$ grade and $73 \%$ in the $9^{\text {th }}$ grade resided in the current location before they went to middle school, while the corresponding percentages for regular students and left-behind students were over $90 \%$
and $85 \%$ in both grades. Such proportions are similar in the analytic sample. The differences between the two samples are less than $1 \%$.

Regarding school characteristics, about 50\% of regular and migrant students from both grades were schooling in urban areas. By contrast, approximately $35 \%$ of left-behind students studied in urban schools. In the schools attended by regular and migrant students, senior teachers accounted for $20 \%$ of the school faculty, while this number for the left-behind students was about $16 \%$. Notably, more than $86 \%$ of the schools attended by left-behind students organised "selfstudy" after school. Whereas, this proportion for the schools of regular students was around $57 \%$ and migrant students were only less than $40 \%$. The school characteristics in the full sample are also similar to those in the analytic sample. In addition to the variables discussed, the comparison between descriptive statistics of the full sample and of the analytic sample suggests that the missing values do not change the data pattern at both the student and family level and the school level.

In case there is multicollinearity problem among predictor variables, I calculated the correlation matrix of all variables, which is shown in the Appendix, and the variance inflation factor (VIF). According to the results, the mean VIF for each model is less than 1.37. Family SES has the maximum VIF value that is 1.96 when it was included in the model for estimating $9^{\text {th }}$-grade students mathematics test scores. Those findings suggest that the predictors used in this study do not have multicollinearity problems.

Table 5-1: Descriptive Statistics of Multi-level Characteristics (Grade 7)

| Full Sample |  |  |  |  |  |  |  |  |  | Analytic Sample |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Regular Students |  |  | Migrant Students |  |  | Left-behind Students |  |  | Regular Students |  |  | Migrant Students |  |  | Left-behind Students |  |  |
| Variable Name | Mean | SD | N | Mean | SD | N | Mean | SD | N | Mean | SD | N | Mean | SD | N | Mean | SD | N |
| Individual Level |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Math | 68.2 | 24.11 | 7004 | 67.8 | 22.85 | 2063 | 61.52 | 24.71 | 987 | 69.13 | 23.4 | 4787 | 70.88 | 21.64 | 1360 | 62.54 | 24.14 | 636 |
| Chinese | 71.82 | 14.07 | 7008 | 70.62 | 14.4 | 2064 | 69.78 | 14.99 | 986 | 72.84 | 12.88 | 4789 | 73.02 | 12.81 | 1360 | 70.76 | 14.27 | 636 |
| English | 73.18 | 21.49 | 7014 | 70.43 | 20.6 | 2059 | 67.47 | 21.88 | 987 | 74.34 | 20.56 | 4793 | 73.36 | 18.52 | 1359 | 68.48 | 21.62 | 636 |
| SES | 0.104 | 1.498 | 6276 | 0.168 | 1.263 | 1804 | -0.671 | 1.279 | 841 | 0.101 | 1.493 | 4865 | 0.214 | 1.289 | 1400 | -0.648 | 1.273 | 650 |
| Cultural Capital | 0.323 | 1.705 | 6886 | 0.322 | 1.715 | 2064 | -0.801 | 1.46 | 973 | 0.355 | 1.697 | 4865 | 0.469 | 1.718 | 1400 | -0.809 | 1.418 | 650 |
| Living with Both Parents | 0.843 | 0.363 | 7145 | 0.833 | 0.373 | 2120 | 0 | 0 | 1013 | 0.844 | 0.363 | 4865 | 0.839 | 0.368 | 1400 | 0 | 0 | 650 |
| Student Educational Expectations | 4.719 | 1.395 | 7145 | 4.578 | 1.428 | 2120 | 4.416 | 1.518 | 1013 | 4.808 | 1.328 | 4865 | 4.724 | 1.356 | 1400 | 4.483 | 1.511 | 650 |
| Attitudes on Learning | 3.344 | 0.97 | 6974 | 3.318 | 0.969 | 2049 | 3.263 | 0.93 | 977 | 3.376 | 0.968 | 4865 | 3.386 | 0.951 | 1400 | 3.286 | 0.93 | 650 |
| Having a Sibling | 0.518 | 0.5 | 7145 | 0.651 | 0.477 | 2120 | 0.77 | 0.421 | 1013 | 0.506 | 0.5 | 4865 | 0.651 | 0.477 | 1400 | 0.766 | 0.424 | 650 |
| Negative Experiences of Schooling | -0.061 | 1.432 | 7033 | -0.107 | 1.344 | 2089 | 0.086 | 1.603 | 984 | -0.125 | 1.351 | 4865 | -0.169 | 1.264 | 1400 | 0.031 | 1.533 | 650 |
| Boarding Status | 0.319 | 0.466 | 7145 | 0.161 | 0.367 | 2120 | 0.558 | 0.497 | 1013 | 0.308 | 0.462 | 4865 | 0.171 | 0.377 | 1400 | 0.554 | 0.497 | 650 |
| Friends at School | 4.05 | 1.509 | 7145 | 3.829 | 1.635 | 2120 | 3.996 | 1.561 | 1013 | 4.101 | 1.455 | 4865 | 3.886 | 1.597 | 1400 | 4.108 | 1.467 | 650 |


| Math Tutoring | 0.187 | 0.390 | 7096 | 0.216 | 0.412 | 2107 | 0.113 | 0.317 | 1005 | 0.188 | 0.39 | 4846 | 0.209 | 0.407 | 1391 | 0.119 | 0.324 | 648 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Chinese Tutoring | 0.124 | 0.330 | 7096 | 0.129 | 0.335 | 2107 | 0.082 | 0.274 | 1005 | 0.116 | 0.32 | 4846 | 0.118 | 0.323 | 1391 | 0.083 | 0.277 | 648 |
| English Tutoring | 0.258 | 0.438 | 7096 | 0.238 | 0.426 | 2107 | 0.132 | 0.339 | 1005 | 0.26 | 0.439 | 4846 | 0.245 | 0.43 | 1391 | 0.13 | 0.336 | 648 |
| Communication with Mother | 0.167 | 1.691 | 6868 | -0.062 | 1.772 | 2045 | -0.4 | 1.683 | 933 | 0.2 | 1.672 | 4865 | 0.050 | 1.777 | 1400 | -0.341 | 1.671 | 650 |
| Parental Control over School Life | 0.135 | 1.411 | 7048 | 0.079 | 1.424 | 2090 | -0.111 | 1.535 | 979 | 0.136 | 1.388 | 4865 | 0.085 | 1.422 | 1400 | -0.153 | 1.526 | 650 |
| Parental Control over Daily Life | 0.142 | 1.407 | 6983 | 0.102 | 1.424 | 2088 | -0.029 | 1.439 | 969 | 0.145 | 1.39 | 4865 | 0.129 | 1.384 | 1400 | -0.022 | 1.443 | 650 |
| Parental Expectations | 4.938 | 1.235 | 7145 | 4.795 | 1.312 | 2120 | 4.68 | 1.38 | 1013 | 5.061 | 1.081 | 4865 | 4.982 | 1.127 | 1400 | 4.874 | 1.208 | 650 |
| Middle-class Neighborhood | 0.190 | 0.392 | 6895 | 0.152 | 0.360 | 2020 | 0.101 | 0.302 | 968 | 0.188 | 0.39 | 4865 | 0.161 | 0.368 | 1400 | 0.106 | 0.308 | 650 |
| Migrate before Middle School | 0.919 | 0.273 | 7145 | 0.79 | 0.407 | 2120 | 0.848 | 0.359 | 1013 | 0.928 | 0.258 | 4865 | 0.805 | 0.396 | 1400 | 0.852 | 0.355 | 650 |
| Gender | 0.525 | 0.499 | 7145 | 0.542 | 0.498 | 2120 | 0.524 | 0.5 | 1013 | 0.513 | 0.5 | 4865 | 0.516 | 0.5 | 1400 | 0.518 | 0.5 | 650 |
| Health Condition | 4.103 | 0.902 | 7057 | 4.143 | 0.889 | 2102 | 3.934 | 0.918 | 1004 | 4.125 | 0.892 | 4865 | 4.161 | 0.878 | 1400 | 3.969 | 0.9 | 650 |


| School Level |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Urban located School | 0.54 | 0.498 | 7145 | 0.498 | 0.5 | 2120 | 0.383 | 0.486 | 1013 | 0.564 | 0.496 | 4865 | 0.536 | 0.499 | 1400 | 0.368 | 0.483 | 650 |
| Academic Infrastructure | -0.002 | 1.849 | 6640 | 0.344 | 1.951 | 2026 | -0.663 | 1.787 | 977 | 0.099 | 1.806 | 4865 | 0.585 | 1.675 | 1400 | -0.595 | 1.808 | 650 |
| Ratio of Senior Teachers | 0.202 | 0.142 | 6868 | 0.207 | 0.157 | 1923 | 0.161 | 0.118 | 996 | 0.212 | 0.148 | 4865 | 0.213 | 0.165 | 1400 | 0.167 | 0.127 | 650 |


| School Disciplinary | 0.004 | 1.685 | 6888 | -0.222 | 1.338 | 2043 | 0.447 | 2.203 | 989 | -0.009 | 1.688 | 4865 | -0.212 | 1.393 | 1400 | 0.335 | 2.122 | 650 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| Self-study after | 0.565 | 0.496 | 7053 | 0.329 | 0.47 | 2120 | 0.861 | 0.346 | 1006 | 0.535 | 0.499 | 4865 | 0.3 | 0.458 | 1400 | 0.852 | 0.355 | 650 |
| School |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Table 5-2: Descriptive Statistics of Multi-level Characteristics (Grade 9)

| Full Sample |  |  |  |  |  |  |  |  |  | Analytic Sample |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Regular Students |  |  | Migrant Students |  |  | Left-behind Students |  |  | Regular Students |  |  | Migrant Students |  |  | Left-behind Students |  |  |
| Variable Name | Mean | SD | N | Mean | SD | N | Mean | SD | N | Mean | SD | N | Mean | SD | N | Mean | SD | N |
| Individual Level |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Math | 62.51 | 24.77 | 6820 | 61.92 | 23.07 | 1321 | 58.62 | 25.37 | 792 | 63.14 | 24.22 | 4927 | 63.97 | 23.12 | 854 | 60.58 | 24.97 | 571 |
| Chinese | 69.95 | 14.28 | 6826 | 70.94 | 13.93 | 1320 | 68.74 | 13.49 | 794 | 70.39 | 13.35 | 4930 | 71.94 | 12.78 | 853 | 69.53 | 13.04 | 572 |
| English | 59.63 | 22.71 | 6821 | 60.13 | 21.02 | 1319 | 56.44 | 21.22 | 793 | 60.18 | 22.39 | 4923 | 61.38 | 21.25 | 851 | 57.28 | 21.23 | 571 |
| SES | 0.010 | 1.462 | 6149 | 0.027 | 1.231 | 1137 | -0.7 | 1.197 | 684 | -0.012 | 1.466 | 5043 | 0.055 | 1.279 | 891 | -0.711 | 1.196 | 594 |
| Cultural Capital | -0.153 | 1.597 | 6816 | -0.132 | 1.573 | 1341 | -1.107 | 1.318 | 801 | -0.178 | 1.571 | 5043 | -0.106 | 1.523 | 891 | -1.16 | 1.269 | 594 |
| Living with Both Parents | 0.855 | 0.352 | 7004 | 0.847 | 0.36 | 1379 | 0 | 0 | 823 | 0.858 | 0.349 | 5043 | 0.855 | 0.352 | 891 | 0 | 0 | 594 |
| Student Educational Expectations | 4.51 | 1.416 | 7004 | 4.415 | 1.454 | 1379 | 4.412 | 1.38 | 823 | 4.542 | 1.377 | 5043 | 4.541 | 1.375 | 891 | 4.532 | 1.339 | 594 |
| Attitudes on Learning | 3.306 | 0.968 | 6667 | 3.296 | 0.942 | 1281 | 3.236 | 0.884 | 787 | 3.322 | 0.969 | 5043 | 3.334 | 0.935 | 891 | 3.273 | 0.855 | 594 |
| Having a Sibling | 0.515 | 0.5 | 7004 | 0.664 | 0.472 | 1379 | 0.775 | 0.418 | 823 | 0.514 | 0.5 | 5043 | 0.658 | 0.475 | 891 | 0.79 | 0.408 | 594 |
| Negative Experiences of Schooling | 0.068 | 1.469 | 6911 | -0.016 | 1.433 | 1353 | 0.149 | 1.520 | 807 | 0.028 | 1.425 | 5043 | -0.053 | 1.402 | 891 | 0.129 | 1.501 | 594 |
| Boarding Status | 0.331 | 0.471 | 7004 | 0.224 | 0.417 | 1379 | 0.578 | 0.494 | 823 | 0.329 | 0.47 | 5043 | 0.237 | 0.425 | 891 | 0.591 | 0.492 | 594 |
| Friends at School | 3.888 | 1.571 | 7004 | 3.555 | 1.761 | 1379 | 3.861 | 1.565 | 823 | 3.972 | 1.495 | 5043 | 3.668 | 1.689 | 891 | 3.87 | 1.522 | 594 |


| Math Tutoring | 0.234 | 0.423 | 6972 | 0.221 | 0.415 | 1372 | 0.101 | 0.302 | 820 | 0.241 | 0.428 | 5031 | 0.244 | 0.429 | 891 | 0.113 | 0.317 | 593 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Chinese Tutoring | 0.101 | 0.302 | 6972 | 0.098 | 0.298 | 1372 | 0.061 | 0.239 | 820 | 0.098 | 0.298 | 5031 | 0.102 | 0.303 | 891 | 0.073 | 0.26 | 593 |
| English Tutoring | 0.242 | 0.428 | 6972 | 0.211 | 0.408 | 1372 | 0.101 | 0.302 | 820 | 0.244 | 0.43 | 5031 | 0.221 | 0.415 | 891 | 0.108 | 0.311 | 593 |
| Communication with Mother | 0.019 | 1.718 | 6849 | -0.206 | 1.795 | 1343 | -0.627 | 1.766 | 801 | 0.024 | 1.698 | 5043 | -0.098 | 1.777 | 891 | -0.579 | 1.764 | 594 |
| Parental Control over School Life | -0.070 | 1.456 | 6950 | -0.191 | 1.438 | 1360 | -0.324 | 1.476 | 814 | -0.056 | 1.445 | 5043 | -0.179 | 1.457 | 891 | -0.279 | 1.477 | 594 |
| Parental Control over Daily Life | -0.118 | 1.407 | 6922 | -0.187 | 1.395 | 1366 | -0.136 | 1.378 | 808 | -0.114 | 1.39 | 5043 | -0.129 | 1.377 | 891 | -0.078 | 1.362 | 594 |
| Parental Expectations | 4.657 | 1.348 | 7004 | 4.477 | 1.49 | 1379 | 4.495 | 1.314 | 823 | 4.817 | 1.139 | 5043 | 4.791 | 1.197 | 891 | 4.694 | 1.102 | 594 |
| Middle-class <br> Neighborhood | 0.183 | 0.387 | 6567 | 0.166 | 0.372 | 1248 | 0.112 | 0.316 | 776 | 0.181 | 0.385 | 5043 | 0.193 | 0.395 | 891 | 0.111 | 0.315 | 594 |
| Migrate before Middle School | 0.929 | 0.257 | 7004 | 0.732 | 0.443 | 1379 | 0.877 | 0.328 | 823 | 0.935 | 0.247 | 5043 | 0.737 | 0.44 | 891 | 0.867 | 0.34 | 594 |
| Gender | 0.499 | 0.5 | 7004 | 0.513 | 0.5 | 1379 | 0.502 | 0.5 | 823 | 0.488 | 0.5 | 5043 | 0.483 | 0.5 | 891 | 0.49 | 0.5 | 594 |
| Health Condition | 3.998 | 0.889 | 6971 | 4.08 | 0.916 | 1368 | 3.898 | 0.874 | 820 | 3.998 | 0.878 | 5043 | 4.102 | 0.889 | 891 | 3.886 | 0.862 | 594 |


| School Level |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Urban located School | 0.524 | 0.499 | 7004 | 0.501 | 0.5 | 1379 | 0.352 | 0.478 | 823 | 0.537 | 0.499 | 5043 | 0.542 | 0.499 | 891 | 0.364 | 0.481 | 594 |
| Academic | -0.001 | 1.863 | 6565 | 0.31 | 1.901 | 1302 | -0.541 | 1.794 | 800 | 0.074 | 1.846 | 5043 | 0.528 | 1.721 | 891 | -0.462 | 1.79 | 594 |
| Infrastructure |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Ratio of Senior | 0.2 | 0.141 | 6761 | 0.205 | 0.166 | 1264 | 0.156 | 0.124 | 816 | 0.205 | 0.144 | 5043 | 0.212 | 0.17 | 891 | 0.153 | 0.124 | 594 |
| Teachers |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |


| School Disciplinary | -0.017 | 1.622 | 6773 | -0.234 | 1.345 | 1330 | 0.505 | 2.009 | 812 | 0.014 | 1.685 | 5043 | -0.178 | 1.419 | 891 | 0.556 | 2.086 | 594 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| Self-study after | 0.575 | 0.494 | 6921 | 0.384 | 0.487 | 1378 | 0.873 | 0.333 | 820 | 0.565 | 0.496 | 5043 | 0.371 | 0.483 | 891 | 0.867 | 0.34 | 594 |
| School |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

