SOCIAL CAPITAL AND ADOLESCENTS MATHEMATICS ACHIEVEMENT:

A COMPARATIVE ANALYSIS OF EIGHT EUROPEAN CITIES

Berglind Gísladóttir

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ABSTRACT

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This study examines the impact of social capital on mathematics achievement in eight European cities. The study draws on data from the 2008 *Youth in Europe* survey, carried out by the Icelandic Center for Social Research and Analysis. The sample contains responses from 17,312 students in 9th and 10th grade of local secondary schools in the following cities: Bucharest in Romania, Kaunas, Klaípéda and Vilnius in Lithuania, Reykjavík in Iceland, Riga and Jurmala in Latvia and Sofia in Bulgaria. The study builds on social capital theory presented in 1988 by the American sociologist James Coleman. He argued that social capital in both family and community is a key factor in the creation of human capital, meaning that children that possess more social capital in their lives will do better in school. Several prior studies have empirically supported the theory, although most of those studies were carried out in the United States. The current study tests whether the theory of social capital holds across different cultures. The findings partly support the theory, showing that the key measures of social capital are positively correlated with mathematics achievement in all of the cities. The impact

however was less in many of the cities than expected. Additionally, Coleman's key social capital variable did not positively associate with mathematics achievement in cities around Europe. The implications of that finding are discussed in the thesis.

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DEDICATION

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CHAPTER I

INTRODUCTION

Within-school factors are not the sole determinants of academic performance. Adolescents live their lives within the domains of parents and family, the peer group, leisure-time activities, and school as well as within the larger social milieu of their local communities. In addition to schools, these social circumstances are determinants of academic achievement. These domains intersect and influence each other in complex ways that affect adolescent educational attainment (Coleman et al. 1966; Morgan & Sorensen, 1999; Israel et al. 2001; Sun 1999).

The work of the American sociologist James Coleman has influenced educational research since the 1966 publication of "Equality of Educational opportunity" (The Coleman Report). His theoretical development of the term "social capital" originates in the explanation of educational achievement and attainment. Coleman focused on the role of social capital in the creation of human capital and used the *High School and Beyond* data (1980) to show that more social capital present in the lives students, in the form of two parents in the home, lower number of siblings, higher educational expectations and intergenerational closure, resulted in lower dropout rates (Coleman 1988). Coleman emphasized the importance of social networks, in particular intergenerational closure, defined as parents knowing the parents of their children's friends. The density of such social ties, according to Coleman, creates a form of social capital that is of particular

importance to the prosperity of youth in the community. In other words, parents are in a better position to establish norms and standards in their community when they know each other personally. Coleman's (1988) discussion of the concept of social capital in the context of educational attainment and social inequality shifted to some extent the focus from pedagogical and curriculum-driven concerns to the influences of family, peers and community on educational achievement (Thorlindsson et al, 2007; Dika and Singh 2002).

The theoretical framework of the current study does not stray far from Coleman's initial idea of social capital. Four theoretically distinct forms of parental relations that can be defined under the general rubric of social capital theory are distinguished. These forms are: Parental monitoring, parental support, time spent with parents, and intergenerational closure in the form of parents knowing their children´s friends and parents knowing the parents of their children´s friends.

This study compares the impact of social capital on mathematical achievement among adolescents in eight European cities. Such comparative research is important in order to understand what factors might be explained by cultural differences and what factors are universal. International comparative studies like the Programme for International Student Assessment (PISA) and The Trends in International Mathematics and Science Study (TIMSS) have provided profuse knowledge that serves as a beacon in mathematics education. Because of the knowledge gained by these studies the interest in comparative studies on achievement has grown as educators realize the extent and usefulness of the knowledge gained by comparison. Mathematical performance furthermore is comparable across different countries since it is a subject taught to most

students across cultures. How exactly these out-of-school factors translate into mathematical achievement across cultures is not well understood. Whether parental monitoring, parental support, time spent with parents, and intergenerational closure is of equal importance as an indicator of mathematical achievement across cultures has not been fully studied yet. Whether social capital relates to mathematics achievement of adolescents and if these relations are different across countries is an unresolved, yet important, question.

Purpose of the Study

The current study is a comparative study to be carried out on non-school factors between students in different European cities. The primary focus of the study is to add to previous knowledge by analyzing new comparative data, and by using appropriate techniques to understand better patterns and determinants of mathematics achievement among adolescents in different European cities. The knowledge this study yields can inform teachers and others who work with and for adolescents. It can be explanatory for educators who strive to enhance academic achievement by understanding the contributing factors in different contexts. That can in turn lead to more informed decisions about education programs and educational policy.

Research questions. The following questions will be considered in the study

1.

- **a.** Is parental monitoring associated positively with mathematics achievement?
- **b.** Is parental support associated positively with mathematics achievement?
- **c.** Is time spent with parents associated positively with mathematics achievement?
- **d.** Does intergenerational closure in the form of (a) parents know the friends of their children and (b) parents know the parents of their children's friends, associated positively with mathematics achievement?

2.

- **a.** Is the statistical association of social capital indicators in 1a-1d and mathematics achievement different in magnitude across the eight cities and if so how?
- **b.** Based on the combined social capital measures across the eight European cities, what is the cumulative variance explained in mathematics achievement and how does it differ between the cities?

The proposed research draws on the Youth in Europe data to compare the relations of social capital on mathematical achievement in eight European cities. The research investigates how social capital might explain comparative difference in mathematics achievement by testing the theory with data from eight cities in five European countries. The cities in question are: Bucharest in Romania, Kaunas, Klaipedia and Vilnius in Lithuania, Reykjavik in Iceland, Riga and Jurmala in Latvia, and Sofia in Bulgaria. All of

these countries are constitutional republics. Although all of the cities included in this study are European countries they differ from one another in important ways. For example, the annual gross domestic productivity (GDP) per capita estimated by the International Monetary fund in US dollars in 2011 was almost 37.000 in Iceland in 2010, ranking 16th out of 183 counties, but only about 12,000 in Romania, ranking 69th out of 183 countries. The difference between the countries can be seen further in the country profiles on the United Nations Human Development Index, which is a worldwide comparative measure of education, literacy, life expectancy, employment and standards of living. In 2010 the index ranked Iceland number 14, Latvia 43, Bulgaria at 55, Lithuania number 40, and Romania number 50. Iceland is the only country out of these to receive a "very high" grade on the index whilst the remaining five receive a "high" score on the index (United Nations, 2011).

These countries also differ to some extent in mathematics performance of their students in the PISA study. Out of these five countries Iceland scored above the OECD average, but the remaining four countries Bulgaria, Latvia, Lithuania, and Romania all scored significantly below the OECD average in mathematics (OESD, 2010). In respective, only two out of the five countries did not outperformed the United States in the 2009 PISA study.

Procedures of the Study

This study uses the data from the 2008 *Youth in Europe* study with responses from about 20,000 adolescences in 11 cities. The current study compares the effect of social capital on mathematics achievement in eight cities. Class-based representative samples were drawn in each participating city. Multiple ordinary least squares regression analysis is used to model the variables for each of the eight participating cities. A calculation of effect sizes for differences followed in order to evaluate the volume of any difference discovered.

If the social capital measures used in this study are related to mathematics achievement in all the cities, it suggests a global relevance of social capital in mathematics achievement among adolescents. The observed relationship is tested in order to discover if it is similar in strength between the cities in the study. If the social capital measures are related differently to mathematics achievement between the cities in the study, it calls for further analysis of the concept and what it is exactly about social capital that contributes to mathematics achievement. This may relate to policy, practice, the nature of social living and parenting in the cities, or indeed some other factors. This will also serve to challenge the existing body of evidence about the relevance of social capital as an indicator in mathematics achievement.

CHAPTER II

REVIEW OF RELATED LITERATURE

In this chapter social capital theory is presented as a theoretical framework for examining academic achievement of adolescents. The empirical link between education and social capital is discussed and the empirical findings regarding academic achievement are summarized.

SOCIAL CAPITAL THEORY

The Origin of Social Capital Theory

Social Capital is arguably one of the most successful "exports" from sociology to other social sciences and in to public discourse. It has been used to explain everything from differences in children's academic attainment to the economic development and government efficiency of cities and nations (Portes, SOCIAL CAPITAL: Its Origins and Applications in Modern Sociology, 1998). Social capital is a dynamic concept that focuses attention on the positive consequences of social networks and the essential importance of relationships. By making social connections, and keeping them going over time, people achieve things that they either would not be able to achieve by themselves, or could only achieve with great difficulty (Field j. , 2003). In a sense, the term social capital recaptures an insight present since the beginnings of the discipline and it is only its systematic contemporary analysis that was first done in the 1980's (Portes, 2000). The

original theoretical development of social capital has its roots in the work of the French sociologist Pierre Bourdieu (1986) and the American sociologist James Coleman (1988). Both scholars focused on individuals or small groups in their analysis and emphasized the benefits of accruing to individuals or families by virtue of their ties with others (Dika & Singh, 2002).