## The Relative Sizes of Family versus School Effects in China

Table 5-3 displays the explained variance from the estimated regression equations of the effects of the multi-level characteristics on mathematics, Chinese, and English test scores. Column 1 shows the average test scores in each subject. Column 2 presents the total variance of student test performance explained by family factors and school fixed-effect, which is estimated by equation (2). Column 3 displays the total variance attributable to student family background, including socioeconomic status and cultural capital, as determined by equation (1); Column 4 presents the total variance explained by school fixed-effect, which is the difference between Column 2 and 3. Column 5 exhibits the ratio between the proportion of variance accounted for by school factors and the total variance explained by the full model.

The first section of Table 5-3 shows the results of Grade 7. Among the three subjects, family and school factors together respectively accounted for $45.8 \%, 47.1 \%$, and $47.1 \%$ of the total variance in the tests of mathematics, Chinese, and English. Among the total variation explained, $22.6 \%, 20.8 \%$, and $28.3 \%$ came from student family background and $23.2 \%, 26.3 \%$, and $18.8 \%$ originated from school characteristics, respectively. The proportion of school effects on mathematics was $50.7 \%$, on Chinese was $55.8 \%$, and on English was $39.9 \%$.

As shown in the second section of Table 5-3, the full models accounted for $41.6 \%$ of the total variance in mathematics, $45.2 \%$ in Chinese, and $47.6 \%$ in English by analysing the Grade 9 sample. The explanatory power of student family background is quite similar to the results of the Grade 7 sample. However, the variance explained by school quality was decreased to $19.0 \%$ in mathematics, $24.6 \%$ in Chinese, and $17.2 \%$ in English. As a result, the proportion of the total
variance explained by school quality was shrunk in this sample, which was $45.7 \%, 54.4 \%$, and $36.1 \%$, respectively.

To sum up, family characteristics were more important than school characteristics to account for the variation in student English reading test scores in China. School quality explained more variance in Chinese reading performance. Both results were consistent across the sample of Grade 7 and Grade 9. Further, an interesting difference was identified from the results. The school quality was relatively more essential than family factors in predicting mathematics performance of $7^{\text {th }}$-grade students. However, family background variables accounted for a more substantial proportion of the total variance in $8^{\text {th }}$-grade students' mathematics test scores. The decreased explanatory power of school characteristics is the primary cause of the phenomenon.

Table 5-3: Variation in Chinese Student Academic Achievement Attributable to Family Background and School Resources

|  |  | Grade 7 |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Subject | Mean Achievement <br> Score <br> $(1)$ | Total Variance <br> Explained <br> $(2)$ | Variance Explained by Family <br> Background Factors <br> $(3)$ | Variance Explained by School <br> Resources Factors <br> $(4)$ | $(4) /(2)$ <br> $(5)$ |
| Math | 67.46 | 0.458 | 0.226 | 0.232 | 0.507 |
| Chinese | 71.37 | 0.471 | 0.208 | 0.263 | 0.558 |
| English | 72.06 | 0.471 | 0.283 | 0.188 | 0.399 |

Grade 9

|  | Grade 9 |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | Mean Achievement <br> Score <br> $(1)$ | Total Variance <br> Explained <br> $(2)$ | Variance Explained by Family <br> Background Factors <br> $(3)$ | Variance Explained by School <br> Resources Factors <br> $(4)$ | $(4) /(2)$ |

## Differences in Multilevel Characteristics among Student Groups

## Comparisons of personal and family characteristics

This study employed one-way ANOVA and Tukey's HSD to compare the variable means among three student groups from the analytic sample. The results of Grade 7 and Grade 9 are respectively displayed in Table 5-4 and Table 5-5. The findings showed that the academic performance of regular students was significantly better than left-behind students in all subjects in Grade 7. $9^{\text {th }}$ - grade regular students' only show a significant academic advantage in English tests. Migrant students presented significantly higher test scores than left-behind students in all subjects and both grades. Moreover, migrant students only showed an advantage over regular students in $9^{\text {th }}$ grade Chinese tests. There was not any other significant academic difference confirmed between the two groups in this study.

The pairwise comparisons displayed that migrant students in both grades had significantly fewer friends at school than the other groups. Regular students communicated most frequently and deeply with their mothers, while left-behind students did least among three groups. $22 \%$ and $17 \%$ of left-behind students from Grade 7 and Grade 9 used supplementary tutoring after school, which were significantly lower than either regular or migrant students. Interestingly, although regular students had the highest educational expectations in both grades, the differences are not significant between them and migrant students in both grades.

Concerning family characteristics, regular and migrant groups displayed significant advantages in SES and cultural capital over left-behind students in both grades. Meanwhile, the comparisons between regular and migrant students showed insignificant distinctions in both grades. By dividing SES into five quintiles, this study found that regular students equally distributed among
five quintiles. By contrast, migrant students concentrated in the middle three quintiles. Such a distribution suggested that the structure of the migrant population had been transiting in China. Migrant labours not only included the people who took labour-intensive jobs; but also incorporated the workforce who accepted specific education and technical training. Additionally, family socioeconomic status was also related to students' choice of participation in boarding at school programs and supplementary education. Based on the T-test results, the mean SES of boarding students was significantly lower than of non-boarding students in both Grade $7(|t|=35.58)$ and Grade $9(|t|=37.87)$. Students who participated in supplementary education had better family socioeconomic background than those who did not, which was also significant in both Grade 7 $(|t|=17.81)$ and Grade $9(|t|=21.10)$.

Left-behind students were more probable to have negative school experiences than regular and migrant students in Grade 7. Additionally, left-behind students tended to board at school during weekdays compared to migrant and regular students in both grades. Migrant students had the highest proportion of commuting between school and home from Monday to Friday.

Concerning family structure, over $77 \%$ of left-behind students had at least one sibling, which was significantly larger than the proportions of migrant and regular students. About $50 \%$ of regular students' families had only one child. Parents of regular and migrant students from $7^{\text {th }}$-grade tended to adopt significantly stricter control over their school and daily lives than of left-behind students. However, such variations were not significant in Grade 9 except for the comparison of parental control over school life between regular and left-behind students. Additionally, parents of regular students shared significantly higher educational expectations on their children than leftbehind students in both grades. Parents of migrant students only showed significantly higher expectations than of left-behind students in Grade 7.

Table 5-4: One-way Analysis of Variance of Student and Family Characteristics in Grade 7

| Grade 7 |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Student and Family Characteristics | Migrant Status |  |  | F |
|  | Regular | Migrant | Leftbehind |  |
| Math | $69.13{ }_{\text {a }}$ | 70.88a | 62.54 b | $29.31^{* * *}$ |
|  | (23.40) | (21.64) | (24.14) |  |
| Chinese | 72.84a | 73.02 a | 70.76b | $7.75{ }^{* * *}$ |
|  | (12.88) | (12.81) | (14.27) |  |
| English | 74.34a | 73.36a | 68.48 b | $23.59^{* * *}$ |
|  | (20.56) | (18.52) | (21.62) |  |
| Friends at Same School | $4.101_{\text {a }}$ | $3.886_{\text {b }}$ | 4.108a | $11.75{ }^{* * *}$ |
|  | (1.455) | (1.597) | (1.467) |  |
| SES | $0.101_{\text {a }}$ | 0.214 a | -0.648b | 89.03*** |
|  | (1.493) | (1.289) | (1.273) |  |
| Cultural Capital | $0.355_{\text {a }}$ | 0.469 a | -0.809 ${ }_{\text {b }}$ | $195.26{ }^{* * *}$ |
|  | (1.697) | (1.718) | (1.418) |  |
| Student Expectation | 4.808a | 4.724 a | 4.483 b | $17.22^{* * *}$ |
|  | (1.328) | (1.356) | (1.511) |  |
| Attitudes on Learning | 3.376a | 3.386a | 3.286 a | 2.74 |
|  | (0.968) | (0.951) | (0.93) |  |
| Negative Experiences of Schooling | -0.125a | -0.169a | $0.031_{\text {b }}$ | 5.01 ** |
|  |  |  |  |  |
|  | (1.351) | (1.264) | (1.533) |  |
| Boarding Status | 0.308 c | $0.171_{\text {a }}$ | $0.554_{\text {b }}$ | $161.54^{* * *}$ |
|  | (0.462) | (0.377) | (0.497) |  |
| Having a Sibling | 0.506 c | $0.651_{\text {a }}$ | 0.766 b | $112.44^{* * *}$ |
|  | (0.500) | (0.477) | (0.424) |  |
| Supplementary Education | 0.344 a | 0.346 a | $0.217_{\text {b }}$ | 21.62*** |
|  | (0.475) | (0.476) | (0.412) |  |
| Communication with Mother | $0.200_{\text {a }}$ | 0.050 a | -0.341 ${ }_{\text {b }}$ | 30.71 *** |
|  | (1.672) | (1.777) | (1.671) |  |
| Parental Control over School Life | 0.136a | 0.085 a | -0.153 ${ }_{\text {b }}$ | $12.17^{* * *}$ |
|  |  |  |  |  |
|  | (1.388) | (1.422) | (1.526) |  |
| Parental Control over Daily Life | $0.145_{\text {a }}$ | 0.129 a | -0.022 ${ }^{\text {b }}$ | 4.14* |
|  |  |  |  |  |
|  | (1.390) | (1.384) | (1.443) |  |
| Parental Expectation | $5.061{ }_{\text {a }}$ | 4.982 a | $4.874{ }^{\text {b }}$ | $9.75{ }^{* * *}$ |
|  | (1.081) | (1.127) | (1.208) |  |
| School Characteristics |  |  |  |  |
| Academic Infrastructure | 0.099 ${ }_{\text {c }}$ | 0.585a | $-0.595_{\text {b }}$ | 100.39** |
|  | (1.806) | (1.675) | (1.808) |  |
| Senior Teacher Ratio | $0.212_{\text {a }}$ | 0.213 a | 0.167 b | 27.60 *** |
|  | (0.148) | (0.165) | (0.127) |  |
| Disciplinary Climate | -0.009c | -0.212a | $0.335_{\text {b }}$ | 23.73*** |
|  | (1.688) | (1.393) | (2.122) |  |

Note. $*=p<.05, * * *=p<.001$. Standard deviations appear in parentheses bellow means. Means with differing subscripts within rows are significantly different at the $p<.05$ based on Fisher's LSD post hoc paired comparisons.

## Comparisons of school characteristics

Since the ratio of Chinese national financial education expenditure to GDP achieved $4 \%$ in 2012, the central and local governments have made some progress in narrowing the gap of infrastructures among schools. However, the schools attended by left-behind students are still poorly equipped with educational facilities compared to the ones of regular students and migrant students. Additionally, the gap of educational resources also reflected on school human capital. 76\% of teachers from schools of regular students hold bachelor degrees. The proportion of migrant students' schools is $74 \%$ on average. While this proportion for schools of left-behind students is only $56 \%$, which is significantly lower among the three groups ( $\mathrm{F}=148.68$ ). The schools of regular and migrant students were characterised by a higher proportion of senior teachers and more disciplined campus environment than the schools of left-behind students in both grades.

Notably, we usually assumed that migrant students could not get access the high-quality educational resources considering their improving social networks and the restrictions of the Hukou system. However, the pairwise comparison presented a surprising result that the schools attended by migrant students possessed the most substantial resources and the highest proportion of highly educated teachers. Moreover, the disciplinary climate of migrant students' schools is the most favourable among the three groups. From these comparisons, it could be summarized that the educational resources used by left-behind students were relatively low in quality comparing to the other student groups. Meanwhile, the school materials enjoyed by migrant students were at least no less than regular students.