Pierre Bourdieu

Bourdieu's conceptualization of social capital is grounded in theories of social reproduction and symbolic power. He defined social capital as "*the aggregate of actual or potential resources linked to possession of a durable network of essentially institutionalized relationships of mutual acquaintance and recognition*" (Bourdieu, 1986, p. 249). Bourdieu (1986) distinguished between economic, social and cultural capital and attempted to explain investments on the part of the dominant class to maintain and reproduce group solidarity in order to preserve the group's dominant position (Linn, 1999). He decomposed social capital into two parts: first, the social relationships itself and second, the amount and quality of those relations. Bourdieu (1986) even went as far as to claim that people intentionally built their relations for the benefits that those relationships would bring them later. He emphasized how different forms of capital, money capital, social capital and cultural capital, can be obtained and how the ultimately can be reduced to economic capital. For example, through social capital (relations with others) people can gain access to loans, investment tips or restricted markets that would increase their economic capital. His analysis of social capital emphasizes social class and

power, or in other words, the social relationships that advance an individual's ability to further his or her own interests (Portes, 1998).

James S. Coleman

The American sociologist James Coleman is widely accepted as the initial theoretical originator of social capital theory. He published one of the most cited and influential articles on the concept in 1988, "*Social capital in the creation of human capital*". Coleman defined social capital by its function as "*a variety of entities with two elements in common: They all consist of some aspect of social structures, and they facilitate certain actions of actors - whether persons or corporate actors - within the structure*" (Coleman J. S., 1988, p. S98). He theorizes social capital not as something inherent within individuals or physical resources, but inherent within relationships between people. While Bourdieu (1986) used social capital to characterize the ways in which elite social classes used their social ties to reproduce privilege, Coleman extended social capital to incorporate the social relationships of disadvantaged individuals. He argues that social capital is positively related to financial capital, meaning that when one person's need for another is diminished due to greater wealth, it generates less quantity of social capital stock (Coleman, 1990). Coleman proposed that social capital is intangible and has three forms: (a) level of trust, seen by obligations and expectations, (b) channels of information, and (c) norms and social control that promote the common good over self-interest (Dika & Singh, 2002). To demonstrate how social capital functions in society Coleman gave an example of a mother of six children who moves with her

husband from suburban Detroit to Jerusalem. The mother described one reason for moving as the increased freedom her young children will have in Jerusalem. She felt safe in letting her eight year old take the six year old across town to school on the city bus and let her children play without supervision in the city park, neither of which she felt she would be able do while living in Detroit. Coleman states that the difference lies in the social capital available to the mother in Jerusalem compared to suburban Detroit since the normative structure ensures that adults in Jerusalem will look after unattended children. However, such normative structure is not in place in most metropolitan cities in the United States (Coleman J. S., 1988, p. S99). Coleman argues that social capital is a positive social control entity where trust and norms are characteristic of the community (Dika & Singh, 2002). "*Effective norms that inhibit crime make it possible to walk freely outside at night in a city and enable old persons to leave their houses without fear for their safety*" (Coleman J. S., 1988, p. S104).

According to Coleman (1986), norms that are reinforced by social support are the social capital that strengthens families and leads family members to act selflessly in the family's interest. He stresses the importance of social networks and places particular emphasize on intergenerational closure, meaning parents knowing the parents of their children's friends, as a social structure that enables the development of effective norms (Dika & Singh, 2002). When intergenerational closure is strong in families, the result is an environment where one's behavior has effective sanctions, which serve to guide and monitor individual behavior. As a result, children in well established inter-generationally closed families develop a strong sense of trust, obligation and expectations for

themselves and other family members and thus act accordingly. In families rich in social capital, children abide and accept shared adult evaluations while in families lacking in social capital, children can be influenced by the children of parents who are outside these social networks (Leonard, 2005). Coleman argued that a family's background is comprised by financial capital, human capital and social capital and that the different forms of capitals are analytically separable. Financial and human capital, are measurable by indicators like the family's income and parent education, respectively. However, he argued that the family social capital is less demonstrable as it is measured by a variety of indicators such as the number of siblings, the mother's expectations of the child's education, the ratio of adults to children in a family, and the frequency of talking with parents about personal experiences. Coleman's key hypothesis regarding the interaction between social capital and other forms of capital, such as human capital, is that if parental human capital is not complemented by family social capital, then the former becomes irrelevant to children's development. He states that social capital in both family and community is a key factor in the creation of human capital in society's younger generations (Coleman, 1990).

Extension of the Term Social Capital

Both Bourdieu´s (1986) definition of social capital and Coleman´s (1988) definition focused on the benefits of social ties for individuals or small groups. A subtle transition took place for the concept social capital where it went from being an asset to individuals to becoming an attribute of the community itself. The political scientist

Robert Putnam (1993) argued that social capital greased the wheels that allowed communities to advance smoothly. He defines social capital in a more expansive fashion as "*features of social organization, such as networks, norms, and trust, that facilitate coordination and cooperation for mutual benefit*" (Putnam, 1993). Putman stated that when social capital is present in communities, in the forms of norms and sanctions, everyday business and social interactions become less costly. He claimed that social capital improves people's knowledge and perspectives with increased awareness where ties between people and organizations maintain character traits such as toleration and empathy. Putnam sees social capital as an essential component for healthy, safer and developed society (Erkan, 2011). According to Portes (2000), this subtle transition of the concept social capital is qualitatively distinct from its individual version and is the reason why the literatures have diverged. This transition of the concept from benefits to individuals to community or national resource has caused controversy among scholars, who many feel that it was never sufficiently theorized. Social capital went from being an asset of children in intact families to becoming an explanation of why some cities are well governed and prosperous. Because of this stretch the concept is at risk of becoming a synonym for everything that is positive in social live.

Critic on Coleman's Theory

Coleman´s (1988) definition of social capital has also caused some debate among scholars. Coleman defined social capital by its function, claiming that it is productive because it facilitates certain actions that would otherwise not be possible or at least hard

to obtain (Linn, 1999, Portes,1998). Linn (1999) argues that this "functional" view, given by Coleman, may imply that social capital only exists when and if it works. He states that Coleman's (1988) definition suggest that the causal explanation of social capital can only be captured by its effect making the theory controversial as the causal and effectual factors are folded into singular function. In other words the cause factor is defined by the effect factor (family ties are social capital for person A because it gives him a better job; family ties are not social capital for person B because it does not give him a better job). Linn argues that allowing the outcome variables to dictate the specification of the causal variable is incorrect and needs to be specified in a more elaborate theory (Linn, 1999).

Fukuyama (2001) criticized Coleman's definition of social capital as a public good. He argues that social capital, as a public good is "clearly wrong" since co-operation is necessary to all individuals as a means of reaching the selfish ends, therefore they will produce social capital as a private good (Fukuyama, 2001, p. 8).

Leonard (2005) claimed that the way social capital is transformed from adults to children is vague by Coleman. She states that Coleman tells little about children's existing usage of social capital but rather that the focus is on children who do not possess it. In that regard Leonard (2005) claims that Coleman misses out on exploring how children's own networks might facilitate the development of social capital among children rather than between children and adults (Leonard, 2005).

Dika and Singh (2002) argue that the original conceptualization of social capital by Coleman is problematic and too vague to develop testable hypotheses. They state that Coleman confuses the sources (relationships) of social capital with the benefits (resources, opportunities) derived from it, thus, leading to circular reasoning. They also argue that Coleman's theories make it unclear whether the ability to access social capital (in the home or community) or the ability to activate this social capital in the school is linked with desirable outcomes. This makes it hard to disentangle the possession of social capital from its activation (Dika & Singh, 2002).

Despite controversy surrounding the concept of social capital, the seminal research by Coleman (1987, 1988, 1990) on education and by Putnam (1993, 1995) on civic participation and institutional performance, has provided inspiration for a large bulk of the current work on social capital, which has since merged around studies in eight primary fields: families and youth behavior; schooling and education; community life; work and organizations; democracy and governance; collective action; public health and environment; crime and violence; and economic development (Woolcock & Narayan, 2000). Social capital remains an intuitively appealing concept even when masked by conceptual obscurity because it draws attention to the positive aspects of social relationships and how the can improve child outcomes.

SOCIAL CAPITAL IN EDUCATIONAL RESEARCH

As stated before social capital is one of the most successful "exports" from sociology to other fields. According to Dika and Singh (2002) social capital was easily imported into educational fields as the theoretical development of the concept by both Bourdieu and Coleman had its origin in the explanation of educational achievement and attainment. The two scholars differed in their educational explanation. Bourdieu's (1986) theories mainly explained how social capital and cultural capital explain unequal academic achievement, which had already been examined using the skill deficit and human capital theories. He argued that the school system reworded cultural advantages. Children that are involved in cultural activities such as attending concerts and galleries, or playing classical instruments and taking art classes are reworded by higher grades because the school system places a high value on cultural knowledge, thus favoring the privileged class. Coleman (1988) used High school and Beyond (HSB) data to show that greater amount of social capital – lower number of sibling, family structure, higher education expectations of parents, and intergenerational closure – resulted in lower numbers of high school dropouts (Dika & Singh, 2002). Bourdieu's conceptualizations of social capital resulted in different type of exportation to the educational literature then Coleman's. Bourdieu's approach has been used to some extent in educational research, including language in the classroom, academic discourse, family- school relations as well as to explain differential experiences in school based on class, gender and race (Dika &

Singh, 2002). However, scholars within the field of education have mainly used Coleman's conceptualization of social capital to predict educational outcomes. Existing research is accepting Coleman's social capital concept and does generally not stray far from the social capital indicators proposed by Coleman in his original work, that is, mainly family structure and parent child interaction variables (Dika & Singh, 2002).