Table 5-5: One-way Analysis of Variance of Student and Family Characteristics in Grade 9

| Grade 9 |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Student and Family Characteristics | Migrant Status |  |  | F |
|  | Regular | Migrant | Left-behind |  |
| Math | $\begin{aligned} & \hline 63.14_{\mathrm{a}, \mathrm{~b}} \\ & (24.22) \end{aligned}$ | $\begin{gathered} \hline 63.97_{\mathrm{a}} \\ (23.12) \end{gathered}$ | $\begin{aligned} & \hline 60.58_{\mathrm{b}} \\ & (24.97) \end{aligned}$ | 3.64* |
| Chinese | $\begin{aligned} & 70.39_{\mathrm{a}} \\ & (13.35) \end{aligned}$ | $\begin{aligned} & 71.94_{\mathrm{b}} \\ & (12.78) \end{aligned}$ | $\begin{aligned} & 69.53_{\mathrm{a}} \\ & (13.04) \end{aligned}$ | 6.72** |
| English | $\begin{aligned} & 60.18_{\mathrm{a}} \\ & (22.39) \end{aligned}$ | $\begin{aligned} & 61.38_{\mathrm{a}} \\ & (21.25) \end{aligned}$ | $\begin{aligned} & 57.28_{\mathrm{b}} \\ & (21.23) \end{aligned}$ | $6.10^{* *}$ |
| Friends at Same School | $\begin{aligned} & 3.972_{\mathrm{a}} \\ & (1.495) \end{aligned}$ | $\begin{aligned} & 3.668_{\mathrm{b}} \\ & (1.689) \end{aligned}$ | $\begin{gathered} 3.87_{a} \\ (1.522) \end{gathered}$ | $15.38{ }^{* * *}$ |
| SES | $\begin{aligned} & -0.012_{\mathrm{a}} \\ & (1.466) \end{aligned}$ | $\begin{aligned} & 0.055_{\mathrm{a}} \\ & (1.279) \end{aligned}$ | $\begin{aligned} & -0.711_{\mathrm{b}} \\ & (1.196) \end{aligned}$ | 68.19*** |
| Cultural Capital | $\begin{aligned} & -0.178 \mathrm{a} \\ & (1.571) \end{aligned}$ | $\begin{aligned} & -0.106_{\mathrm{a}} \\ & (1.523) \end{aligned}$ | $\begin{aligned} & -1.16_{b} \\ & (1.269) \end{aligned}$ | $113.24^{* * *}$ |
| Student Expectation | $\begin{aligned} & 4.542_{\mathrm{a}} \\ & (1.377) \end{aligned}$ | $\begin{aligned} & 4.541_{\mathrm{a}} \\ & (1.375) \end{aligned}$ | $\begin{aligned} & 4.453_{\mathrm{a}} \\ & (1.339) \end{aligned}$ | 0.02 |
| Attitudes on Learning | $\begin{aligned} & 3.322_{\mathrm{a}} \\ & (0.969) \end{aligned}$ | $\begin{gathered} 3.334_{\mathrm{a}} \\ (0.935) \end{gathered}$ | $\begin{aligned} & 3.273_{a} \\ & (0.855) \end{aligned}$ | 0.83 |
| Having a Sibling | $\begin{aligned} & 0.514_{\mathrm{c}} \\ & (0.500) \end{aligned}$ | $\begin{aligned} & 0.658_{\mathrm{a}} \\ & (0.475) \end{aligned}$ | $\begin{aligned} & 0.790_{\mathrm{b}} \\ & (0.408) \end{aligned}$ | $105.81^{* * *}$ |
| Negative Experiences of Schooling | 0.028a | $-0.053_{\text {a }}$ | 0.129 b | 2.88 |
|  | (1.425) | (1.402) | (1.501) |  |
| Boarding Status | $\begin{aligned} & 0.329_{\mathrm{c}} \text { c } \\ & (0.47) \end{aligned}$ | $\begin{aligned} & 0.237_{\mathrm{a}} \\ & (0.425) \end{aligned}$ | $\begin{aligned} & 0.591_{\mathrm{b}} \\ & (0.492) \end{aligned}$ | $109.21^{* * *}$ |
| Supplementary Education | $\begin{aligned} & 0.338_{a} \\ & (0.473) \end{aligned}$ | $\begin{aligned} & 0.340_{\mathrm{a}} \\ & (0.474) \end{aligned}$ | $\begin{aligned} & 0.173_{\mathrm{b}} \\ & (0.379) \end{aligned}$ | $33.87^{* * *}$ |
| Communication with Mother | $\begin{aligned} & 0.024_{\mathrm{a}} \\ & (1.698) \end{aligned}$ | $\begin{aligned} & -0.098_{\mathrm{a}} \\ & (1.777) \end{aligned}$ | $\begin{aligned} & -0.579_{\mathrm{b}} \\ & (1.764) \end{aligned}$ | $33.35^{* * *}$ |
| Parental Control over School Life | -0.056a | $-0.179{ }_{\text {a }, \mathrm{b}}$ | -0.279 b | 8.08*** |
|  | (1.445) | (1.457) | (1.477) |  |
| Parental Control over Daily Life | -0.114a | -0.129a | -0.078a | 0.25 |
| Parental Expectations | $\begin{array}{r} (1.39) \\ 4.817_{\mathrm{a}} \\ (1.139) \\ \hline \end{array}$ | $\begin{aligned} & (1.377) \\ & 4.791_{\mathrm{a}, \mathrm{~b}} \\ & (1.197) \\ & \hline \end{aligned}$ | $\begin{gathered} (1.362) \\ 4.694_{\mathrm{b}} \\ (1.102) \end{gathered}$ | $3.15 *$ |
| School Characteristics |  |  |  |  |
| Academic Infrastructure | $\begin{aligned} & \hline 0.074_{\mathrm{c}} \\ & (1.846) \end{aligned}$ | $\begin{gathered} 0.528 \mathrm{a} \\ (1.721) \end{gathered}$ | $\begin{aligned} & -0.462_{\mathrm{b}} \\ & (1.790) \end{aligned}$ | $53.06{ }^{* * *}$ |
| Senior Teacher Ratio | $\begin{aligned} & 0.205_{\mathrm{a}} \\ & (0.144) \end{aligned}$ | $\begin{aligned} & 0.212_{\mathrm{a}} \\ & (0.170) \end{aligned}$ | $\begin{aligned} & 0.153_{\mathrm{b}} \\ & (0.124) \end{aligned}$ | $36.29^{* * *}$ |
| Disciplinary Climate | $\begin{array}{r} 0.014_{\mathrm{c}} \\ (1.685) \\ \hline \end{array}$ | $\begin{aligned} & -0.178_{\mathrm{a}} \\ & (1.419) \\ & \hline \end{aligned}$ | $\begin{aligned} & 0.556_{\mathrm{b}} \\ & (2.086) \\ & \hline \end{aligned}$ | $35.59{ }^{* * *}$ |

Note. ${ }^{*}=p<.05,{ }^{* * *}=p<.001$. Standard deviations appear in parentheses bellow means. Means with differing subscripts within rows are significantly different at the $p<.05$ based on Fisher's LSD post hoc paired comparisons.

## The Effects of Individual Characteristics on Students’ Academic Success

The intraclass correlation in Table 5-6 shows that the school-level clusters captured approximately $26 \%, 35 \%$, and $22 \%$ of the variance in mathematics, Chinese, and English scores in Grade 7. In Grade 9, the proportion was approximately $23 \%, 29 \%$, and $23 \%$. The results indicate that despite substantial variation among students at the individual level, students' academic achievement, especially Chinese test scores, varies significantly among schools. Therefore, it is necessary to use hierarchical linear models to investigate the predictive strength of multilevel characteristics on students' academic performance due to the nested data structure. The coefficients displayed in Table 5-6 are unstandardized. The first three columns present the results of the $7^{\text {th }}$-grade sample.

Regarding personal characteristics, after controlling for individual- and school-level characteristics, the mathematics achievement of migrant students was exhibited 1.43 points higher than of regular students. Their Chinese reading achievement showed 0.79 points higher comparing to regular students. However, this was not the case for English achievement. Additionally, no significant differences were founded between left-behind students and regular students. Students' educational expectations and attitudes on learning had a strong positive association with their academic achievement, which was consistent across three subjects. Students who had more friends at school achieved higher scores in $7^{\text {th }}$-grade tests of mathematics and English.

Not surprisingly, I found significant positive associations between family SES and $7^{\text {th }}$ grade students' test performance in all three subjects. It indicated that students living in affluent families with highly educated parents tended to achieve higher grades on average. Different parental practices are also related to children's educational outcomes. The results show that $7^{\text {th }}-$ grade students who lived with both parents and communicated more with their mothers tended to
perform better than the otherwise similar students at school. Parents who employed stricter control over children's daily lives, including time for entertainment and their social network, had their children displayed a higher outcome in Chinese and English achievement. Higher parental expectations were strongly and positively associated with students' academic achievement. Students who live in the current location before middle school achieved higher test scores than recently arrived students on average.

By contrast, several covariates showed negative relations with students' academic in Grade 7. Although high-brow cultural activities correlated with family socioeconomic status (correlation coefficient $=0.47$ ), cultural capital showed a negative relation with students' achievement of all three subjects in Grade 7. Specifically, one unit of increase in students' cultural capital was associated with $0.70,0.42$, and 0.66 units of decline respectively in students' mathematics, Chinese, and English tests when controlling for the other factors. Having negative schooling experience was also significantly and negatively associated with students' performance in all three subjects. The English test scores of students who had a sibling were 1.30 points lower than their cohorts who were the only child of families. Parents' strict control over children's school life, including school performance and homework, was also negatively detrimental to $7^{\text {th }}$ grade students' performance in the three subjects.

Interestingly, the usage of supplementary tutoring and gender presented inconsistent predictive strength on $7^{\text {th }}$-grade students' academic achievement among mathematics, Chinese reading, and English reading. Students who participated in Chinese shadow education did not show significant differences in test scores compared to otherwise similar non-participants. Accepting supplementary education on mathematics contributed to a decrease of 1.40 points in students' mathematics test. Using English tutoring after school significantly improved students' test scores by 1.46 points. Students' Chinese and English achievement in Grade 7 also varied significantly depending on students' gender. Male students scored 4.28 points lower in Chinese
and 6.93 points lower in English compared to otherwise similar female students. However, the $7^{\text {th }}$-grade boys showed a significant advantage of 1.26 points in mathematics performance.

Column 4-6 present the HLM estimates of the effects of multilevel factors on students' academic achievement in Grade 9. Many effects detected in $7^{\text {th }}$ grade were present in $9^{\text {th }}$ grade. However, migrant students did not show an academic advantage in mathematics tests. By contrast, the association between migration and Chinese reading was consistently significant and positive in Grade 9. Living with both parents failed to serve as a significant predictor of students' achievement in any of the three academic domains in this grade. The number of friends at the same school was no longer significantly associated with students' mathematics performance. Instead, this variable was significantly and positively related to students' Chinese performance in Grade 9. Students who were boarding students respectively achieved 2.25 and 1.29 points higher in mathematics and Chinese tests comparing to their otherwise similar cohorts who commuted between school and home at weekdays. Participation in shadow education on mathematics and English was associated with an increase of 2.31 and 2.50 points in $9^{\text {th }}$-grade tests, respectively. Students do not academically benefit from strict parental supervision over their daily lives. The results merely confirm a negative and significant association between mathematics test scores and middle-class neighbours in Grade 9. Finally, the magnitude of migration length was much weaker in this grade than in $7^{\text {th }}$ grade.

Table 5-6: HLM Estimates of Factors Influencing Students’ Academic Achievement

|  | Grade 7 |  |  | Grade 9 |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | (1) <br> Math | (2) <br> Chinese | (3) <br> English | (4) <br> Math | (5) <br> Chinese | (6) <br> English |
| Level 1: Individual Predictors |  |  |  |  |  |  |
| Migrant Status: Migrant Students | $\begin{gathered} \text { (Regular } \\ 1.427^{*} \\ (0.608) \end{gathered}$ | ents is the $0.794 *$ (0.333) | $\begin{aligned} & \text { ference gr } \\ & 0.486 \\ & (0.519) \end{aligned}$ | $\begin{gathered} 1.297 \\ (0.761) \end{gathered}$ | $\begin{aligned} & 1.293^{* *} \\ & (0.409) \end{aligned}$ | $\begin{gathered} 0.632 \\ (0.665) \end{gathered}$ |
| Left-behind Students | $\begin{aligned} & -0.724 \\ & (0.891) \end{aligned}$ | $\begin{gathered} 0.113 \\ (0.489) \end{gathered}$ | $\begin{aligned} & -0.0310 \\ & (0.763) \end{aligned}$ | $\begin{gathered} 0.670 \\ (1.017) \end{gathered}$ | $\begin{aligned} & -0.137 \\ & (0.546) \end{aligned}$ | $\begin{gathered} 0.651 \\ (0.887) \end{gathered}$ |
| SES | $0.679 * *$ | 0.305** | $0.725^{* * *}$ | $0.575^{*}$ | $0.571 * * *$ | $0.653^{* *}$ |


|  | (0.206) | (0.113) | (0.177) | (0.239) | (0.129) | (0.208) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Cultural Capital | $\begin{gathered} -0.700^{* * *} \\ (0.157) \end{gathered}$ | $\begin{aligned} & -0.416^{* * *} \\ & (0.0863) \end{aligned}$ | $\begin{gathered} -0.660^{* * *} \\ (0.135) \end{gathered}$ | $\begin{gathered} -0.891^{* * *} \\ (0.186) \end{gathered}$ | $\begin{aligned} & -0.508^{* * *} \\ & (0.1000) \end{aligned}$ | $\begin{gathered} -0.749^{* * *} \\ (0.162) \end{gathered}$ |
| Living with Both Parents (1=yes) | $2.439^{* * *}$ | $1.162^{* * *}$ | $2.336^{* * *}$ | 0.584 | 0.239 | 0.719 |
|  | (0.603) |  |  | (0.690) | (0.371) | (0.603) |
| Students' Education Expectations | $\begin{gathered} 2.818^{* * *} \\ (0.186) \end{gathered}$ | $\begin{aligned} & 1.588^{* * *} \\ & (0.102) \end{aligned}$ | $\begin{aligned} & 2.705^{* * *} \\ & (0.159) \end{aligned}$ | $\begin{aligned} & 3.984^{* * *} \\ & (0.202) \end{aligned}$ | $\begin{aligned} & 1.789^{* * *} \\ & (0.108) \end{aligned}$ | $\begin{aligned} & 3.101^{* * *} \\ & (0.176) \end{aligned}$ |
| Attitudes on Learning | $\begin{aligned} & 5.066 * * * \\ & (0.234) \end{aligned}$ | $\begin{aligned} & 2.456^{* * *} \\ & (0.128) \end{aligned}$ | $\begin{aligned} & 4.069^{* * *} \\ & (0.200) \end{aligned}$ | $\begin{aligned} & 5.173^{* * *} \\ & (0.267) \end{aligned}$ | $\begin{aligned} & 2.227^{* * *} \\ & (0.143) \end{aligned}$ | $\begin{aligned} & 4.772^{* * *} \\ & (0.233) \end{aligned}$ |
| Having a Sibling | $\begin{gathered} -0.533 \\ (0.505) \end{gathered}$ | $\begin{aligned} & -0.480 \\ & (0.277) \end{aligned}$ | $\begin{aligned} & -1.297^{* *} \\ & (0.432) \end{aligned}$ | $\begin{aligned} & -0.859 \\ & (0.593) \end{aligned}$ | $\begin{aligned} & 0.0947 \\ & (0.319) \end{aligned}$ | $\begin{gathered} -0.971 \\ (0.517) \end{gathered}$ |
| Negative Experiences of Schooling | $-1.472^{* * *}$ | $-0.868^{* * *}$ | $-1.319^{* * *}$ | $-0.949^{* * *}$ | $-0.614^{* * *}$ | $-0.547^{* * *}$ |
|  |  |  |  |  |  |  |
| Boarding Status | $\begin{gathered} 1.044 \\ (0.785) \end{gathered}$ | $\begin{gathered} 0.803 \\ (0.433) \end{gathered}$ | $\begin{gathered} 0.920 \\ (0.669) \end{gathered}$ | $\begin{aligned} & 2.248^{* *} \\ & (0.841) \end{aligned}$ | $\begin{aligned} & 1.289^{* *} \\ & (0.454) \end{aligned}$ | $\begin{gathered} 0.475 \\ (0.733) \end{gathered}$ |
| Total Friends at Same School | $\begin{gathered} 0.290^{*} \\ (0.141) \end{gathered}$ | $\begin{gathered} 0.125 \\ (0.077) \end{gathered}$ | $\begin{aligned} & 0.300^{*} \\ & (0.120) \end{aligned}$ | $\begin{gathered} 0.083 \\ (0.151) \end{gathered}$ | $\begin{gathered} 0.230^{* *} \\ (0.0815) \end{gathered}$ | $\begin{aligned} & 0.363^{* *} \\ & (0.132) \end{aligned}$ |
| Supplementary Education | $\begin{aligned} & -1.401^{*} \\ & (0.566) \end{aligned}$ | $\begin{aligned} & -0.554 \\ & (0.362) \end{aligned}$ | $\begin{aligned} & 1.456^{* *} \\ & (0.470) \end{aligned}$ | $\begin{aligned} & 2.310^{* * *} \\ & (0.614) \end{aligned}$ | $\begin{gathered} 0.454 \\ (0.432) \end{gathered}$ | $\begin{aligned} & 2.489^{* * *} \\ & (0.536) \end{aligned}$ |
| Communication with Mother | $\begin{aligned} & 0.403^{* *} \\ & (0.145) \end{aligned}$ | $\begin{gathered} 0.234^{* *} \\ (0.0793) \end{gathered}$ | $\begin{aligned} & 0.355^{* *} \\ & (0.124) \end{aligned}$ | $\begin{gathered} 0.327^{*} \\ (0.156) \end{gathered}$ | $\begin{aligned} & 0.354^{* * *} \\ & (0.0836) \end{aligned}$ | $\begin{aligned} & 0.561^{* * *} \\ & (0.136) \end{aligned}$ |
| Parental Control over School Life | $\begin{gathered} -0.653^{* * *} \\ (0.172) \end{gathered}$ | $\begin{aligned} & -0.197^{*} \\ & (0.094) \end{aligned}$ | $\begin{aligned} & -0.315^{*} \\ & (0.147) \end{aligned}$ | $\begin{gathered} -0.705^{* * *} \\ (0.188) \end{gathered}$ | $\begin{aligned} & -0.218^{*} \\ & (0.101) \end{aligned}$ | $\begin{gathered} -0.622^{* * *} \\ (0.164) \end{gathered}$ |
| Parental Control over Daily Life | $\begin{gathered} 0.261 \\ (0.174) \end{gathered}$ | $\begin{gathered} 0.222^{*} \\ (0.096) \end{gathered}$ | $\begin{aligned} & 0.431^{* *} \\ & (0.149) \end{aligned}$ | $\begin{aligned} & -0.159 \\ & (0.192) \end{aligned}$ | $\begin{aligned} & -0.070 \\ & (0.103) \end{aligned}$ | $\begin{gathered} -0.293 \\ (0.167) \end{gathered}$ |
| Parental Expectations | $\begin{gathered} 2.725^{* * *} \\ (0.218) \end{gathered}$ | $\begin{aligned} & 1.253^{* * *} \\ & (0.119) \end{aligned}$ | $\begin{aligned} & 2.107^{* * *} \\ & (0.186) \end{aligned}$ | $\begin{gathered} 4.423^{* * *} \\ (0.241) \end{gathered}$ | $\begin{aligned} & 2.029^{* * *} \\ & (0.130) \end{aligned}$ | $\begin{aligned} & 3.574^{* * *} \\ & (0.211) \end{aligned}$ |
| Middle-class Neighborhood | 0.106 | -0.399 | -0.236 | $-1.570^{*}$ | -0.463 | 0.304 |
|  | (0.574) | (0.314) | (0.491) | (0.626) | (0.336) | (0.547) |
| Migrate before $7^{\text {th }}$ Grade | 1.924** | $1.433^{* * *}$ | $2.185^{* * *}$ | 1.962* | 0.878* | -0.136 |


| (1=yes) | (0.697) | (0.382) | (0.597) | (0.797) | (0.428) | (0.695) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Gender (1=male) | $\begin{aligned} & 1.260^{* *} \\ & (0.426) \end{aligned}$ | $\begin{gathered} -4.277^{* * *} \\ (0.233) \end{gathered}$ | $\begin{gathered} -6.927^{* * *} \\ (0.364) \end{gathered}$ | $\begin{aligned} & 1.858^{* * *} \\ & (0.473) \end{aligned}$ | $\begin{gathered} -4.530^{* * *} \\ (0.254) \end{gathered}$ | $\begin{gathered} -7.283^{* * *} \\ (0.412) \end{gathered}$ |
| Health Condition | $\begin{aligned} & -0.734^{* *} \\ & (0.238) \\ & \hline \end{aligned}$ | $\begin{array}{r} -0.208 \\ (0.130) \\ \hline \end{array}$ | $\begin{array}{r} -0.296 \\ (0.204) \\ \hline \end{array}$ | $\begin{gathered} -0.447 \\ (0.266) \\ \hline \end{gathered}$ | $\begin{array}{r} -0.251 \\ (0.143) \\ \hline \end{array}$ | $\begin{aligned} & -0.432 \\ & (0.232) \\ & \hline \end{aligned}$ |
| Level 2: School Predictors |  |  |  |  |  |  |
| Urban Located School | $\begin{aligned} & 5.713^{* *} \\ & (2.091) \end{aligned}$ | $\begin{gathered} 1.639 \\ (1.421) \end{gathered}$ | $\begin{aligned} & \hline 3.684^{*} \\ & (1.634) \end{aligned}$ | $\begin{gathered} \hline 2.920 \\ (2.088) \end{gathered}$ | $\begin{gathered} \hline 0.197 \\ (1.304) \end{gathered}$ | $\begin{aligned} & \hline 3.693^{*} \\ & (1.815) \end{aligned}$ |
| Academic Infrastructure | $\begin{gathered} 1.241^{*} \\ (0.576) \end{gathered}$ | $\begin{gathered} 0.726 \\ (0.392) \end{gathered}$ | $\begin{aligned} & 1.462^{* *} \\ & (0.450) \end{aligned}$ | $\begin{gathered} 0.661 \\ (0.573) \end{gathered}$ | $\begin{aligned} & 1.141^{* *} \\ & (0.358) \end{aligned}$ | $\begin{aligned} & 1.383^{* *} \\ & (0.498) \end{aligned}$ |
| Ratio of Senior Teachers | $\begin{aligned} & -4.435 \\ & (7.178) \end{aligned}$ | $\begin{gathered} -2.834 \\ (4.890) \end{gathered}$ | $\begin{aligned} & 13.55^{*} \\ & (5.602) \end{aligned}$ | $\begin{gathered} -2.947 \\ (7.140) \end{gathered}$ | $\begin{gathered} -4.072 \\ (4.468) \end{gathered}$ | $\begin{gathered} -9.245 \\ (6.206) \end{gathered}$ |
| School Disciplinary Climate | $\begin{gathered} -1.436^{*} \\ (0.664) \end{gathered}$ | $\begin{aligned} & -0.308 \\ & (0.452) \end{aligned}$ | $\begin{gathered} -1.346^{* *} \\ (0.518) \end{gathered}$ | $\begin{aligned} & -0.746 \\ & (0.658) \end{aligned}$ | $\begin{aligned} & -0.536 \\ & (0.412) \end{aligned}$ | $\begin{gathered} -1.531^{* *} \\ (0.572) \end{gathered}$ |
| Self-Study After School | $\begin{gathered} 3.948 \\ (2.286) \end{gathered}$ | $\begin{gathered} 1.909 \\ (1.549) \end{gathered}$ | $\begin{aligned} & 6.899^{* * *} \\ & (1.789) \end{aligned}$ | $\begin{gathered} 2.209 \\ (2.277) \end{gathered}$ | $\begin{gathered} 1.199 \\ (1.418) \end{gathered}$ | $\begin{gathered} 1.182 \\ (1.979) \end{gathered}$ |

School Located in: (East China is the reference group)

| Middle China | $-10.53^{* * *}$ <br> $(2.733)$ | -1.613 | $-5.652^{* *}$ | $-6.490^{*}$ | 0.885 | -4.389 |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | $(2.134)$ | $(2.708)$ | $(1.695)$ | $(2.354)$ |  |
| West China | $-5.777^{* *}$ | -2.470 | 1.337 | $-11.93^{* * *}$ | -1.845 | $-4.909^{*}$ |
|  | $(2.822)$ | $(1.921)$ | $(2.202)$ | $(2.804)$ | $(1.754)$ | $(2.437)$ |
|  |  |  |  |  |  |  |
| _cons | $(3.148)$ | $50.01^{* * *}$ | $28.05^{* * *}$ | 5.834 | $46.41^{* * *}$ | $17.34^{* * *}$ |
|  |  | $(2.019)$ | $(2.536)$ | $(3.252)$ | $(1.932)$ | $(2.828)$ |
| lns1_1_1 | $2.271^{* * *}$ | $1.895^{* * *}$ | $2.018^{* * *}$ | $2.256^{* * *}$ | $1.796^{* * *}$ | $2.116^{* * *}$ |
| _cons | $(0.0752)$ | $(0.0738)$ | $(0.0763)$ | $(0.0765)$ | $(0.0753)$ | $(0.0770)$ |
| lnsig_e |  |  |  |  |  |  |
| _cons | $2.808^{* * *}$ | $2.206^{* * *}$ | $2.651^{* * *}$ | $2.871^{* * *}$ | $2.250^{* * *}$ | $2.734^{* * *}$ |
|  | $(0.00867)$ | $(0.00867)$ | $(0.00867)$ | $(0.00895)$ | $(0.00895)$ | $(0.00896)$ |


| Intraclass Correlation (ICC) |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| School Level | 0.255 | 0.350 | 0.220 | 0.226 | 0.287 | 0.225 |
| $N$ | 6754 | 6755 | 6758 | 6340 | 6343 | 6333 |

[^1]
## The Effects of School Characteristics on Students’ Academic Success

The estimated effects of school-level variables on the academic performance of Grade 7 students are also shown in column 1-3 of Table 5-7. The location of the school was strongly related to students' test scores in mathematics and English. Specifically, students in an urban school were associated with an increase of 5.71 points in mathematics and 3.68 points in English reading, respectively. Students at schools with better educational infrastructure received higher test scores in mathematics and English than otherwise similar students in underfunded schools. It suggested that if a school invested more in building labs and libraries and creating a more favourable studying environment, students at such schools would be likely to receive higher educational returns.

Furthermore, schools with relatively more senior teachers were positively associated with students' English performance. Schools that organised self-study after classes received an addition 6.90 points to the average scores of English reading. Less disciplinary campus environment was significantly and negatively associated with students' academic performance. One unit improved in the corresponding variable, respectively, dropped 1.44 and 1.35 units in mathematics and English tests.

The regional variance was also confirmed in Table 5-7. Compared to schools in East China, on the one hand, schools located in Middle China had 10.53 and 5.65 points of decrease in average students' mathematics and English performance, respectively. On the other hand, schools in West China received 5.78 points of decline in mathematics, but not in the other subjects.

The group-level estimates of Grade 9 in column 4-6 showed several interesting differences. First of all, rural schools did not present significant disadvantages for students' performance in mathematics. Then, the ratio of senior teachers and school organised self-study could not benefit students' academic achievement in any of the three subjects. Surprisingly,
variables indicating school human resources only presented weak or no relationship with students performance in both grades. Finally, students from Middle China did not show disadvantages in English tests comparing to those from East China. By contrast, the magnitude of the school located in West China on mathematics performance was larger in $9^{\text {th }}$-grade sample. Additionally, students from West China displayed 4.91 points lower in English tests than students from East China.

To ensure the robustness of the models, I also added extra control variables such as access to the internet at home, communication with father, school funding type (private or public), service facilities at school, total of highly educated teachers, the ratio of teacher to student, the proportion of migrant students, and school mean test scores. The results showed that there was no significance in any of those variables in predicting students' academic performance. Thus, I did not include them in the final models. Although school mean SES is positively and significantly associated with students' school performance in all subjects and both grades, its VIF value is higher than 4.29 in each mode. One possible contributing reason is that school mean SES can be linearly predicted from the indicators of school educational resources, including educational facilities, human capital, and campus climate. Given the multicollinearity problem, I excluded this variable from the final models.

## The Moderation Effects of Migrant Status on Academic Performance

## The Interactions between student migration and students' background characteristics

Table 5-7 presents the moderation effects of migrant status and left-behind in both grades, which were estimated by HLM models that held the control variables as constant. The coefficients of interaction terms between SES and student migration were significant and
negative. Compared to the regular students of the same SES, migrant students showed 1.31 points lower score on mathematics, 0.87 points lower on Chinese reading, and 1.12 points lower on English reading. Based on the results of Pearson's Chi-squared tests, the effects of SES on migrant students' academic performance, which were the sum of the main effects of SES and the conditional effects of the interaction terms, were not significantly different from zero. Students with higher educational expectations tended to perform better at school, but this relationship is stronger among regular students than migrant students. In other words, although migrant students' educational expectations were still positively associated with their mathematics and Chinese test scores, they gain significantly lower advantages than their non-migrant cohorts. This case also works for the effects of parental expectations. Specifically, in contrast with regular students, the effect of parental expectations to migrant students was 1.27 points lower on mathematics, 0.91 points lower on Chinese, and 0.85 points lower on English. Notably, student migration did not moderate the effects of deep and frequent communication with mother and negative schooling experience on all subjects in Grade 7.

At the school level, the interaction terms between urban school and student migration were significantly and negatively associated with $7^{\text {th }}$-grade test scores in all subjects. Specifically, migrant students in urban schools derived 3.68 points lower advantage of mathematics tests than regular students. They also respectively gained 1.82 points and 2.01 points lower advantage of Chinese and English reading tests compared to their otherwise similar cohorts who were regular students. Due to the adverse conditional effects, the effect of studying in urban schools is not significantly different from zero to migrant students. However, student migration did not show moderation effects on the association between students' academic performance and school educational resources or disciplinary climate on any of the three subjects.

In Grade 9, the effect on test scores of having the same family SES was smaller for migrant students than it was for regular students because the interaction between SES and student
migration was negatively associated with school performance. Particularly, migrant students benefited 1.20 points lower on mathematics and 0.79 points lower on Chinese reading compared to their regular cohorts with the same family SES. The results of the Chi-squared tests presented that there was no statistically significant difference between zero and the sum of the coefficients on SES and on interaction terms. The coefficients of interaction between cultural capital and student migration were also significantly negative. Given cultural capital showed negative effects on students' mathematics and Chinese test scores, this result indicated that migrant students obtained significantly more disadvantage from the same cultural capital in contrast with regular students, which was 1.25 and 0.68 points lower. In addition, migrant students derived 1.78 points and 1.28 points lower advantage of mathematics and English tests from learning attitudes compared to regular students, respectively. Student migration also moderated the effects of parental educational expectations on students' academic achievement. Migrant students derived 1.38 points, 1.17 points, and 1.00 points, lower from parental expectation, respectively. By using the Chi-squared tests, this study found that the sum of the main effects and the conditional effects of the variables above were significantly different from zero.

The results did not show any of the effects of school factors were consistently moderated by student migration in Grade 9. It suggested that the convergent effects of school characteristics were observed from $9^{\text {th }}$-grade migrant students and their otherwise similar cohorts who are local and live with at least one of their parents.