Undoubtedly the most influential study on family's social capital was "Equality of Education Opportunity", better known as the "Coleman Report". The "Coleman report" was published in 1966, more than twenty years before Coleman's theoretical development of the concept social capital. The 737-page study came to the unsettling conclusion that schools might not be the great equalizers in society after all. The study drew data for 570,000 students, 60,000 teachers and 4,000 elementary and secondary schools across the country (Viadero, 2006). The "Coleman report" indicates several groundbreaking findings, including that schools were not great contributors to students' academic achievement. For example, the report found that black children started out school trailing behind their white counterparts and essentially never caught up, even when their schools were as well equipped as those with predominantly white enrollments. The report stated that what mattered most in determining children's academic success was their family social environment (Viadero, 2006).

Many studies have drawn on the study "Equality of Education Opportunity", investigating the effects of school and home resources on children's academic achievement. Hanushek (1997) found that nearly 400 studies done in the years following

the “Coleman report” demonstrated that there was no strong relationship between student performance and school resources, if family inputs were taken into account. In other words implying that simply increasing school resources will not necessarily yield better student performances (Hanushek, 1997).

Dika and Singh (2002) critically reviewed 14 studies published from 1986 to 2001 where social capital was used as a framework to explore educational achievement. They found that the majority of these studies suggested positive association between achievement and social capital. Only one study found and inverse relationship between achievement and two social capital indicators, parent school involvement and parental monitoring of student progress (Dika & Singh, 2002).

Dafur, Parcel, & Troutman (2013) examined whether social capital created at home and at school has differing effects on child achievement in math, reading comprehension, and science. They used data from the second follow-up wave of the National Education Longitudinal Study (NELS: 88) employing data from the 12th grade surveys, yielding a sample of 10,585 students. They found that family social capital exerts stronger effects on academic achievement than school social capital, thus clarifying ideas about sites of social investment. These findings highlight the importance of the social capital that children experience in the home as critical to promoting students achievement.

Family Resources

Coleman (1988) argued that family background was separable analytically into financial capital, human capital and social capital. He argued that financial and human capital could be measured by indicators such as the family's income and the parents' education, respectively. Coleman (1988) claimed that one aspect of social capital was the means through which children can assess their parent´s human and financial capital. The quality and quantity of the connection and associability of adolescents with the resources of their parents can thus serve as a measure of their social capital. Factors such as socioeconomic status, family structure and education of parents are known to have affect on children's academic achievement, especially in economically developed nations.

Financial capital is typically measured in terms of family income. It is widely documented that family income is particularly relevant with regard to its impact on children's general academic achievement and attainment. Students with lower socio-economic status are more likely to experience academic problems including more grade retentions and course failures, lower achievement test scores and fewer completed years of schooling then their more advantaged peers (Artis, 2007; Boardman, Powers, Padilla, & hummer, 2002; Brooks-Gunn & Duncan, 1997; McLoyd, 1998). Socio economic status is consistently the family background variable that has the strongest relation to all aspects of children's academic achievement (Entwisle, Alexander, & Olson, 2005; Lytton & Pyryt, 1998; McLoyd, 1998; Miller, 1995). For example Lytton & Pyryt 1998 found that between 35% and 50% of the variation in elementary school students academic achievement could be explained by socio-economic status. Similarly Miller (1995) found

that poor and low – SES children performed significantly worse then non-poor and middle-class children on several academic indicators, such as achievement test scores, grade retention, special education placement, high school graduation and drop out rates as well as completed years of schooling.

Family income both directly and indirectly affects children´s social capital. Family income will largely determine the locations of the child's neighborhood and to a large extend dictate where the child attends school. Thus, family income not only directly provides home resources but also indirectly provides social capital in the form of supportive relationships among individuals, that promote the sharing of societal norms and values that are helpful to succeed in school (Dika & Singh, 2002; Coleman J. S., 1988).

Education of Parents

Human capital is the amount of education or training that a person has invested in oneself. Human capital in the family is usually measured by examining the education level of the parents or the family's socio-economic status. Parents' level of education is one of the greatest predictor for students' achievement, especially mothers' education (Davis-Kean, 2005; Haveman & Wolfe, 1995; Israel, Beaulieu, & Hartless, 2001; Magnuson, 2007; Sirin, 2005). Children of educated parents have generally more advantages and opportunities of achievement. Educated parents are more likely to encourage their children academically and have social ties to peers who share the values of achievement (Mullis, Rathge, & Mullis, 2003). Parents with higher educational level

also tend to have grater academic expectations. Coleman (1993) argued that expectations are a way parents can influence adolescent's academic performance. Adolescents whose parents expect them to do well tend to live up to those expectations, whereas adolescents whose parents have lower academic expectations tend to do worse (Steinberg, 1996). Israel et al (2001) found that children whose mother or father attended college showed scored higher both in math and reading. Similarly Boardman et al (2002) found that children of mothers who completed high school scored significantly higher on measures of math and reading than children whose mothers did not complete high school. Halle, Kurtz-Costes, & Mahoney, (1997) also looked at the relations between mothers' education level, academic expectations and children's achievement. They used a sample of low-income minority families, and found that mothers with higher education had higher expectations for their children's academic achievement and that these expectations were related to their children's greater achievement in math and reading. In general, educated parents tend to be able to provide their children with more educational recourses and learning opportunities as well as being more capable of helping adolescents with academic course work (Gutman & Eccles, 1999).

Family Structure

Coleman (1988) argued that the ratio of adults to children in a family is an indicator of the social capital available in the home. He claimed that because single parents are less able to spend time with their children, they have fewer opportunities to interact with their children in contrast with parents of children in two parent families.

This leads, according to Coleman, to less supportive learning environment for children in single parent families. Coleman also argued that children from single parent households, leads to inconsistent and weak social ties to the community, which in turn leads to lower social capital. Using data from the base year and first follow-up of the National Education Longitudinal study (NELS: 88), Pong (1998) supports Coleman's argument and suggested two possible explanations for the unfavorable effect of single parenthood on mathematics and reading achievement: first the lack of economic resources; and second the lack of social capital. She found that mathematics and reading achievement differences between schools with low concentrations of students form single parent families and schools with medium concentrations was explained by economic status and social capital (in the form of parental involvement) (Pong, 1998).

In the last decades family structure has changed to a large extent around the world as more children now live in single-parent families, step and guardian families. Research shows that alternative family structures are often associated with lower educational achievement; the disadvantage is partly due to socioeconomic factors. Two-parent households typically have higher socioeconomic status that allows parents to spend more time with their children and be more involved with their children's schooling (Lareau, 2002). Much supports the notion that children in single-parent families are at a greater risk than are children in two-parent families of educational failure, either by lower achievement scores or by dropping out of school. These detrimental effects of single parenthood are found even when factors such as socio- economic status, ethnicity and other family background factors are controlled for (McLanahan &

Sandefur, 1994; Zill, 1996).

Börklund and Sandstrum (2007) investigated the impact of childhood family structure, schooling and earnings in Sweden and the United States. Their hypothesis was that family structure could potentially have less negative effect in Sweden than in the United States because norms in Sweden have de-emphasized the importance of marriage as an institution. Thus, the stigma of growing up in a non-intact family may be less severe in Sweden then in the United States. Their findings, however, showed strikingly similar educational differences by family structure in the two countries. When only looked at family structure and controlled for other family background variables, like age, sex, race, nearly all non-intact family structure variables are negatively associated with educational outcomes. Some studies have also suggested that greater number of children in the home may require finer divisions of parental time, resources and energy, resulting in lower academic achievement (Coleman,1988; Downey, 1994; Parcel & Dafur, 2001; Parcel & Menaghan, 1994).

Parental Support

In general researchers have found that parental involvement has positive effect on students' achievement (Coleman 1988; Epstein 1991; Fan and Chen 2001; McNeal 1999; Singh et al. 1995). Coleman (1988) defines this capital simply as: "relationship between children and parents" that promotes success in the field of education. He believed that parents who spent time and effort involved in their children´s lives greatly enhanced their children's academic and intellectual performance in school (Schneider & Coleman,

1993). Research does support Coleman´s theory, there is a positive relationship between parental involvements and how children do in school. Thus, parental involvement has been found to be positively related to academic achievement (Coleman 1988; Epstein 1991; Fan and Chen 2001; Jeynes, 2007; Kristjansson & Sigfusdottir, 2009; McNeal 1999; Singh et al., 1995).

Fan and Chen (2001) conducted a meta-analysis on the effect of parental involvement on academic achievement. They found that even though the literature related to parental involvement in students education appears to be huge, a closer examination reviled that only a small number of these studies are empirically based. They also argued that that the operational use of parental involvement was not clear and consistent within the literature, which makes it difficult to draw any general conclusions across the studies and may have contributed to the inconsistent findings in this area. Twenty-five studies met Fan and Chen's (2001) inclusion criteria of and were subsequently used in their meta – analysis. Their findings reviled a small to moderate relationship between parental involvement and academic achievement. Parental involvement had stronger effects on achievement when students' GPA represented academic achievement, rather then being represented by a subject specific indicator such as mathematics achievement. Parental expectations for their children's education achievement had the strongest relationship to academic achievement while they found that parental home supervision had the weakest relationship to student achievement (Fan & Chen, 2001).

Jeynes (2007) undertook a meta-analysis of 52 studies to determine the influence of parental involvement on the educational outcomes of urban secondary school children.

He considered the following in his analysis: to what degree parental involvement associates with higher levels of school achievement, if parental involvement in school programs positively influences urban students, what aspect of parental involvement helps students the most and whether relationship between parental involvement and academic achievement is the same across racial groups. He found that the influence of overall parental involvement is positively related to achievement and the relationship holds across different types of populations of children. Similarly to the findings of Fan and Chen (2001), Jeynes found expectations were the specific component of parental involvement that had the greatest impact on achievement (Jeynes, 2007).

Kristjansson and Sigfusdottir (2009) examined the relationship between parental support, parental monitoring and time spent with parents on the academic achievement among adolescent girls and boys. In their analysis Kristjansson and Sigfusdottir (2009) used data from a 7350 ninth and tenth graders in Icelandic secondary schools. Their results indicated that parental practices, such as access to care and warmth, reasonable monitoring, and time spent with parents are important factors for adolescents academic achievement. Furthermore they found that most of the influence of parental support and time spent with parents on achievement is indirect through school effort, but the effect of parental monitoring on achievement is mostly direct and not mediated through effort. Therefore Kristjansson and Sigfusdottir argued that children that are well supported and spend much time with their parents are more able and willing to put in the effort that is needed in order to succeed in school, while those who are monitored more will do well for that reason only (Kristjansson & Sigfusdottir, 2009).

Even though most studies support the theory that parental support effects academic achievement, Epstein (1991) claimed that while parental involvement in students' studies showed positive relations to some achievement test it does not have the same positive relations to mathematics achievement. She argues that the achievement gains might be grater in subject were parents feel less apprehensive about helping their children (Epstein, 1991).

Mathematics Achievement

Because the "Equality of Education Opportunity" study 1966, found that what mattered most in determining children's academic success was their family background, Coleman later developed his theory on social capital by specifying intergenerational closure as a source for students better academic achievement. He and his associates argued that students in Catholic schools performed better then students in regular public high schools even though Catholic schools spend less money per pupil (Coleman & Hoffer, 1987). Coleman contributed the superior achievement of catholic school students on standardized tests to two factors: the ideology of the Catholic Church and intergenerational closure. Coleman argued that students in Catholic schools benefited from shared norms generated by social closure among the parents in the school community. The density of such social ties is, however, not present in the school community of students in public schools. He claimed that Catholic schools are embedded in communities with stronger achievement norms, which increase student effort. In general, parents must be connected to their children's friends through their relationships

with other parents if they are to communicate the social norms needed for children's academic development (Coleman & Hoffer, 1987).

Coleman's claim that intergenerational closure has positive effects on student achievement has both been supported and doubted by researchers (Morgan & Sørensen, 1999; Carbonaro, 1998; Morgan & Todd, 2009; Israel, Beaulieu, & Hartless, 2001; Sun, 1998, 1999; Thorlindsson, Bjarnason, & Sigfusdottir, 2007; Dafur, Parcel, & Troutman, 2013). Carbonaro (1998) tested the hypotheses whether higher levels of intergenerational closure among students, their friends, their parents, and their friends' parents influence educational outcomes for students. He used data from the National Educational Longitudinal Study of 1988 (NELS: 88) and analyzed the responses of students and parents from the 8th- to the 12th- grade longitudinal cohort, with a total sample size of 16,489. He found that there was a significantly positive association between mathematics achievement and intergenerational closure. Carbonaro, however, did not find the same positive relations to achievement in reading, history, or science (Carbonaro, 1998).

Morgan and Sørensen (1999), tested the hypotheses: Whether or not social capital, in the form of social closure, is associated with increased learning in mathematics and if social closure could explain a substantial portion of the Catholic school effect on learning. Like Carbonaro (1998), Morgan and Sørensen (1999) used data from the National Educational Longitudinal Study of 1988. Their findings showed that in public schools, the density of student friendship networks increased mathematics learning but the density of parental networks decreased it. Morgan and Sørensen contributed Catholic

schools students' higher performance to the fact that Catholic schools tend to offer a wider variety of honors mathematics classes and concluded that social closure couldn't explain away any substantial portion of the observed "Catholic school effect" on learning. Their findings are in contrast to Coleman's hypotheses as they state that social closure is not as closely related to the "Catholic school effect" as Coleman's empirical findings led him to believe. However, Morgan and Todd (2009), revisited the controversy and analyzed more recent data from the 2002 and 2004 waves of Education Longitudinal Study (ELS) and came to a somewhat different conclusion. Unlike Morgan and Sørensen (1999), Morgan and Todd (2009) did not find a negative association between parental closure and learning within the public school sector. On the contrary they found a positive association between parental closure and mathematics achievement. They also found that parental closure has substantial association with mathematics achievement in Catholic schools and that parental closure can to some extent increase achievement in Catholic schools, thus supporting Colman's conjecture that student's learning is to some degree facilitated by parental closure (Morgan & Todd, 2009).

Grades in mathematics are commonly used as an indicator of academic achievement within educational research (Bassani, 2006; Carbonaro, 1998; Israel, Beaulieu, & Hartless, 2001; Morgan & Todd, 2009 Morgan & Sorensen, 1999; Thorlindsson, Bjarnason, & Sigfusdottir, 2007). In general studies suggest that there is a positive relationship between social capital indicators and mathematics scores. These studies, however, all use data from the United States. The only exception is a study by Thorlindsson, Bjarnason, & Sigfusdottir (2007) that uses data from Iceland and Bassani

(2006) that uses data from Japan, Canada and the United States. Bassani (2006) drew on data from the PISA study to compare the impact of social capital on mathematics achievement in Japan, Canada and the United States. She found that the measures of social capital were not all significantly associated with levels of mathematics scores. She found that social capital was a stronger indicator of mathematics achievement in the two western countries and argued that the reason might be that the theory was largely developed in the United States and the vast majority of researchers have used US data to test social capital theory. Bassani (2006) also argued that because mathematics is a core subject that is taught in all nations, its use facilitates cross—national comparison. Because the laws of mathematics are more standard among cultures, then for example language skills, which vary more between countries and cultures, mathematics scores are a reliable and valid measure of achievement among students from different nations (Bassani, 2006).

In spite of great advances that have been made in understanding the importance of social capital for mathematic achievement and despite the implications for educational policy in a global context, gaps still remain in our knowledge of how social capital affects achievement in different cultural contexts. One reason for this lack of understanding is a dearth of comparative studies of the association between social capital and mathematic achievement across countries. The key aim of the current study is to add to existing knowledge on this important aspect, namely by thoroughly examining the association between social capital and mathematic achievement in different European cities.

CHAPTER III

METHODOLOGY

This chapter provides a discussion of the data and methods that are used in this study starting with an overview of the study. Participating cities are noted, followed by a discussion on specific variables that are analyzed. In addition, a preliminary study is presented and discussed and finally a review of the statistical analyses that will be conducted in this study.

Overview of the Study

This study explores the impact of social capital on mathematics achievement in eight different European cities. The study builds on the theoretical framework of the concept of social capital presented by Coleman (1988), stating that social capital in both family and community is a key factor in the creation of human capital. Meaning that greater amount of social capital – lower number of siblings, ratio of adults to children in a family, higher education expectations of parents, and intergenerational closure – will result in higher academic achievement (Coleman J. S., 1988). Four theoretically distinct forms of parental relations are used as an indication of social capital, namely, parental monitoring, parental support, time spent with parents, and intergenerational closure in the form of parents knowing their children´s friends and parents knowing the parents of their children´s friends.

There were two main research questions:

1.
    a. Is parental monitoring associated positively with mathematics achievement?
    b. Is parental support associated positively with mathematics achievement?
    c. Is time spent with parents associated positively with mathematics achievement?
    d. Does intergenerational closure in the form of (a) parents knowing the friends of their children and (b) parents knowing the parents of their children's friends, associated positively with mathematics achievement?
2.
    a. Is the statistical association of social capital indicators in 1a-1d and mathematics achievement different in magnitude across the eight cities and if so how?
    b. Based on the combined social capital measures across the eight European cities, what is the cumulative variance explained in mathematics achievement and how does it differ between the cities?

Sample

This study uses data from the 2008 *Youth in Europe* study with responses from about 20,000 adolescences in 11 cities. Class-based representative samples of 14 – 15 year olds adolescents were drawn in each participating city in October and November of

2008. The participants were students in 9th and 10th grade of local secondary schools of each city. All classes from all schools within each city were randomly sampled for participation. Anonymous questionnaires and envelopes for returning completed questionnaires were distributed to participants. Teachers supervised the participation of the students in the study and administered the survey questionnaire at individual school sites guided by a strict methodological protocol from The Icelandic Centre for Social Research and Analysis (ICSRA). All students who attended school on the day that the questionnaire was scheduled to be administered, completed the questionnaire inside their classrooms. A prior study by Bjarnason (1995) showed that there are no teacher effects of this method of data collection on adolescent answers in the questioners. Unfortunately, the data from three of the cities that participated in the Youth in Europe study suffered from limitations for the purpose of the current study and will there for not be included.