Table 5-7: Interaction Effects on Students' Academic Achievement

|  | Grade 7 |  |  | Grade 9 |  |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
|  | (1) <br> Math | (2) <br> Chinese | (3) <br> English | (4) <br> Math | (5) <br> Chinese | (6) <br> English |
| Migrant * SES | $-1.308^{* *}$ | $-0.868^{* * *}$ | $-1.117^{* *}$ | $-1.200^{*}$ | $-0.791^{* *}$ | -0.143 |
|  | $(0.412)$ | $(0.226)$ | $(0.353)$ | $(0.531)$ | $(0.286)$ | $(0.464)$ |
| Left * SES |  |  |  |  |  |  |
|  | -0.430 | -0.171 | -0.266 | -0.511 | -0.178 | 0.359 |
|  | $(0.557)$ | $(0.305)$ | $(0.476)$ | $(0.653)$ | $(0.351)$ | $(0.569)$ |
| Migrant * Cultural Capital | -0.545 | -0.110 | -0.366 | $-1.249^{* *}$ | $-0.682^{* *}$ | -0.682 |


|  | (0.311) | (0.171) | (0.266) | (0.438) | (0.236) | (0.383) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Left * Cultural Capital | $\begin{gathered} -0.234 \\ (0.497) \end{gathered}$ | $\begin{gathered} -0.249 \\ (0.272) \end{gathered}$ | $\begin{gathered} -0.582 \\ (0.425) \end{gathered}$ | $\begin{aligned} & -1.186 \\ & (0.618) \end{aligned}$ | $\begin{gathered} -0.546 \\ (0.332) \end{gathered}$ | $\begin{gathered} -0.869 \\ (0.539) \end{gathered}$ |
| Migrant * Students’ Expectations | -0.990* | -0.673** | -0.655 | -0.857 | $-0.637^{*}$ | -0.534 |
|  | (0.392) | (0.215) | (0.335) | (0.490) | (0.264) | (0.427) |
| Left * Students' Expectations | $\begin{gathered} -0.372 \\ (0.479) \end{gathered}$ | $\begin{gathered} -0.152 \\ (0.263) \end{gathered}$ | $\begin{gathered} -0.617 \\ (0.410) \end{gathered}$ | $\begin{gathered} 0.085 \\ (0.591) \end{gathered}$ | $\begin{gathered} -0.0252 \\ (0.317) \end{gathered}$ | $\begin{aligned} & 0.0783 \\ & (0.515) \end{aligned}$ |
| Migrant * Attitudes on Learning | $\begin{gathered} -0.447 \\ (0.546) \end{gathered}$ | $\begin{aligned} & -0.748^{*} \\ & (0.299) \end{aligned}$ | $\begin{gathered} -0.778 \\ (0.467) \end{gathered}$ | $\begin{gathered} -1.778^{*} \\ (0.708) \end{gathered}$ | $\begin{gathered} -0.558 \\ (0.380) \end{gathered}$ | $\begin{gathered} -1.278^{*} \\ (0.617) \end{gathered}$ |
| Left * Attitudes on Learning | $\begin{gathered} -0.385 \\ (0.763) \end{gathered}$ | $\begin{gathered} -0.439 \\ (0.418) \end{gathered}$ | $\begin{aligned} & -0.0762 \\ & (0.652) \end{aligned}$ | $\begin{aligned} & -1.610 \\ & (0.926) \end{aligned}$ | $\begin{gathered} 0.694 \\ (0.497) \end{gathered}$ | $\begin{gathered} -0.565 \\ (0.808) \end{gathered}$ |
| Migrant * Communication with Mother | -0.372 | -0.219 | $-0.388$ | -0.530 | -0.373 | -0.898** |
|  | (0.300) | (0.164) | (0.257) | (0.379) | (0.204) | (0.331) |
| Left * Communication with Mother | -0.827 | -0.117 | $-0.345$ | -1.050 * | 0.131 | -0.202 |
|  | (0.425) | (0.233) | (0.363) | (0.450) | (0.241) | (0.392) |
| Migrant * Negative School Experience | 0.144 | 0.107 | 0.121 | 0.414 | $0.605^{*}$ | 0.621 |
|  | (0.401) | (0.220) | (0.346) | (0.472) | (0.253) | (0.418) |
| Left * Negative School Experience | 1.014* | -0.0165 | -0.395 | 0.694 | 0.273 | 0.625 |
|  | (0.472) | (0.259) | (0.404) | (0.525) | (0.282) | (0.458) |
| Migrant * Parental Control over School Life | -0.657 | -0.0979 | $-0.678^{*}$ | 0.241 | 0.205 | 0.171 |
|  | (0.365) | (0.200) | (0.312) | (0.454) | (0.244) | (0.396) |
| Left * Parental Control over School Life | -0.268 | 0.0429 | $-0.320$ | $-1.169^{*}$ | -0.191 | -0.275 |
|  | (0.468) | (0.256) | (0.400) | (0.538) | (0.289) | (0.469) |
| Migrant * Parental Control over Daily Life | -0.252 | -0.0945 | $-0.407$ | -0.285 | -0.003 | -0.260 |
|  | (0.374) | (0.205) | (0.320) | (0.481) | (0.258) | (0.419) |
| Left * Parental Control over Daily Life | -0.289 | -0.333 | -0.222 | -0.897 | -0.494 | -0.361 |
|  | (0.491) | (0.269) | (0.420) | (0.579) | (0.311) | (0.505) |


| Migrant * Parental Expectations | $\begin{gathered} -1.270^{* *} \\ (0.471) \end{gathered}$ | $\begin{gathered} -0.907^{* * *} \\ (0.258) \end{gathered}$ | $\begin{gathered} -0.851^{*} \\ (0.403) \end{gathered}$ | $\begin{gathered} -1.376^{*} \\ (0.567) \end{gathered}$ | $\begin{gathered} -1.170^{* * *} \\ (0.304) \end{gathered}$ | $\begin{aligned} & -1.002^{*} \\ & (0.494) \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Left * Parental Expectations | $\begin{gathered} -1.066 \\ (0.594) \end{gathered}$ | $\begin{gathered} -0.487 \\ (0.325) \end{gathered}$ | $\begin{gathered} -1.206^{*} \\ (0.508) \end{gathered}$ | $\begin{aligned} & -1.433^{*} \\ & (0.720) \end{aligned}$ | $\begin{aligned} & -0.790^{*} \\ & (0.387) \end{aligned}$ | $\begin{aligned} & -1.505^{*} \\ & (0.628) \end{aligned}$ |
| Migrant * Male | $\begin{gathered} 0.484 \\ (1.033) \end{gathered}$ | $\begin{aligned} & 0.0461 \\ & (0.566) \end{aligned}$ | $\begin{gathered} -0.234 \\ (0.884) \end{gathered}$ | $\begin{gathered} 1.217 \\ (1.323) \end{gathered}$ | $\begin{aligned} & 0.0976 \\ & (0.711) \end{aligned}$ | $\begin{gathered} 1.486 \\ (1.155) \end{gathered}$ |
| Left * Male | $\begin{gathered} 2.073 \\ (1.411) \end{gathered}$ | $\begin{gathered} 0.227 \\ (0.773) \end{gathered}$ | $\begin{gathered} -0.953 \\ (1.207) \end{gathered}$ | $\begin{gathered} 3.416^{*} \\ (1.574) \end{gathered}$ | $\begin{gathered} 0.497 \\ (0.845) \end{gathered}$ | $\begin{gathered} 0.844 \\ (1.371) \end{gathered}$ |
| Migrant * Urban Located School | $\begin{aligned} & -3.676^{* *} \\ & (1.186) \end{aligned}$ | $\begin{gathered} -1.815^{* *} \\ (0.651) \end{gathered}$ | $\begin{aligned} & -2.013^{*} \\ & (1.014) \end{aligned}$ | $\begin{aligned} & -0.082 \\ & (1.472) \end{aligned}$ | $\begin{aligned} & -0.059 \\ & (0.792) \end{aligned}$ | $\begin{aligned} & -0.141 \\ & (1.284) \end{aligned}$ |
| Left* Urban Located School | $\begin{gathered} -1.496 \\ (1.549) \end{gathered}$ | $\begin{gathered} -0.935 \\ (0.849) \end{gathered}$ | $\begin{gathered} -0.289 \\ (1.325) \end{gathered}$ | $\begin{gathered} 1.249 \\ (1.749) \end{gathered}$ | $\begin{gathered} 1.735 \\ (0.939) \end{gathered}$ | $\begin{aligned} & -3.244^{*} \\ & (1.526) \end{aligned}$ |
| Migrant * Academic Infrastructure | 0.0713 | 0.228 | 0.102 | 0.234 | -0.326 | 0.266 |
|  | (0.347) | (0.190) | (0.296) | (0.418) | (0.225) | (0.364) |
| Left * Academic Infrastructure | $\begin{aligned} & -1.131^{* *} \\ & (0.421) \end{aligned}$ | $\begin{gathered} -0.539^{*} \\ (0.231) \end{gathered}$ | $\begin{aligned} & 0.0232 \\ & (0.359) \end{aligned}$ | $\begin{aligned} & -1.054^{*} \\ & (0.464) \end{aligned}$ | $\begin{aligned} & -0.492^{*} \\ & (0.249) \end{aligned}$ | $\begin{gathered} -0.684 \\ (0.404) \end{gathered}$ |
| Migrant * School Disciplinary Climate | 0.542 | -0.372 | 0.0834 | 0.414 | $0.549^{*}$ | 0.584 |
|  | (0.387) | (0.212) | (0.331) | (0.503) | (0.270) | (0.439) |
| Left * School Disciplinary Climate | 0.823* | 0.254 | $0.647^{*}$ | 0.213 | 0.318 | -0.338 |
|  | (0.361) | (0.198) | (0.308) | (0.405) | (0.217) | (0.353) |
| Migrant * Self-Study After School | -1.257 | -0.192 | -0.887 | 0.503 | -1.302 | -1.266 |
|  | (1.256) | (0.689) | (1.072) | (1.502) | (0.807) | (1.309) |
| Left * Self-Study After School | $\begin{gathered} 3.663 \\ (1.946) \end{gathered}$ | $\begin{gathered} 0.934 \\ (1.066) \end{gathered}$ | $\begin{gathered} 3.434^{*} \\ (1.664) \end{gathered}$ | $\begin{gathered} -1.726 \\ (2.300) \end{gathered}$ | $\begin{gathered} -0.495 \\ (1.235) \end{gathered}$ | $\begin{gathered} -0.705 \\ (2.014) \end{gathered}$ |
| $N$ | 6324 | 6326 | 6328 | 6058 | 6060 | 6051 |

## The Interactions between left-behind and students' background characteristics

The moderation effects of left-behind, as shown in Table 5-7, presented different patterns comparing to student migration. Some factors that significantly interacted with student migration were not moderated by left-behind. In particular, compared to regular students, left-behind students did not benefit differently from Family SES, cultural capital, and self-expectation on all subjects and in both grades.

Most of the interaction terms between left-behind and family characteristics showed inconsistent relationships with students' academic achievement across either different subjects or grades. For example, the negative effect of frustrated schooling experiences was smaller on $7^{\text {th }}$ grade left-behind students' mathematics test scores. Whereas, there were several consistent relationships that needed extra attention. Although left-behind students significantly benefit from higher parental expectations, they derived 1.43 points lower on mathematics in Grade 9 compared to the other students with the same parental expectations. They also gained 0.79 points and 1.56 points lower on Chinese and English tests from one-unit higher in parental expectations in Grade 9.

Furthermore, the interaction between left-behind and school educational facilities was negatively associated with academic performance. This result indicated that left-behind students derived significantly smaller academic advantages from improved school facilities than their otherwise similar cohorts. Specifically, the corresponding contrast was 1.13 points and 1.05 points lower on mathematics in Grade 7 and Grade 9, respectively. The contrast on Chinese reading tests was 0.54 points and 0.49 points lower in Grade 7 and Grade 9 , respectively. The results of Chi-squared tests indicated that the sum of the main effects of school academic infrastructure and the conditional effects of the interaction terms were not significantly different from zero. Notably, $7^{\text {th }}$-grade left-behind students suffered lower damage from less disciplinary
campus climate on both mathematics and English. However, those associations were not significant in Grade 9 sample.

## Chapter 6

## Discussion

Using the nationally representative data from the China Education Panel Survey (CEPS), this study investigated the relationships between academic influencing factors and academic achievement of students from $7^{\text {th }}$ and $9^{\text {th }}$ grades. This dissertation addressed the limitations of prior studies on students' school performance by estimating the relative importance of school versus family effects, considering the school-level variability into the estimation models, and examining the moderation effects of students' migrant status in the understudied context of China. Based on the theoretical framework, this chapter detailedly discusses the major findings of this study in the following sections.

## The relative importance of family versus school factors differed by specific subjects

This study examined the relative contributions of family and school characteristics to students' academic performance. Partially supporting the theory of Heyneman and Loxley, the current study finds that the relative importance of family versus school factors are inconsistent among subjects in China, which is an upper-level developing country. Family background variables explained more variance in English performance. By contrast, school characteristics accounted for more variance in Chinese achievement. Concerning mathematics test performance, the results supported the relative superiority of school factors over family variables in influencing students' test scores in Grade 7. Family factors played a more critical role in Grade 9.

Two possible reasons may account for the relatively more contributions of family factors to English performance. On the one hand, sociocultural experiences from the family directly influence their motivation to learn a second language (Gardner, Masgoret, \& Tremblay, 1999). Specifically, parents who can create a favourable sociocultural milieu are capable of using English in the home environment and enrolling their children in English private tutoring, which assist children's Englishing skills and confidence in mastering this language (Gardner et al., 1999; Duo Liu, Chung, \& McBride, 2016). On the other hand, family environments are related to students' solutions for problems of learning a second language. One of the considerable difficulties encountered by Chinese English learners lies in English vocabulary (H. Li \& Suen, 2015). School educators may focus on this defect and teach them test-taking strategies to partially compensate for this deficiency. In addition to formal school education, students from relatively high SES families can learn more syntactic knowledge from situations outside school. Therefore, they tend to achieve better text reading comprehension for studying a second language (Shiotsu \& Weir, 2007).

Due to its unique characteristics, students need to gradually accumulate knowledge from multiple sources to really improve their abilities in Chinese (Dongdong Liu \& Yao, 2018). Extra educational resources merely have a fuzzy impact on Chinese achievement across students with various academic abilities (Dongdong Liu \& Yao, 2018; G. Zhao, 2015). Additionally, reading comprehension benefit from large general and academic corpora (Hwang, Lawrence, Collins, \& Snow, 2017). If students do not have a distinctive experience, their general corpora do not vary notably. Academic language cannot be used and improved in daily routines (Schuth, Köhne, and Weinert 2017). As such, students may depend on school education to strengthen their test-taking strategies and enlarge their academic corpora, which determine the more critical role of schoollevel variables in shaping their scores in Chinese reading tests.

There may be two reasons to explain the inconsistency of the relative contributions of school versus family background variables to students' mathematics performance in Grade 7 and Grade 9. First of all, the difficulty level of curriculums is increased with grades. $7^{\text {th }}$-grade students are more comfortable to fully digest the knowledge taught in mathematics classes without extra assistance. However, school education alone may not be sufficient to support the $9^{\text {th }}$-grade students' studying process. They also need to intensify their efforts on school curricula either by prolonging their study time outside of school or get additional help from their relatively highly educated family members. Second, $9^{\text {th }}$-grade students in China need to prepare for the High School Entrance Examinations, which are high-stakes tests that determine the quality of educational resources derived by them in the following three years. Therefore, they may seek assistance from extra resources, like supplementary education, which also relatively attenuate the contributions of school-level factors.