Participating Cities

There are eight cities in five different European countries that are considered in the current study. The cities are Bucharest in Romania, Kaunas, Klaípéda and Vilnius in Lithuania, Reykjavík in Iceland, Riga and Jurmala in Latvia and Sofia in Bulgaria.

Southeastern Europe. Two cities are located in Southeastern Europe, namely Bucharest in Romania and Sofia in Bulgaria.

Romania is a country in the southeastern part of Europe bordering the Black Sea. Romania shares borders with Hungary, Serbia, Ukraine, Moldavia and Bulgaria. Bucharest is the capital, and largest city of Romania. It is the countries financial and central point with a population of about 1.7 million people. Over 95% of the population living in Bucharest is Romanians but other significant ethnic groups are Roma Gypsies, Hungarians, Turks, Chinese and Germans. The city experienced a rapid growth during the Ceausescu regime (1965 – 1989) when its population grew from 1.3 million to over 2 million. Bucharest is the most economically developed city in Romania and is inhabitants pay almost one third of the countries taxes even though only 9% of the countries population lives in Bucharest. The per-capita GDP in Bucharest is about $34,000, which is more then twice the Romanian average. However, quality of life remains hard in Bucharest and according to the Mercer survey 2011 on the quality of life in 225 cities around the world, Bucharest is second to last in the European ranking.

Bulgaria is located in Southeastern Europe. It shares borders with Romania, Serbia, Macedonia, Greece and Turkey. Sofia is the Capital of Bulgaria and the countries largest city with about 1.2 million habitants. The population in Sofia is made up 96.4% ethnic Bulgarians but other significant ethnic groups are Roma Gypsies and Turks. The GDP per capita in Sofia is more then twice the Bulgarian average. Bulgaria's unemployment is high and Sofia is the only city in Europe that ranked lower than Bucharest on the Mercer quality of life index, ranking 113th out of 221 cities globally.

Compulsory education in both Romania and Bulgaria is free of cost, starting with first grade at the age of seven and ends in 10th grade, which corresponds to the age of

sixteen or seventeen. In Bulgaria there is also a preparatory school year in order to enter first grade at the age of seven. Expected years of schooling, in other words the number of years of schooling that a child at school entrance age can expect to receive are, according to the United Nations Human Development Index, 13.7 in Bulgaria and 14.2 in Romania

Mathematics is one of the core subjects taught in schools in both countries and both countries participate in PISA (Programme for International Student Assessment) and TIMSS (Trends in International Mathematics and Science study). Both Bulgaria and Romania scored statistically significantly below the average in the PISA study in Mathematics 2009 and ranked 46 and 47, out of 65 countries, respectively. In the TIMSS study 74% students participating in Bulgaria and 73% of students participating in Romania reached the Low International Benchmark which states, "Students have some knowledge of whole numbers and decimals, operations and basic graphs"(IEA study center,2007). The high International Benchmark in the TIMSS study states: "Students can apply their understanding and knowledge in a variety of related complex situations. They can relate and compute with fractions, decimals, and percent, operate with negative integers, and solve word problems involving proportions. Students can work with algebraic expressions and linear equations. Students use knowledge of geometric properties to solve problems including area, volume and angles. They can interpret data in a variety of graphs and table and solve simple problems involving probability". This bench mark was reached by 20% of students participating in both countries (Martin, Mullis, & Foy, 2008).

The Baltic region: Northern Europe. The Republic of Lithuania is a European country on the eastern coast of the Baltic Sea. Lithuania borders Russia, Belarus, Lativa and Poland. Three of the cities in this study are in Lithuania.

Kaunas is located in the center of Lithuania,has a population of little over 300,000 and is the second largest city in the country. It is the center of industry, trade and service in Lithuania. Approximately 94% of the population are Lithuanians,4% are Russians with 3% of other ethnicities.

Klaípéda is a city in the northwestern region of Lithuania with a population of less then 200.000. The ethnic composition in the city consist of 75% Lithuanians, 20% Russians with 5% other ethnicities. The cities regional importance is mainly due to its port as it is usually an ice-free port on the Baltic Sea and the only commercial port in Lithuania.

Vilnius is the countries capital and the center of industry, business academy and culture, located in the southeast of the country. It is the counties largest city with a population of about 600,000. Even though it is home to only 15% of the countries population, Vilnius generates approximately 25% of the GDP. About 60% of the population in Vilnius is made up of Lithuanians with the Poles and Russians as the other largest significant ethnic groups. The city is very diverse with estimated over a 100 different ethnicities, making it the most ethnically diverse city in Lithuania.

Compulsory education is free of charge in Lithuania starting from age 7 until the 10^{th} grade or age 16. The expected years of schooling are 15.9. Mathematics is a core subject taught in schools in Lithuania and the country takes part in both the international

studies PISA and TIMSS. Lithuania scored below the OECD average in the PISA 2009 study in Mathematics ranking 36 out of 65 countries. In the TIMSS study Lithuania has done better as 94% of students reach the low International Benchmark and 42% of students reach the high International Benchmark. Their average score in mathematics in the study has gone up 34 points between the 1995 study and the 2007 study (Martin, Mullis, & Foy, 2008).

Two cities in this study are from The Republic of Latvia. Latvia is a country in the Baltic region of Northern Europe. It has borders to Estonia, Lithuania, Russia and Belarus. Riga is the capital of Latvia and the largest city in the Baltic countries, with a population of about 700,000 inhabitants. The city is an important seaport and a major industrial, cultural and financial center of the Baltic Sea region. During the Soviet occupation (1944-1991) a large number of Russians and other Soviet republic citizens immigrated, causing dramatic change in the demographic of Riga. Today, Latvians make up 46% of the cities population, which has increased from 1989 when the only made up 36% of the population. The percentage of ethnic Russians in Riga today is 40% and has fallen from 47% in 1989 when they were the dominant ethnicity in the city.

Jurmala is a small city about 25 kilometers west of Riga with a population of about 55,000. The city was formally a part of Riga and known as Riga's Jurmala. The demographics are similar to that of Riga.

Education in Latvia is free and compulsory starting at the age of 7 until the age of 15. A child entering school can expect to spend an average of 15.4 years in school. Latvia scored below the OECD average in the PISA 2009 study in Mathematics ranking

37 out of 65 countries. In the TIMSS study 95% of students participating in Latvia reach the low International Benchmark and 44% of students participating reached the high International Benchmark. Their average score in mathematics in the study has gone up 38 points between the 1995 study and the 2007 study (Martin, Mullis, & Foy, 2008).

The history of Latvia and Lithuania are both heavily marked by the Soviet occupation and coercion from the Second World War until 1991, when the Baltic states regained independence. With the entry into the EU and NATO in 2004, Russian influence in the Baltic region appeared somewhat to diminish.

Northwestern Europe. Reykjavík in Iceland is the only city in this study located in Northwestern Europe. Iceland is an island country in northwestern European, located on the Mid- Atlantic Ridge. Reykjavík is the capital of Iceland and the counties only city with about 180,000 inhabitants, which is two-thirds of the countries population. The population is very homogeneous with around 95% of Reykjavik's inhabitants being Icelanders due partly to the isolated geographic location of the country as well as the strict immigration policy.

Of the counties considered in this study, Iceland has the lowest inequality in the distribution of family income in a country and has the highest educational index, which measures literacy rate and combined primary, secondary and tertiary gross enrollment ratio (United Nations, 2011). Primary and lower secondary education is mandatory by law in Iceland, from 1st grade, age six to 10th grade, age sixteen and the expected years of schooling are 18 years. Iceland participated in PISA (2009), and is the only country in this study to score significantly above the OECD average in mathematics, ranking

number 18 in out of 74 countries.

Even though all these cities are in Europe they differ from each other in fundamental ways. Seven of the cities are located in post-communist countries; these cities are heavily marked by former Soviet influence and have gone through process of market society since the fall of the Iron Curtain in 1989. Some of these cities continue to experience a range of social problems, such as high levels of inequality and unemployment. Reykjavík has lower inequality then the other cities and is the only one of these cities to receive a "very high" grade on then United Nation development index. Because of the differences of the cities, this study should give a good indication of weather the impact of social capital on achievement is generalizable in different cultural contexts.

Table 1. Number of participants in each city and response rate.

City	N	Response rate (%)
Bucharest	**2,657**	**95**
Jurmala	**567**	**91**
Kaunas	**2,567**	**92**
Klaipeda	**1,898**	**94**
Reykjavík	**2,111**	**75**
Riga	**2,679**	**96**
Sofia	**2,668**	**95**
Vilnius	**2,263**	**94**

Measures

The Youth in Europe survey was developed by The Icelandic Centre for Social Research and Analysis (ICSRA) at Reykjavík University in cooperation with associates at the University of Iceland. The questionnaire was the same in all participating cities and included several locally developed and international scales and individual questions (see Kristjansson (2008) for full discussion). In each participating city the core questionnaire was translated and then back translated for accuracy of interpretation. The questionnaire contains questions on substance use and delinquency as well as core questions that cover a broad selection of demographic and social variables, including family structure, parental and peer support, structured and unstructured activities, as well academic achievement and expectations.

Dependent Variable.

MATHEMATICAL ACHIEVEMENT: Students were asked about their grades for the semester in mathematics.

Controlled Variables.

GENDER: Participant´s gender is coded with 1 for girls and 0 for boys.

AGE: The Youth in Europe survey was conducted in respective 9^{th} and 10^{th} grades in the participating cities, where a majority of students were 14 - 15 year olds. However, the range of the participants is from 12 to 18 years old and therefore age will be controlled for.

FAMILY FINANCIAL STATUS: Family financial status is used as a control variable in this study as it is widely documented as the family background variable that has one of the strongest relation to all aspects of children's academic achievement (Artis, 2007; Boardman, Powers, Padilla, & hummer, 2002; Brooks-Gunn & Duncan, 1997; Entwisle, Alexander, & Olson, 2005; Lytton & Pyryt, 1998; McLoyd, 1998; Miller, 1995). As an indicator of socio-economic status participants were asked about how well off financially their family was in comparison to other families in the community: the answers were measured on a seven-point scale: 7="Much better off", 6="quite better off", 5="a bit better off", 4="similar", 3="a bit worse off", 2="quite better off", 1="much worse off".

EDUCATION OF PARENTS: Because parents' level of education is one of the greatest predictor for students' achievement, (Davis-Kean, 2005; Haveman & Wolfe, 1995; Israel, Beaulieu, & Hartless, 2001; Magnuson, 2007; Sirin, 2005) it will be used as a control variable in this study. Participants were asked about the highest level of schooling their mother and father have completed: The responses were measured on an 8 point scale in all cities except Bucharest where they used a 10 point scale and in Reykjavik were a 6 point scale was used. The eight point scale was as follows: 1="Primary school or less", 2="started high school but has not finished", 3="graduated from high school", 4="started junior college or trade school but has not finished", 5="graduated from junior college or trade school", 6="started university but has not finished", 7="graduated from a university", 8 = "don't know/does not apply". Within

each city data the option “don’t know/does not apply”, was replaced with the mean value for parents’ education within that city.

FAMILY STRUCTURE: Family structure is also controlled for as it has been shown to have strong effect on children’s academic achievement (Börklund and Sandstrum, 2007; Pong, 1998; McLanahan & Sandefur, 1994; Zill, 1996;). Family structure measured whether adolescents lived with both biological parents both parents or in other family arrangements: Respondents were divided into two groups, with 0 = “lives with both parents” and 1= ”other arrangements”.

SCHOOL ABSENCE: School absence is measured with three questions. Participants were asked how many whole days they had been absent from school during the last 30 days: “Because of illness”, “Because they skipped or cut classes” or “for other reasons”. The answers were measure on a six point scale: 1= “none”, 2 = “1 day”, 3 = “2 days”, 4 = “3-4 days”, 5 = “5-6 days” or 6 = “7 days or more”.

Independent Variables

PARENTAL SUPPORT: Parental support was measured with the following questions:

How easy or hard would it be to receive the following from your parents. “Caring and warmth”, “discussions about personal affairs”, “advice about the studies”, “advice about other issues (projects) of yours”, “assistance with things”. The responses were measured

on a four-point scale: 1="Very difficult", 2=" rather difficult", 3="rather easy",4="very easy".

TIME SPENT WITH PARENTS: Two questions were used to measure time spent with parents. The participants were asked how well the following applies to them: "I spend time with my parents outside school hours on working days", "I spend time with my parents during the weekends". The items are rated on a five - point scale: 1="almost never", 2="seldom", 3="sometimes", 4="often", 5 ="almost always".

PARENTAL MONITORING: Two questions were used to measure parental monitoring. The participants were asked how well or badly the following statements applied to them: "My parents monitor with whom I am in the evenings", "My parents know where I am in the evenings". The items are rated on a four-point scale: 1="Applies very well to me", 2="Applies rather well to me", 3="Applies rather badly to me", 4="Applies very badly to me".

INTERGENERATIONAL CLOSURE: Intergenerational closure was measured with four questions measuring: first, if parents know their children's friends to see the ties between parents and adolescents from different families and second, if parents know the parents of their children's friends to asses the ties between parents from different families. The participants were asked to answer how the following statement applied to them: "my parents know my friends", "my parents know the parents of my friends", "my parents

often talk to the parents of my friends" and "my parents and the parents of my friends sometimes meet to talk to one another". The answers were measured on a four-point scale: 1="applies very well to me", 2=Applies rather well to me", 3="applies rather poorly to me", 4="applies very poorly to me",

Preliminary Study

In order to support the use of self-reported mathematics grades, as a dependent variable in this research, a preliminary study was conducted in November 2011 in cooperation with The Icelandic Centre for Social Research and Analysis. Data were collected in four 9th grade Icelandic classrooms in two different schools in Reykjavík metropolitan area. A questionnaire was administered that contained questions on students background, educational expectations as well as a question regarding their final grade in mathematics and Icelandic from the prior semester. Anonymous questionnaires and envelopes for returning completed questionnaires were distributed to students. Teachers supervised the participation of the students in the study and administered the survey questionnaire. Once students had finished answering all questions, they were asked to place their completed questionnaire in the envelope and carefully close it before returning it to the teacher. The students were asked and reminded not to write their names or social security numbers, or any other identifying information, anywhere on the questionnaire. In addition, students were asked to complete the entire questionnaire and ask for help if they had any problems with any questions. Students were asked to raise their hand after sealing the envelope with the questionnaire and the teacher collected the

envelope from the student. Teachers wrote the actual grade in mathematics and Icelandic on the envelope without the students' knowledge and students were unaware that their response would be compared to their actual grades.

The aim of the pilot study was to gather evidence of the relationship between students' self-reported grades in mathematics and their actual grads. Some methodological studies suggest that validity and reliability of self-reported grades are similar to actual school transcripts but other indicate slight grade inflation. Maxey and Ormsby (1971), investigated the accuracy of self-reported grades on the ACT Test Battery and found that the accuracy of self – reported grades provided a reasonable reliable (r = .81) measure of students high school grades. Further more they found the information to be staple over income levels, gender and race. Similarly, Kuncel, Credé and Thomas (2005), found in their meta-analysis of the validity of Self-reported grade point average, class ranks and test scores, that self-reported grades are a reasonably good reflection of actual grades, especially for high ability students but found that low ability students tended to over report their grades more. The also found that grades for a particular subject tended to be more accurately reported then grade point average. They concluded that self-reported grades generally predict outcomes to a similar extent as actual grades (Kuncel, Credé, & Thomas, 2005).

The findings of the preliminary study stuggest that self-reported grades are highly correlated with actual grades with r = .77. The correlation is stronger for girls (r = .80) then for boys (r = .77) were boys tend to over report their grades more then girls. Higher achieving students reported their grates more accurately with the correlation between

self-reported and actual grades being (r = .86) for students that score above 80% but lower for students scoring below 80% or (r = . 57). The findings from the preliminary study support findings from former studies that looked at the relationship between self-reported grades and actual grades, thus supporting that using self-reported grades in this study is justified.

Analysis

First, descriptive statistics for mean differences will be used to signal any visual differences between the cities along with a bivariate correlation matrix to rule out any unusually strong associations between the independent variables. A bivariate matrix will also give the correlation between the dependent variable and each of the independent variables in this study. A multiple ordinary least squares regression analysis will be used to model the variables for each of the eight participating cities. There will be five regression models to determine the effect of social capital on mathematics achievement. Model 1; the base model will include the control variables, "gender", "age", "family structure", "family financial status", "parental education" and "school absence".

Base model:

$$Y_i = (\beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \beta_3 X_{i3} + \beta_4 X_{i4} + \beta_5 X_{i5} + \beta_6 X_{i6}) + \varepsilon_i$$

Y is the outcome variable (mathematics achievement), β_1 is the coefficient of the first predictor X_1(gender), β_2 is the coefficient of the predictor X_2(age), β_3 is the coefficient of the predictor X_3(family structure), β_4 is the coefficient of the predictor X_4(family financial status), β_5 is the coefficient of the predictor X_5(parents education), β_6 is the

coefficient of the predictor X_6(school absence), and ε_i is the difference between the predicted and the observed value of Y for the *i*th participant.

In the next four models each social capital variable, "parental support", "parental monitoring", "time spent with parents" and "intergenerational closure" are added in to the "base model" one by one in accordance with relative association found in the bivariate matrix. In other words predictors are entered into the model first in order of their importance in predicting the outcome. This allows for examination of the extent to which the social capital variables add to explained variance of the dependent variable, and the extent to which the social capital variables impact mathematics achievement while controlling for other known predictors of academic achievement. Figure 1 shows the final regression model.