## Migrating with parents or not: a choice between favourable environments and stable social networks

Using one-way ANOVA and Tukey's HSD, this research confirmed the comparatively disadvantaged position of left-behind students. Compared to the other students, $7^{\text {th- }}$ and $9^{\text {th }}$-grade left-behind students showed unfavourable conditions in most indicators at both individual-level and school-level, except for their social networks at school and attitudes on learning. Although parental migration may raise left-behind children's economic status, those parents mainly engaged in low-skill and low-paying jobs (Wen \& Lin, 2012), which is unhelpful to improve their socio-cultural milieu. The poor educational conditions in migrant origins determine that solo migrant parents cannot fully transfer their improved family income into educational resources enjoyed by their children. Further, the parent-child separation leads to the lack of parental support
and timely parenting practices, which create students' dilemma at school and further reduce parental expectations on children's schooling outcome. For example, left-behind students are more likely to have psychological and behavioural problems (Ye \& Lu, 2011), which distract their concentration on schooling and lead to their unsatisfactory academic performance. The separation also causes a lack of communication between parents and children, which possibly worsen the parent-child relationship and make parents reconsider their further investment in children' education.

Moreover, left-behind students only presented substantially lower expectations in Grade 7. This result can be attributed to the average educational expectations of $9^{\text {th }}$-grade regular and migrant students are much smaller than the Grade 7 sample. One possible explanation is that $9^{\text {th }}$ grade students may have a more practical educational expectation on themselves based on their performance in the past two years. Due to the low self-efficacy of left-behind students (Q. Zhang et al., 2019), their educational expectation may be conservative. Therefore, they may not experience such a matching process as their over-confident cohorts.

According to the results, migrant students enjoyed the family and school environments similar to regular students on average. They displayed advantages in background characteristics over left-behind children but had comparatively fewer friends at the same school in contrast with either regular or left-behind students. Surprisingly, migrant students attended schools with better academic infrastructures and disciplinary climate on average comparing their cohorts from the other groups.

Two reasons contribute to the fact that migrant students have fewer close friends at the current schools. While migrating to a relatively unfamiliar place, children need time to reconstruct their social networks in the new environments. Another possible explanation is that migrant children face discrimination and exclusion at the destination school because of their extra
expenses for schooling there, relatively low family SES, and "strange" accent (Xiang, Wong, \& Hou, 2018).

It is general to assume that migrant students cannot get access to high-quality schools due to their unqualified Hukou. However, the findings of this dissertation show a different story. It indicates that the labours migrated with families are overall well-educated and adequately trained for specific occupational skills. Compared to locals, their socioeconomic status concentrated in the middle three quintiles. They can engage in relatively well-paid jobs and may transit their migrant purposes from improving income to becoming permanent residents of the destination areas (Cao, Li, Wang, \& Liu, 2017). Therefore, they afford and tend to enrol their children in high-quality schools.

## Personal and family background factors are associated with academic performance to varying degrees

Based on the results of HLM models, this study found that students' personal and family characteristics had high predictive strength on their academic achievement in China.

## Family socioeconomic status and cultural capital are closely related to students' school performance

The findings provide partial support to the predictive power of family SES and cultural capital found by previous research. Consistent with the results of prior works, this study suggests that high SES students performed better in all subjects, especially English. High-SES parents can supply more resources to facilitate their children's English learning outside of schools (Butler, 2015), which improve their reading accuracy and comprehension at school (Butler \& Le, 2018; Howard et al., 2014). The relatively affluent families are capable of investing in children's
education through stimulating their learning with higher expectations and providing various supporting resources (S. Lee \& Shouse, 2011; J. Li et al., 2010; Roksa \& Potter, 2011), which is also proved in this study by presenting that parental educational expectations are positively related to students' test performance in both grades. Parents with high socioeconomic positions can create a nurturing home environment and invest in a residence located in high-performed school districts. It largely contributes to children's academic success by putting them into the environment surrounded by adults and peers who can supply them with timely academic and psychological assistance and share the same understanding of the importance of study (S. Lee \& Shouse, 2011; J. Li et al., 2010; Luo \& Zhang, 2017; McDonough, 1997; Roksa \& Potter, 2011; Schultz, 1993).

The findings also yield the surprising results concerning the effects of students' cultural capital. Although studies in the western countries found a positive relationship between cultural capital and academic achievement (Bodovski et al., 2017; Cheng \& Kaplowitz, 2016; Gaddis, 2013; Jæger, 2011; Su \& Hwang, 2009), the research conducted in the Korean and Russian contexts found the opposite results (Bodovski et al., 2019; Byun et al., 2012). Consistent with both studies, the current results indicate that cultural capital was negatively associated with Chinese students' academic performance of all subjects in both Grade 7 and Grade 9. The most reliable explanation for this disparity is that participating in highbrow cultural activities does not facilitate students' performance in high-stakes examinations. In a context like China or Korea, where high-stake examinations serve as the main venue of upward mobility, each student needs to devote maximum efforts to schoolwork for enrolling in a high-status school (Byun et al., 2012; Hannum, An, \& Cherng, 2011). Although the familiarity with inscribed cultural codes gives students an early lead in an academic competition, frequent participation in activities under cultural capital may become a burden on students in the context of East Asia. Therefore, it is
difficult for students from the low socio-cultural milieu to facilitate their educational outcomes through improving cultural capital in China.

## Social capital favours educational returns in a way consistent with Chinese cultural characteristics

According to Bourdieu's and Coleman's theories, the close relationships between family members and aggregated parental resources collaboratively contribute to an effective mechanism for using family social capital to facilitate children's academic achievement (Bourdieu, 2011; James S Coleman, 1988). The current findings partially support the argument by revealing that having in-depth and frequent conversations with mother and high parental expectations can benefit children's educational returns. However, strict parental control over children's daily and school life is inconsistently related to their academic performance. Specifically, if parents impose over-strict requirements on children's schooling process, including homework, school performance, and time for schooling, the children tend to perform worse at school. By contrast, having strict parental control over children's daily lives, including social network, dressing, and time for entertainment, positively contribute to younger children's ( $7^{\text {th }}$-grade) academic performance.

The inconsistent relationships between parental control and students' performance may be attributed to that the fast developing information and communications technology (ICT) changes parental role in family education. In Chinese traditional culture, parenting is required to be high demandingness. The Three-Character Classic, a Chinese preschool educational material written around A.C. 1200, mentions that parents should be blamed for rearing children without educating them well. Thus, Chinese parents believe that in addition to school, they have an enormous responsibility for instructing children from a very early stage. However, easy access to
information and communication expands the content of school education. According to the CEPS, over $90 \%$ of schools were equipped with computers and over $60 \%$ of students could use the internet at home. The popularity of computers and the internet assists students to become the centre of learning endeavour (Gaitanaru, 2014). Meanwhile, it is difficult for parents to adapt to the new role adequately due to the lack of professional training. Although parents can still play an essential role in shaping children's values and social networks, over-strict control on school work may gradually become laborious and futile. This phenomenon may become more prominent with the growing age of children because the higher-grade curricula are more complicated, and students can get more access to various information. In other words, the current study suggests that education on children grow to be more specialized, and parenting should focus more on advising children's daily lives and having meaningful conversations with them rather than just closely monitoring their studies.

Furthermore, high demandingness does not mean parenting in Chinese traditional culture lacks responsiveness. The Intrigues of the Warring States, a classic Chinese history, mentions that parents' love for children reflects on making a long-term plan for them. Thus, Chinese parents have the tradition to display their warmth by facilitating their children's future. Although the current findings indicate that investing in community with middle-class neighbours has at most weak relations with children's schooling outcome, parental expectations are profoundly and positively related to academic performance. It is reasonable to assume that parents with high expectations on children's school outcomes tend to transfer their confidence and prospects into other forms of tangible resources, like supplementary courses and parental tutoring, which contribute to children's success at school.

To sum up, the current findings suggest that appropriate utilization of family social capital can be an assistance to students' academic success. Family environments are more influential than community environment in shaping students' performance at school. Parents
should consider family conditions into the education process rather than merely adopting a traditional or simplified way to cultivate their children.

## Boarding on campus may partially compensate for students' disadvantages

Within the sample, more than half of left-behind students choose to board on campus. According to the T-test results, boarding students' family socioeconomic status are significantly lower than non-boarding students'. The $t$-score is 39.93 in Grade 7 and 41.25 in Grade 9 . The results suggest that "boarding school" is not a synonym for "elite school" in China. Instead, it is a policy tool for concentrating educational resources in either less developed or sparsely populated areas and supplying an option for students in both urban and rural areas whose parents fail to provide proper family support because of work reasons. The current findings further indicate that $9^{\text {th }}$-grade boarding students achieve higher scores in mathematics and Chinese reading tests, but it is not the case for $7^{\text {th }}$-grade students.

A possible explanation for this inconsistency is the variance of students' studying length in middle school. Given the CEPS data was collected after the mid-term of the first semester, the positive effect of boarding on campus may not be significant enough to differentiate the test performance of boarding students from their otherwise similar non-boarding cohorts. By contrast, $9^{\text {th }}$-grade students are facing the pressure of high-school entrance examinations. Most students need extra assistance from both school and family to be well prepared for such fateful high-stakes tests. In this situation, boarding school may better compensate students' disadvantages of lacking supports outside school. Given that school factors accounted for a small portion of the variance in English performance, students cannot derive significant advantages in English tests from strengthening school effects.

The findings further suggest that choosing a boarding school should be seen as an investment in children's development based on family social capital. Even though they possess strong family ties, disadvantaged parents may lack the ability to engage in children's educational activities. Enrolling children in boarding programs is a positive parenting practice because it creates a supportive after-school environment to the maximum extent. In this situation, family social capital embodied in parent-child relations can be helpful to convert parental resources into academic advantages of children from low-SES families.

## Using supplementary education is an effective way to improve students' test scores

This study is partially along with Bray's theory that supplementary education can be used to maintain competitive advantages and offset education equalization effort through differentiation of access (Bray, 2014; W. Zhang \& Bray, 2018). In the last two decades, supplementary education has rapidly grown popular in China (Bray, 2013; G. Zhao, 2015). According to the CEPS, over $30 \%$ of $7^{\text {th }}$ - and $9^{\text {th }}$-grade students participated in at least one supplementary course for mathematics, Chinese reading, or English reading. The findings suggest that students with high family SES tend to participate in supplementary education. Meanwhile, supplementary education contributes to students' advantages in $7^{\text {th }}-$ and $9^{\text {th }}$-grade English tests and $9^{\text {th }}$-grade mathematics test. However, it is negatively associated with students' performance in mathematics in Grade 7. None of the significant relationships is confirmed between Chinese reading and supplementary education in neither Grade 7 nor Grade 9.

Concerning the discrepancies among subjects, the current findings echoed previous research by claiming that supplementary courses have a fuzzy impact on Chinese achievement across students with various academic abilities (Dongdong Liu \& Yao, 2018; G. Zhao, 2015). The most reliable explanation is that the content of Chinese tests consists of many subjective
questions aimed to investigate students' reading comprehension. Those questions make the scoring criterion be much more flexible than the other tests. As a second language learning in China, vocabulary breadth and depth have considerable predictive power on students' scores on multiple-choice reading comprehension and summary writing, which are the primary components of high-stakes English tests in Chinese secondary education (M. Li \& Kirby, 2015). Given that both types of questions have relatively objective answers compared to Chinese tests, supplementary education can effectively improve participants' English achievement by teaching them memorial skills and exam-taking skills.

A possible explanation for the differentiated effects on mathematics performance between two grades is that students' demands for after-school tutoring are different among grades of middle school. The educational content in $7^{\text {th }}$-grade courses needs to bridge the knowledge learned in primary school and middle school. Such a situation determines that the mathematics courses in Grade 7 are not complicated enough to motivate many high-achieving students to seek extra assistance outside school and family. By contrast, relatively low-achieving students can offset learning loss at school by private tutoring on mathematics (Lauer et al., 2006). Therefore, after controlling for the other covariates, participants of mathematics tutoring are in disadvantaged positions in $7^{\text {th }}$-grade tests. In Grade 9 , both high and low performing students are driven by the increasing difficulty of curricula and the pressure and anxiety brought by high school entrance examinations to participate in supplementary education. Due to the more balanced sample, the effect of mathematics tutoring turns to significant and positive.

## Student migration is positively associated with students' test scores on Chinese reading

Migration changes the size and quality of resources available to students, which have a further impact on their educational outcomes. According to the results of ANOVA and Tukey's

HSD, migrant students' Chinese and English test scores were significantly lower than regular students in Grade 7. However, after controlling for the other covariates, migrant students did not show significant disadvantages in any subjects and both grades. Further, the current study finds that migrant students achieved higher scores in the mathematics tests in $7^{\text {th }}$-grade and the Chinese tests in both grades.

Both Chinese and English reading tests are designed to examine students' comprehension and vocabulary. However, the results do not confirm any significant relation between student migration and English performance in either grade. A possible attribution is that students benefit from migration in constructing the vocabulary in Chinese rather than in English, which improves their Chinese achievement. Having large academic and general corpora can strengthen students' reading comprehension (Hwang et al., 2017). Unlike academic language, general vocabulary can be used and improved in daily routines (Schuth, Köhne, \& Weinert, 2017). Considering the geographical and historical reasons, China has formed different dialects and language codes across the country. Migrant students, who benefit from their migration experience, are familiar with the different language codes of Chinese due to their frequent use in various daily contexts. Such experience enlarges their general corpora and benefits their academic vocabulary (Masrai \& Milton, 2018). However, as an unofficial second language studied in schools, English is rarely used in Chinese daily lives. The corpora of English hardly benefit from migration. Therefore, student migration brings advantages to Chinese performance but not to English.

Moreover, the evidence shows that migration to the current residence before Grade 7 was significantly and positively associated with students' performance in both grades. The effect size and magnitude of this variable are notably smaller in Grade 9 than in Grade 7. One possible reason is attributed to the time for adapting to a new environment. For $7^{\text {th }}$-grade students, residing in the current district after entering middle school means that they transferred to this school in the mid of term. In this situation, they may encounter difficulties in adjusting themselves to a new
social network at school, different teaching methods, and a changed study schedule in a short time, which indirectly hinder the development of students' educational outcomes through mediating the effects their academic self-concept (D. Zhang, Cui, Zhou, Cai, \& Liu, 2018). Nevertheless, $9^{\text {th }}$-grade students may deal with this issue better because they have more time and a stronger academic foundation to acclimatise to the schooling environments.

## Left-behind students perform no worse than regular students in all subjects and both grades

Unlike migrant students, parental migration merely improves left-behind students' family socioeconomic status rather than either creates a supportive family environment or changes their school environment. As such, the academic effect of migration become modest to left-behind students. Although the findings from ANOVA and Tukey's HSD show left-behind students achieved lower performance than regular students, especially in Grade 7, the similar results were not confirmed by using Hierarchical Linear Models. Such findings reveal that the academic disadvantages of left-behind students can be adequately explained by their individual and school factors, especially by student and family characteristics. Therefore, the changes in parenting practices and family structure brought by parental absence are the essential sources of left-behind children's academic difficulties.