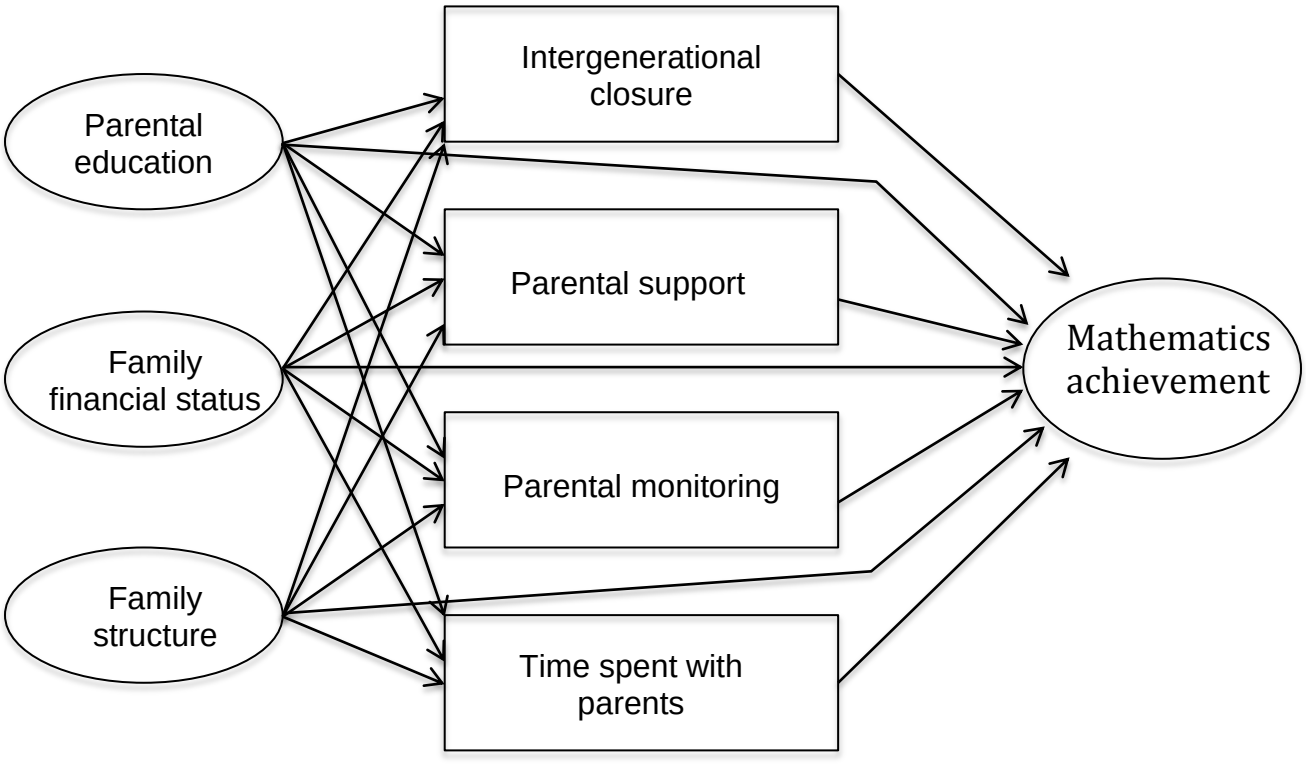

Figure 1: ***Final model: the influence of family and social capital variables on adolescents' mathematics achievement.***

Assumptions of Regression Analysis

Regression models rely upon certain assumptions about the variables used in the analysis. If these assumptions are not met, the results my not be trustworthy and result in over- or under- estimation of effect size or significance.

Normality. The regression model places assumptions on the distribution of the residuals. It assumes that the residuals in the model are random, normally distributed variables with a mean of zero. In other words the differences between the model and the observed data are most frequently zero or close to zero (Field A. , 2009). To check if this assumption is violated residuals are plotted around their mean value 0. This assumption is met if the histogram shows an approximate bell shape about 0.

Even though the regression model does not necessarily rely upon the variables to have normal distributions. Non-normally distributed variables can distort relationships and significance tests. Visual inspection of data plots (histograms, p-p plots), skew, kurtosis, are conducted to get information about normality. Skewness measures a lack of symmetry in the data. If the result of the measure is greater than zero, the distribution is positively skewed. If it's less than zero, it's negatively skewed and equal to zero means it's symmetric. Kurtosis measures whether the data are peaked or flat relative to a normal distribution. Negative values of kurtosis indicate a flat and light tailed distribution whereas positive values indicate a pointy and heavy-tailed distribution. It is reasonable to assume normality if skewness and kurtosis have values between –1.0 and +1.0.

Transformation of variables is used to correct any violations of normality. (Field A. , 2009).

Linearity. Standard multiple regression assumes a linear relationship between the dependent and independent variables in order to accurately estimate the relationship between them. If the relationship between independent variables and the dependent variable is not linear, the results of the regression analysis will under-estimate the true relationship (Field A. , 2009).

Independent errors. The residual term should be uncorrelated for any two observations. The assumption is tested with the Durbin – Watson test, that tests for correlations between errors. The test statistic varies between 0 and 4, with 2 giving no correlation between the residuals. A value grater than 2 indicates a negative correlation and less then 2 a positive correlation. A conservative rule of thumb gives a value of 1 and 3 as course for concern (Field A. , 2009).

Homoscedasticity. Refers to the pattern of the errors, or residuals, when plotted against the predicted values The variance of the residual terms should be constant throughout the data, meaning that the residuals at each level of the predictors should have the same variance. When the variance is unequal, heteroscedasticity is indicated. To test the assumption a scatterplot of the residuals is used to see if vertical spread of the residuals is approximately the same across the plot, which indicates *Homoscedasticity* (Field A. , 2009).

Multicollinearity. Multicollinearity occurs when two or more predictors in the model are correlated and provide redundant information. A perfect collinearity between predictor variables makes it impossible to obtain unique estimates of the regression coefficients, resulting from infinite number of combinations of coefficients that would work equally well. In other words if two variables in the regression model are highly correlated, one unknowingly uses the same type of information more than once. Collinearity is tested with a correlation matrix to see if any predictor variables violate this assumption. The variance inflation factor (VIF) also used to look for evidence of collinearity. The *VIF* quantifies how much the variance is inflated. Values less then 10 indicate that there is little cause for concern, also if the average of the VIF values is not substantially greater then 1, then collinearity is not a problem for the regression model (Field A. , 2009).

Reliability analysis of scales. To assess the reliability of the scale variables within each city data, "parental monitoring", "parental support" and "intergenerational closure", Coefficient alpha (Cronbach, 1951) is used, which is the most common measure of scale reliability. Cronbach's α is:

$$\alpha = \frac{N^2\overline{Cov}}{\sum s^2_{item} + \sum Cov_{item}}$$

It measures internal consistency and is expressed as a function of the number of total test items, along with the average inter-correlation between them. This produces an alpha coefficient ranging from zero to one. The closer to one, the more accurate the scale is. In

general a $\alpha \geq 0.7$ is an acceptable value for Cronbach's α values, substantially lower α values indicate an unreliable scale (Field A. , 2009).

CHAPTER IV

RESULTS

This chapter reports the results of this study. First a descriptive analysis of data from each city is put forth and hence reliability measures of the scales used in the study are described. In order to answer research question 1a-1d, tables showing bivariate relationships for each city, between the independent variables and the outcome variable is provided. The second research question is evaluated by using multivariate regression to examine the effects of the social capital indicators on mathematics achievement and significant test in order to test the differences of those effects between the participating cities in the study.

Pearson's correlations measure the association between each two variables. Bivariate analysis provides answers to the first research question by showing the relations of each of the social capital measures to mathematic achievement within all of the cities. The bivariate correlations between the predictor variables and the dependent variable also establishes in what order the dependent variables should be entered in the regression models, as they should be entered into the model in the order of their importance in predicting the outcome. The bivariate matrix gives a rough idea of the relationship between predictors and the outcome and is good for detecting potential problems with multicollinearity, which can cause a problem for regression analysis. Table 2 shows descriptive statistics for all variables used in this study.

Table 2. Descriptive Statistics for All Study Variables within Each City Data

Mean and Standard Deviation																
	Bucharest		**Jurmala**		**Kaunas**		**Klaipeda**		**Reykjavik**		**Riga**		**Sofia**		**Vilnius**	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Gender	.59	.49	.52	.50	.48	.50	.50	.50	.50	.50	.55	.50	.56	.50	.52	.50
Age	15.9	.49	13.55	.73	16.01	.45	15.98	.43	14.99	.15	13.58	.70	15.58	.55	14.02	.51
Family structure	.21	.41	.42	.49	.32	.47	.34	.48	.30	.47	.41	.49	.29	.45	.32	.46
Family financial status	5.27	1.27	4.61	1.03	4.25	1.03	4.57	1.04	4.61	1.03	4.65	1.03	4.86	1.20	4.56	1.03
Parents education[1]	12.03	4.09	10.23	2.83	10.62	2.69	10.47	2.55	7.81	1.98	11.10	2.59	11.03	3.29	11.01	2.68
School Absence	1.52	.43	1.60	.47	1.63	.47	1.64	.47	1.48	.39	1.59	.47	1.63	.48	1.65	.48
Parental support	17.32	2.84	16.67	2.19	16.58	3.09	16.51	3.03	16.83	2.99	16.62	3.02	16.95	3.07	16.24	3.16
Time spent with parents	5.45	2.19	5.67	2.06	5.38	2.0	5.32 .	1.91	6.10	1.97	5.57	2.02	7.08	2.20	5.28	1.93
Parental monitoring	6.64	1.66	6.17	1.70	6.24	1.70	6.01	1.77	6.18	1.67	6.14	1.67	6.64	1.65	6.00	1.75
Intergenerational closure	8.79	2.99	8.46	2.67	8.65	2.72	8.12	2.63	9.86	2.81	8.53	2.67	9.44	1.36	8.09	2.54

1. The scale for Mothers and Fathers education separately, was 1- 8 in all cities except Bucharest where it was 1 - 10 and Reykjavík were it was 1 - 6.