Furthermore, the evidence from Tukey's HSD indicates that left-behind students have a significantly higher proportion of having a sibling than either regular students and left-behind students. Such a situation may not only dilute family resources used for their education but also increase their parents' financial cost for migrating with them (Downey, 1995; D.-R. Lee \& Yu, 2005). Although the results from HLM models did not support the negative effect of having a sibling, it is possibly because family socioeconomic status explains most of the inverse
relationship between sibship size and students' academic performance (Downey, 1995). Based on the ANOVA and Tukey's HSD results, failing to migrate with parents means the left-behind children may face the potential school problems of underdeveloped facilities, lack of senior teachers, and undisciplined school climate. All of the factors negatively affect the students' learning process at school.

## Supportive school climate contributes to students' academic achievement

This study is extending the previous research on the academic effects of school climate. The current evidence indicates most of the relationships between school climate components and students' academic performance are insignificant in Grade 9. Specifically, urban located school, well-developed educational facilities, and well-disciplined campus climate are positively related to students' mathematics and English achievement in Grade 7. Whereas, all of the factors have at most weak relations to students' mathematics test scores in Grade 9. Moreover, having a high proportion of senior teachers and school-organised self-study after school only contribute to students' English performance in Grade 7 other than in Grade 9.

A possible reason for the grade discrepancies is attributed to the different curriculum difficulties and pressure faced by students in two grades. As mentioned in the previous part, Grade 7 is the bridge between primary school and middle school. In this situation, teachers with more experience tend to possess adept instruction and advising skills that assist students in the transition to adapt better. This explains why $7^{\text {th }}$-grade students showed lower scores in schools with a lower ratio of senior teachers. When the adaptation is no longer a problem in Grade 9, the insufficient teaching experience has a significantly smaller effect on students' performance.

The findings of this study partially contradict Borman and Overman's (2018) conclusion by indicating that a supportive school community is equally essential to educational resources in
the school climate. In the current study, having few cases of truant students, fight, vandalism, and drunk at school represent a supportive school community. Located in an urban area and possessing sufficient educational facilities stand for affluent educational resources. Notably, both factors have a consistent and positive impact on English performance in both grades.

One possible explanation is that low-quality schools fail to attract high-quality teachers and students. Specifically, highly educated and high-quality teachers may flow to well-funded schools located in relatively developed areas (X. An, 2018). The teachers left in disadvantaged schools are incapable of instructing English courses in middle school. Although school selection is forbidden in the middle school stage, families with certain economic strength can transfer to a better school district through purchasing the house in a more prestigious location. In addition to face difficulties in school transfer, students in disadvantaged schools are laborious to benefit from out-of-school educational resources, like private tutoring, to facilitate their English studies because of the extra expense. Considering students' learning of English as a second language relies on professional support, the disadvantaged school situations may lead to students' underperformance on English in China.

## The positive effects of family capital, learning attitudes, and school location moderated by student migration

The evidence found in the current study demonstrates that the academic effects of several background characteristics can be moderated by student migration. Compared to non-migrant students with the same family SES, migrant students derived smaller academic advantages on mathematics and Chinese tests in both grades, and on English tests in Grade 7. A plausible explanation is that the restrictions on school choices in migrant destinations narrow down their choices of school. In China, The Law on Compulsory Education stipulates the principle of nearby
enrollment for public primary and middle schools. Parents who want to enrol their children in a high-performing school have to live in residence within the qualified district. Due to the change of residences, migrant parents with high SES background lack the information and time to find an available school in their destinations as good as the ones their children attended before migration. Therefore, the positive effects of SES on students' school performance are smaller for migrant students than for otherwise similar students.

Meanwhile, the results suggest that higher parental expectations bring significantly less educational returns to migrant students in all subjects and both grades compared to otherwise similar regular students. Migrant students also derive a lower advantage in Chinese reading from higher educational expectations. This result may not come as a surprise. Internal migration always directs at more developed regions (Easterlin, 1980; Mincer, 1978). Although migrant students enjoy relatively high-quality educational resources there, they are facing more severe competition with well-grounded local peers. Therefore, when they experience more severe difficulties in realising educational expectations from their parents and themselves, a better environment may turn into burdens for migrant students.

The current results do not confirm that the academic effects of cultural capital are significantly moderated by student migration. Migration significantly intensifies the negative effects of cultural capital on $9^{\text {th }}$-grade students' math and Chinese performance. The interaction is attributed to that the available educational resources are relatively fewer for migrant students in the grade aimed at preparing the high-stakes tests. Given the pressure and anxiety brought by high-school entrance examination, all parents with high expectations compete for supplying their children with high-quality resources from both formal schools and educational market. As discussed above, the lack of social network and information may put migrant students in a disadvantaged position at this "armament race". As such, spending more time on extra-curriculum activities may have a more substantial negative effect on migrant students' test performance.

In contrast with regular students possessing the same learning attitudes, migrant students displayed lower scores on Chinese tests in Grade 7, and mathematics and English tests in Grade 9. Additionally, migrant students derived a significantly lower advantage from schooling at urban schools compared to their cohorts from the regular group. Such findings suggest that migration may moderate educational returns on some favourable academic factors. A plausible explanation is that highly motivated migrant students cannot derive sufficient academic support matching with their effort contributed to learning. Although the evidence from the ANOVA and Tukey's HSD does not show a significant difference between educational resources used by migrant and regular students, it is possibly because a relatively larger proportion of regular students concentrated in the lowest SES quintile ${ }^{5}$, who are incapable of competing for high-quality resources. The mean value may conceal the disadvantages brought by hukou identity in the middle social strata. Moreover, migrant students may not enjoy equal educational services despite the fact that they enrol in the same formal and informal educational institutions as local students. Although the situation is changing, migrants are generally stereotyped to be uneducated due to the composition of first wave migrant labours (Afridi, Li, \& Ren, 2015). The negative stereotypes against migrant students' hukou identity may lead to a discriminating treatment on them (Afridi et al., 2015; Dee, 2014).
${ }^{5}$ The current evidence shows that regular students' families equally distributed among five SES quintiles. By contrast, migrant families concentrated in the middle three quintiles. Only a small portion of them was in the lowest SES quintile. This phenomenon is attributed to that low-quality labours are difficult to find regular and well-paid jobs in migrant destinations, which allows them to migrate with children.

## The advantages from higher parental expectations and studying in urban schools moderated by left-behind status

Left-behind students generally have formal identities at school, considering that their Hukou is in the same district as the school they attended. They also enjoy improved family economic status because of parental migration. Thus, they rarely experience discriminating treatment caused by stereotypes as migrant students. However, parental absence brings unique difficulties for them. This study finds that left-behind students achieved lower scores from higher parental expectations on mathematics and Chinese tests in Grade 9 and English tests in both grades compared to regular students.

Although the situation is similar to the one faced by migrant students, the reason behind it is different. On the one hand, left-behind students experience the negative impact brought by overpressure. For example, they tend to face higher-level social anxiety, more prevalent depression, and lower self-esteem. Such symptoms hinder them from balancing the motivation and pressure from higher parental expectations. Consequently, the overpressure results in the undermined positive effect on academic achievement. On the other hand, parental absence may complicate the outcome of parenting practices. Parents of left-behind students also recognized the importance of school education. According to the descriptive table, they expected their children to accept at least post-secondary education despite that the expectations were significantly lower than the regular parents'. However, given the separation, they may only use the growth of test scores to measure children's school performance rather than make rational cultivation plans based on children's capacity and interests. As a result, the neglect of children's demands may produce a converse effect on academic advantages brought by high parental expectations.

At the school level, the interaction between left-behind status and school academic infrastructure showed a negative effect on mathematics and Chinese reading test scores in both grades. Such a finding suggests that left-behind students derived smaller advantages from well-
equipped school facilities comparing to regular students. This situation is also attributed to parent-child separation because it shrinks left-behind students' chances of utilizing educational facilities at school. The use of school facilities happens both in class and after class. For example, students can take advantage of school libraries to extend the knowledge learned in class. According to the descriptive statistics, over $77 \%$ of left-behind students have at least one sibling. If their siblings are younger than them, those students need to look after them and do housework after school. Their absent parents are not helpful to relieve the burden, and their senior grandparents may not afford to take such responsibilities. As family affairs account for a substantial portion of their spare time, left-behind students cannot sufficiently take advantage of improved academic infrastructures to facilitate their studies.

Notably, left-behind students suffered smaller academic disadvantages from a less disciplinary school climate in Grade 7. A possible explanation is that the lack of spare time weakens left-behind students' social networks established at school. Such a situation moderates both positive and negative effects from the campus environment on their educational outcome. With the approaching of high-school entrance examinations, more students focus on test preparation rather than involve in misbehaviour at school. Thus, the interaction effects are insignificant on $9^{\text {th }}$-grade students.

## Chapter 7

## Conclusion

## Major conclusion and implication

The findings derived from this study contribute to the theory and practice concerning students' academic achievement in the context of China. In the theoretical aspect, the current study is conducive to construct a new model for explaining Chinese students' academic performance in mathematics, Chinese, and English reading. Researchers have observed that family and school background are the primary contributors to students' school performance (J. S. Coleman, 1968; James S Coleman, 1988; Davis-Kean, 2005; Dufur et al., 2013; Parcel \& Dufur, 2001). Based on this theory, Heyneman and Loxley (1983) further pointed out that the importance of school factors is negatively related to national per capita income. However, the subsequent studies indicated that such a relationship is becoming weak and family characteristics are still the primary contributor to students' academic achievement (Baker et al., 2002; Hanushek \& Luque, 2003; Harris, 2007). Enlightened by those studies, this dissertation focuses on the research gap and further improves the process model of academic achievement.

Although previous studies have formed a well-constructed theoretical framework to explain students' academic achievement, it may not be appropriately adapted to Chinese situations. First of all, the Chinese educational system is characterised by high-stakes tests, which defines that good schooling has to facilitate students' preparation for the examinations. The effectiveness of school education may depend on specific subjects due to various characteristics. China has a unique culture that has a long history of emphasising the importance of education, which encourages family investment in children's schooling. It is possible that Chinese parents may sacrifice economic interests to provide for a better educational environment for their
children. Finally, China is one of the fastest developing economies in the world that brings largescale horizontal mobility to Chinese society. It provides Chinese residents with chances to improve their current situations, and further changes their family structure. Those factors collectively influence what educational resources are available to students and to what extent a student can effectively benefit from changed resources.

Through noticing such variance, this dissertation contributes to the theory by demonstrating that the relative importance of family versus school effects varies among the subjects. More specifically, family effects are relatively more relevant to students' English performance. School factors accounted for more variance in students' Chinese performance. The relative importance of students' mathematics achievement relies on students' unique demands originated from the primary mission of different grade. Such findings supply a new perspective to explain why the same background characteristics may have differentiated effects on the test performance of different subjects.

Furthermore, this dissertation adds migrant status to the theoretical model. On the one hand, migration with children can improve their educational environment that brings advantages to their educational outcome. However, it also presents unique difficulties. For example, migration temporarily weakens social networks of students at school and of parents in the local community. As such, migrant students may be treated differently at school, and cannot equally benefit from their current environment as their otherwise similar cohorts. On the other hand, migration without children leads to parent-child separation. Parental migration increases family income. Whereas, the absence of parenting makes left-behind students' psychologic conditions be more vulnerable than the other students. Migrant parents fail to supply timely support to their children and put more family responsibilities on them by contraries, which reduce their chances to benefit from improved resources academically. Through including migrant status into the
model, it can depict a more precise picture to describe Chinese middle school students' educational process.

In the practical aspect, although the factors influencing academic outcomes are multifaceted, this dissertation describes the patterns and tendencies of factors influencing students' educational outcomes, which may supply references to parents and educators. Notably, family SES is still a vital contributor to students' educational outcome. Cultural capital mostly performs the function of social reproduction because the improved cultural taste fails to benefit students' school performance, which is closely related to their access to top-tier Chinese universities. Therefore, it is academically futile for parents to encourage children to participate in high-brow cultural activities.

The particular parental practices based on family social capital should respond to students' specific psychological and academic requirements that may change with their grades. For example, the presence of parents and a stricter parenting style may benefit younger students more than $9^{\text {th }}$-grade students. Parents should pay more attention to children's English studies. Creating a supportive environment at home is more beneficial to their English performance than just depending on school education.

High family social capital is a promise of supplying the backing of the collectivelyowned capital, which is related to the available educational resources inside and outside schools. However, such capital may not be sufficiently present in every family in the first place. For students without necessary academic assistance from families, proper utilization of boarding school and supplementary education may compensate those students' acquired disadvantages. Boarding on campus helps to isolate students from the unsupportive environment outside the campus. For students from low-performing schools, supplementary education plays a role in supplementing their learning loss at school and compensating for formal school disadvantages in educational facilities and human capital. Although both measures need further investigation on
their working conditions, they can be a potential approach to alleviate the negative impact of the external environment.

Concerning student migration, parents should consider the constraints before making decisions about family migration. For example, migrant students may not get equal access to high-quality educational resources as their local counterparts. More competitive school environment places heavy psychological burdens on migrant students, which requires parents and teachers to supply more timely guidance and appropriate supports. Furthermore, the academic disadvantages of left-behind students are the results of unsupportive family and school environments. To be detailed, even though family financial conditions are improved due to parental migration, the lack of appropriate parental care and needed educational resources still diminish left-behind students' educational returns.

This dissertation also has implications for policy-makers. Given the essential role played by schools in shaping students' academic outcome, it is crucial for the Chinese governments to promote equality in public educational resources among areas with different levels of development. In the long term, the fiscal policies in the next stage should tilt towards disadvantaged schools. For example, governments can use the relatively higher income to attract more high-quality teachers to those schools. Additionally, disadvantaged schools are generally located in rural or suburban areas in China. However, highly educated teachers tend to choose urban schools due to well-equipped infrastructures or their spouses' jobs. A new policy may solve this dilemma by supplying commuter buses for teachers who devote their careers to disadvantaged schools. Otherwise, even though a more considerable investment may fill the hardware gap, it will never really narrow the achievement gap due to the lack of high-quality human capital.

Considering that the school disparities discussed above cannot be eradicated at one stroke, the current dissertation also has short-term suggestions. As discussed in Chapter Three,
the implementation of the Guidance on Strengthening the Construction of Small-scale Rural Schools and Township Boarding Schools can improve education equity in rural and lessdeveloped area. However, children from disadvantaged families also exist in urban areas, where residential facilities are not equipped in each school. In the next step, the governments should enlarge the scope of investment in residential infrastructures to urban schools, especially those with low average SES. As such, urban students may have a choice to isolate themselves from unsupportive environments.

Moreover, in order to regulate the development of supplementary education, the newly published ORSS prohibited shadow education on enrichment purposes. Given the difficulty in defining the specific function of supplementary schools accurately, this policy may potentially damage supplementary education for remedial purposes either. In this situation, students from a disadvantaged school environment may hardly find academic support outside schools to offset their learning loss. The future policy should utilise shadow education as a short-term policy tool to promote education equity in China. For example, the government may provide underachieving individuals and students from low-performing schools with vouchers for supplementary schools. This measure may, to some extent, reduce the gap brought by disparities in school quality.

Finally, although qualified migrant and left-behind students can enter public schools as regular students with the same identity and within the same classroom, it does not mean they get equal access to high-quality educational resources. Given the specific challenges they face, students with migrant status, especially left-behind students, need more timely guidance and appropriate support. According to the CEPS, over $70 \%$ of schools possess counselling room to provide psychological supports to students. The future policies should grant individual funding for schools with a large proportion of migrant or left-behind students to employ professional counsellors. Then, the provincial governments should respectively supply them with essential training corresponding to the specific dilemmas faced by either kind of students. The positive
intervenes from school may help those students equally benefit from improved resources as their cohorts from regular families.

## Limitation

This study falls short in several aspects mainly due to data limitations. First, the database does not provide information on students before parental migration. It is challenging to discern specific changes in family income, parenting practices, and school characteristics brought by migration. Thus, the current study may not accurately estimate the size of advantage and disadvantage brought by parental migration.

Second, given that the CEPS do not supply students' previous test scores, the estimates of variables of interest may be biased due to the lack of controlling for prior knowledge. For example, some students may have learnt the $7^{\text {th }}$-grade curricula before they enter middle school. Given their familiarity with the knowledge taught at school, those students may achieve better test performance than their otherwise similar cohorts. Given that migrant origins are generally less developed than destinations, migrant students are in disadvantaged positions at school due to their relatively weak knowledge basis. Such a situation possibly leads to an underestimate of the academic effect of student migration. Therefore, the current findings do not allow for causal inferences.

Third, although this dissertation considered the variation among students with different migrant status, it assumes the homogenous effect of other variables of interest on educational returns across students from particular levels. For example, some factors may work differently in varied achievement levels or family socioeconomic strata. The current study may overlook the different distribution of students' academic performance in a specific cluster. As such, the findings cannot supply more targeted policy implications.

Fourth, there may be omitted variables at the school level. The results of all estimations models indicate that school characteristics accounted for a large proportion of variance in students' achievement. The models have included variables representing school economic, social, and human capital. However, the associations between specific school-level covariates and school performance are neither consistent across three subjects nor both grades. This situation may be attributed to the fact that either the performance variance is fully explained by individual-level variables, or there are omitted variables.

## Future research

Based on the limitations discussed above, future studies focusing on Chinese students' academic influencing factors may make contributions through the following promising avenues. First of all, a panel data analysis should be used to re-investigate the factors associated with students' academic performance. Panel data allows for the application of more advanced statistic techniques that can draw causal inference about the relations between background characteristics and educational outcome in the context of China. Second, more advanced data imputation techniques can be applied in future studies to deal with missing values in school-level variables. One missing value in a variable representing school characteristics may lead to the loss of the whole school sample in the analytic process. If an accurate value can be imputed, the finding may have more substantial external validity. Third, future studies may contribute to explore whether the effects of academic influencing factors are varied with different levels of personal capacities or family socioeconomic status. The findings of those studies may not only be helpful to supply more personal and productive school education to students, but also provide a reference for increasing returns of educational investment from both families and governments. Fourth, more theoretical research needs to focus on academic influencing factors in the context of China,
especially at the school level. The previous studies usually used western theoretical framework to explain the educational phenomenon in China. It may neglect specific factors generated in the Chinese culture, which potentially bias the interpretation of the findings. This dissertation tried to construct a framework adapted to the context of China. Nevertheless, more theoretical studies are needed to figure out what factors differentiate the average performance in different schools.

## Appendix

## Correlations Between Dependent and Independent Variables

|  | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. | 11. | 12. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1. Mathematics | 1.00 |  |  |  |  |  |  |  |  |  |  |  |
| 2. Chinese | $0.59^{* * *}$ | 1.00 |  |  |  |  |  |  |  |  |  |  |
| 3. English | $0.68{ }^{* * *}$ | 0.63 *** | 1.00 |  |  |  |  |  |  |  |  |  |
| 4. SES | $0.24 * * *$ | $0.15{ }^{* * *}$ | $0.27^{* * *}$ | 1.00 |  |  |  |  |  |  |  |  |
| 5. Cultural Capital | $0.17^{* * *}$ | $0.10^{* * *}$ | $0.21 * * *$ | $0.45 * * *$ | 1.00 |  |  |  |  |  |  |  |
| 6. Living with Both Parents | $0.08^{* * *}$ | $0.05^{* * *}$ | $0.08^{* * *}$ | $0.15 * * *$ | $0.19^{* * *}$ | 1.00 |  |  |  |  |  |  |
| 7. Student Expectation | $0.39^{* * *}$ | $0.35{ }^{* * *}$ | 0.41 *** | $0.22^{* * *}$ | $0.23 * * *$ | $0.05{ }^{* * *}$ | 1.00 |  |  |  |  |  |
| 8. Learning Attitude | $0.35{ }^{* * *}$ | $0.34{ }^{* * *}$ | $0.37{ }^{* * *}$ | $0.14 * * *$ | $0.19 * * *$ | $0.04{ }^{* * *}$ | $0.30^{* * *}$ | 1.00 |  |  |  |  |
| 9. Sibling | $-0.14^{* * *}$ | $-0.04^{* * *}$ | $-0.15{ }^{* * *}$ | $-0.43^{* * *}$ | $-0.30^{* * *}$ | $-0.11^{* * *}$ | $-0.12^{* * *}$ | $-0.06^{* * *}$ | 1.00 |  |  |  |


| 10. Negative Experience | $-0.19^{* * *}$ | $-0.21^{* * *}$ | $-0.21^{* * *}$ | $-0.07^{* * *}$ | $-0.09^{* * *}$ | $-0.03^{* * *}$ | $-0.18^{* * *}$ | $-0.21^{* * *}$ | $0.05^{* * *}$ | 1.00 |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 11. Boarding | $-0.04^{* * *}$ | $0.03^{* *}$ | $-0.07^{* * *}$ | $-0.41^{* * *}$ | $-0.28^{* * *}$ | $-0.15{ }^{* * *}$ | $-0.09^{* * *}$ | $-0.05^{* * *}$ | $0.33^{* * *}$ | $0.05^{* *}$ | 1.00 |  |
| 12. Friends at School | 0.03** | $0.05^{* * *}$ | $0.05^{* * *}$ | $-0.03^{* * *}$ | $0.04{ }^{* * *}$ | 0.01 | $0.07^{* * *}$ | 0.06 *** | $0.04 * * *$ | $-0.05^{* * *}$ | $0.04 * * *$ | 1.00 |
| 13. Communication with Mother | $0.18^{* * *}$ | $0.18^{* * *}$ | 0.23 *** | $0.19^{* * *}$ | $0.45{ }^{* * *}$ | $0.11^{* * *}$ | 0.23 *** | $0.22^{* *}$ | $-0.16^{* * *}$ | $-0.10{ }^{* * *}$ | $-0.06^{* * *}$ | $0.07^{* * *}$ |
| 14. Parental Control (School) | 0.02* | $0.03 * *$ | $0.05^{* *}$ | 0.02 | $0.22^{* * *}$ | $0.07^{* * *}$ | $0.15^{* * *}$ | $0.07^{* * *}$ | $-0.04^{* * *}$ | -0.02* | 0.00 | $0.06{ }^{* * *}$ |
| 15. Parental Control (Daily) | $0.07^{* * *}$ | $0.09^{* * *}$ | $0.12^{* *}$ | 0.01 | $0.18^{* * *}$ | $0.03 * * *$ | $0.17^{* * *}$ | $0.09^{* * *}$ | -0.02* | $-0.08^{* * *}$ | $-0.02^{* *}$ | $0.04^{* * *}$ |
| 16. Parental Expectation | $0.37^{* * *}$ | $0.31^{* * *}$ | $0.38^{* *}$ | $0.22^{* * *}$ | $0.18^{* * *}$ | $0.06^{* *}$ | $0.51{ }^{* * *}$ | $0.28{ }^{* * *}$ | -0.13 *** | $-0.12{ }^{* * *}$ | $-0.08^{* * *}$ | $0.03{ }^{* * *}$ |
| 17. Middle-class Neighborhood | $0.10^{* * *}$ | 0.06 *** | $0.12^{* * *}$ | $0.32^{* * *}$ | $0.18{ }^{* * *}$ | $0.06{ }^{* * *}$ | $0.12{ }^{* * *}$ | $0.08^{* * *}$ | $-0.15{ }^{* * *}$ | -0.02* | -0.16 *** | -0.01 |
| 18. Migrate before Middle School | $0.06^{* * *}$ | $0.05^{* *}$ | $0.05^{* *}$ | $0.04^{* * *}$ | $0.04^{* * *}$ | $0.07^{* * *}$ | $0.04^{* * *}$ | $0.04^{* * *}$ | $-0.06^{* * *}$ | $-0.03^{* * *}$ | $-0.06 * * *$ | $0.04^{* * *}$ |
| 19. Gender | $-0.05^{* * *}$ | $-0.24^{* * *}$ | $-0.24 * *$ | 0.00 | -0.02 | $-0.03^{* *}$ | $-0.12^{* * *}$ | $-0.18^{* * *}$ | $-0.08{ }^{* * *}$ | $0.13{ }^{* * *}$ | -0.01 | $-0.02^{* *}$ |
| 20. Health Condition | $0.05^{* *}$ | 0.03** | $0.06{ }^{* *}$ | $0.13 * * *$ | $0.19^{* * *}$ | 0.07 *** | $0.09^{* * *}$ | $0.09^{* * *}$ | $-0.06{ }^{* * *}$ | $-0.09^{* * *}$ | $-0.08{ }^{* * *}$ | $0.05{ }^{* *}$ |


| 21. School Location | $0.14{ }^{* * *}$ | $0.05^{* * *}$ | $0.17^{* * *}$ | $0.39^{* * *}$ | $0.23 * * *$ | $0.08^{* * *}$ | $0.17^{* * *}$ | $0.05^{* * *}$ | $-0.31^{* * *}$ | $-0.02^{* *}$ | $-0.35^{* * *}$ | $-0.08^{* * *}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 22. Academic Infrastructure | $0.14{ }^{* * *}$ | $0.15{ }^{* * *}$ | $0.18{ }^{* * *}$ | 0.20 *** | 0.13 *** | $0.10^{* * *}$ | $0.03^{* *}$ | $0.07{ }^{* * *}$ | $-0.11^{* * *}$ | $-0.05^{* * *}$ | $-0.06{ }^{* * *}$ | $-0.05^{* * *}$ |
| 23. Ratio of Secnior Teacher | 0.01 | $-0.02^{* *}$ | $0.07^{* * *}$ | 0.20 *** | $0.18 * * *$ | $0.09^{* *}$ | $0.06{ }^{* * *}$ | 0.03 *** | $-0.19^{* * *}$ | $-0.05^{* * *}$ | $-0.25^{* * *}$ | -0.01 |
| 24. Disciplanry Climate | $-0.13^{* * *}$ | $-0.08^{* * *}$ | -0.13 *** | -0.20 *** | $-0.16^{* * *}$ | $-0.06^{* * *}$ | $-0.02^{* *}$ | $-0.06^{* * *}$ | $0.14^{* * *}$ | $0.06{ }^{* * *}$ | $0.12^{* * *}$ | 0.01 |
| 25. Self-study after School | $-0.04^{* * *}$ | 0.03** | $-0.05^{* * *}$ | $-0.37^{* * *}$ | $-0.30^{* * *}$ | $-0.21^{* * *}$ | $-0.08^{* * *}$ | $-0.09^{* * *}$ | $0.35^{* * *}$ | $0.05^{* * *}$ | 0.56 *** | 0.04*** |
| $N$ | 13443 |  |  |  |  |  |  |  |  |  |  |  |


|  | 13. | 14. | 15. | 16. | 17. | 18. | 19. | 20. | 21. | 22. | 23. | 24. | 25. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 13. Communication with Mother | 1.00 |  |  |  |  |  |  |  |  |  |  |  |  |
| 14. Parental Control (School) | $0.29^{* * *}$ | 1.00 |  |  |  |  |  |  |  |  |  |  |  |
| 15. Parental Control (Daily) | $0.28{ }^{* * *}$ | $0.50^{* * *}$ | 1.00 |  |  |  |  |  |  |  |  |  |  |
| 16. Parental Expectation | $0.16^{* * *}$ | $0.09^{* * *}$ | $0.09^{* * *}$ | 1.00 |  |  |  |  |  |  |  |  |  |
| 17. Middle-class Neighborhood | $0.10^{* * *}$ | $0.03^{* * * *}$ | $0.04{ }^{* * *}$ | $0.13{ }^{* * *}$ | 1.00 |  |  |  |  |  |  |  |  |
| 18. Migrate before Middle School | $0.04{ }^{* * *}$ | 0.00 | 0.01 | $0.03^{* * *}$ | 0.03 *** | 1.00 |  |  |  |  |  |  |  |
| 19. Gender | $-0.14{ }^{\text {**** }}$ | -0.00 | $-0.10^{\text {ma* }}$ | $-0.06^{\text {**** }}$ | $-0.03^{* *}$ | $-0.04^{* * *}$ | 1.00 |  |  |  |  |  |  |
| 20. Health Condition | $0.13^{* * *}$ | $0.09^{* * *}$ | $0.05^{* * *}$ | $0.05^{* * *}$ | $0.02{ }^{*}$ | 0.01 | $0.05^{* * *}$ | 1.00 |  |  |  |  |  |
| 21. School Location | $0.12^{* * *}$ | $0.04 * * *$ | $0.06{ }^{* * *}$ | $0.18^{* * *}$ | 0.20 *** | -0.01 | 0.01 | $0.04^{* * *}$ | 1.00 |  |  |  |  |
| 22. Academic | $0.06{ }^{* * *}$ | -0.01 | -0.01 | $0.03^{* *}$ | $0.05{ }^{* * *}$ | -0.01 | -0.00 | $0.03{ }^{* * *}$ | $0.0{ }^{5 * *}$ | 1.00 |  |  |  |

## Infrastructure

| 23. Ratio of Secnior Teacher | $0.07^{* * *}$ | -0.00 | -0.01 | $0.04 * * *$ | $0.07^{* * *}$ | $0.05^{* * *}$ | $-0.03 * *$ | $0.06{ }^{* * *}$ | $0.14 * * *$ | $0.11^{* * *}$ | 1.00 |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 24. Disciplanry Climate | $-0.08^{* * *}$ | 0.02 | $0.02 * *$ | -0.02* | -0.06 *** | $-0.07^{* * *}$ | $0.02 * *$ | $-0.06^{* * *}$ | $0.04{ }^{* * *}$ | $-0.11^{* * *}$ | $-0.21^{* * *}$ | 1.00 |  |
| 25. Self-study after School | $-0.10{ }^{* * *}$ | -0.00 | 0.01 | $-0.08^{* * *}$ | $-0.12{ }^{* * *}$ | $-0.07^{* * *}$ | 0.02** | -0.10 *** | $-0.19{ }^{* * *}$ | $-0.07^{* * *}$ | -0.30 *** | 0.21 *** | 1.00 |
| $N$ | 13443 |  |  |  |  |  |  |  |  |  |  |  |  |

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## Selected Publication

Tan, M. (2016). The Path Dependence and Reform of "Study in China". Contemporary Education Science, (5), 62-64 (in Chinese).

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Tan, M. \& Bodovski, K. Compensating for Family Disadvantages: An Analysis of the Effects of Boarding School on Chinese Students Academic Achievement.


[^0]:    ${ }^{1}$ The key word was typed in Chinese＂中学＂and＂初中＂。
    ${ }^{2}$ The key word was typed in Chinese＂成绩＂and＂学业表现＂。

[^1]:    Note. Standard errors in parentheses.
    ${ }^{*} p<0.05,{ }^{* *} p<0.01,{ }^{* * *} p<0.001$