Scale Reliability Analysis

The independent variables "parental monitoring", "parental support" "intergenerational closure" and "time spent with parents" were all measured with more then one question in the questionnaire. Parental monitoring was constructed with two questions, parental support with five questions, intergenerational closure with four questions and time spent with parents with two questions. Cronbach's alpha (1951) was used to measure the reliability of those scales. Table 3 lists the construct values for the scale reliability.

Table 3. Cronbach's Alpha for scale measures

	Bucharest	Jurmala	Kaunas	Klaipeda	Reykjavik	Riga	Sofia	Vilnius
Parental support	.81	.81	.85	.83	87	.82	.77	.83
Time spent with parents	.60	.68	.59	.61	.81	.64	.67	.58
Parental monitoring	.83	.83	.84	.86	.86	.84	.79	.85
Intergenerational closure	.83	.79	.80	.81	.83	.80	.81	.77

Research question I

The first research question put forth in this study asks if mathematics achievement is associated positively with parental support, parental monitoring, time spent with parents and intergenerational closure. The question is answered by examining the

bivariate correlations between each of the independent variables and the outcome variable within each city.

1a) Is parental monitoring associated positively with mathematics achievement?

Parental monitoring is associated positively with mathematics achievement in all of the participating cities. The correlation is strongest in Reykjavík (r = .206), Klaipeda (r = .174) and Kaunas (r = .135). The weakest correlation between parental monitoring and mathematics achievement was in Riga (r = .050). Table 4 shows the Pearsons correlation for the variables mathematics achievement and parental monitoring for each participating city.

Table 4. Pearson Correlation for Mathematics achievement and parental monitoring

	Bucharest	Jurmala	Kaunas	Klaipeda	Reykjavík	Riga	Sofia	Vilnius
	Mathematics achievement							
Parental onitoring	.075	.108	.135	.174	.206	.050	.116	.098

1b) Is parental support associated positively with mathematics achievement?

Parental support is positively associated with mathematics achievement in all of the participating cities. The relation is strongest in Reykjavík (r = .240) followed by Riga (r = .114). The association was weakest in Jurmala (r = .047) and Bucharest (r = .075). Table 5 shows the persons correlation between parental support and mathematics achievement for each of the cities in the study.

Table 5. Pearson Correlation for Mathematics achievement and parental support

	Bucharest	Jurmala	Kaunas	Klaipeda	Reykjavik	Riga	Sofia	Vilnius
	Mathematics achievement							
Parental support	.083	.047	.064	.084	.240	.114	.072	.057

1c) Is time spent with parents associated positively with mathematics achievement? Time spent with parents is related positively with mathematics achievement in all the participating cities. The correlation is highest in Reykjavik (r = .167), Klaipeda (r = .136), Sofia (r = .127) and Jurmala (r = .123). The weakest correlation was in Riga (r = .029). Table 6 shows the Person correlation for mathematics achievement and time spent with parents in each participating city.

Table 6. Pearson Correlation for Mathematics achievement and time spent with parents

	Bucharest	Jurmala	Kaunas	Klaipeda	Reykjavik	Riga	Sofia	Vilnius
	Mathematics achievement							
Time spent with parents	.085	.123	.103	.136	.167	.029	.127	.093

1d) Does intergenerational closure in the form of (a) parents know the friends of their children and (b) parents know the parents of their children's friends, associated positively with mathematics achievement? Intergenerational closure is not associated positively with mathematics achievement in all of the participating cities. The association is positive in Bucharest, Klaipeda, Reykjavik and Riga. The association is negative in Jurmala, Kaunas, Sofia and Vilnius. The highest positive association is in Reyjavik (r = .153) and the lowest negative association was in Jurmala (r = .-116).

Table 7 shows the Pearson correlation between Mathematics achievement and intergenerational closure for each of the participating cities.

Table 7. Pearson Correlation for Mathematics achievement and intergenerational closure

	Bucharest	Jurmala	Kaunas	Klaipeda	Reykjavik	Riga	Sofia	Vilnius
	Mathematics achievement							
Intergenerational closure	.048	-.116	-.044	.030	.153	.040	-.008	-.045

In summary the social capital variables, parental monitoring, time spent with parents and parental support all correlate positively with mathematics grades in each of the participating cities. Only intergenerational closure correlates negatively with grades in mathematics in four of the participating cities.

Research question II (a)

The second research question asks if the statistical association of the social capital indicators (parental monitoring, parental support, time spent with parents intergenerational closure) and mathematics achievement is different in magnitude across the participating cities and if so how? And how much the cumulative variance of mathematics achievement is explained by the social capital measures and whether it is different between the participating cities. A multiple ordinary least squares regression is used to determine the effect of the dependent variables on mathematics grades in the eight cities. Each social capital variable, parental support, parental monitoring, time spent with parents and intergenerational closure is added in to the base model in order of their

importance in predicting the outcome. The order of importance in predicting the outcome is seen with bivariate correlation. Table 8 shows the correlation between the predicting variables and the outcome variable in each city and the order in which the predictors are entered in the regression models.

Table 8. Bivariate correlation between dependent variable and independent variables.

		Mathematics grades							
		Bucharest	**Jurmala**	**Kaunas**	**Klaipeda**	**Reykjavik**	**Riga**	**Sofia**	**Vilnius**
1.	**Parental monitoring**	.075	.108	.135	.174	.206	.050	.116	.098
2.	**Time spent with parents**	.085	.123	.103	.136	.167	.029	.127	.093
3.	**Parental support**	.083	.047	.064	.084	.240	.114	.072	.057
4.	**Intergenerational closure**	.048	-.116	-.044	.030	.153	.040	-.008	-.045

The variable that had the strongest correlation to the outcome variable in most of the cities is parental monitoring followed by time spent with parents, then parental support and finally intergenerational closure. The regression models used are as follows:

Model 1. Grades in mathematics $= \beta_0 + \beta_1$(gender) $+ \beta_2$(age) $+ \beta_3$(family structure) $+ \beta_4$(family financial status) $+ \beta_5$(parents education) $+ \beta_6$(school absence) $+ \varepsilon$

Model 2. Grades in mathematics $= \beta_0 + \beta_1$(gender) $+ \beta_2$(age) $+ \beta_3$(family structure) $+ \beta_4$(family financial status) $+ \beta_5$(parents education) $+ \beta_6$(school absence) $+ \beta_7$(parental monitoring) $+ \varepsilon$

Model 3. Grades in mathematics $= \beta_0 + \beta_1$(gender) $+\beta_2$(age) $+\beta_3$(family structure) $+\beta_4$(family financial status) $+\beta_5$(parents education) $+\beta_6$(school absence) $+\beta_7$(parental monitoring)$+\beta_8$(time spent with parents) $+\varepsilon$

Model 4. Grades in mathematics $= \beta_0 + \beta_1$(gender) $+\beta_2$(age) $+\beta_3$(family structure) $+\beta_4$(family financial status) $+\beta_5$(parents education) $+\beta_6$(school absence) $+\beta_7$(parental monitoring)$+\beta_8$(time spent with parents)$+\beta_9$(parental support) $+\varepsilon$

Model 5. Grades in mathematics $= \beta_0 + \beta_1$(gender) $+\beta_2$(age) $+\beta_3$(family structure) $+\beta_4$(family financial status) $+\beta_5$(parents education) $+\beta_6$(school absence) $+\beta_7$(parental monitoring)$+\beta_8$(time spent with parents)$+\beta_9$(parental support) $+\beta_{10}$(intergenerational closure) $+\varepsilon$

The results for the eight participating cities are reported in the standardized b-values, which tell us the number of standard deviations that the outcome variable (mathematics grades) will change as a result of one standard deviation change in the predictor variables.

Results for Bucharest

In Table 9, the multivariate linear regression models are presented predicting the effect on the variable "grades in mathematics" for Bucharest. The results show that in Bucharest, gender, age, education of parents, school absence and parental support have

significant effect on grades in mathematics, when influences of other variables in the models have been accounted for.

Table 9. Multivariate linear regression models, predicting mathematics achievement in Buchares

City = Bucharest					
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**
	β	***β***	***β***	***β***	***β***
Gender	.176**	.173**	.172**	.172**	.173**
Age	-.111**	-.111**	-.107**	-.105**	-.105**
Family structure	-.013	-.012	-.009	-.006	-.006
Family financial status	.019	.018	.017	.009	.009
Education of parents	.174**	.173**	.175**	.170**	.169**
School absence	-.058**	-.056*	-.051*	-.052*	-.052*
Parental monitoring		.016	.004	-.001	.000
Time spent with parents			.046*	.035	.035
Parental support				.048*	.048*
Intergenerational closure					-.004

β = Beta, standardized coefficient. * p < .05 ** p < .01.

Looking at model 1, the results show that in Bucharest being a girl (β = . 176, p < .01) has a rather strong positive effect on mathematics grades, age (β = -.111, p < .01) has a negative effect and the education level of the parent (β = .174, p < .01) has significant and quite a strong effect. School absence (β = -.058, p < .01) has a week negative effect on mathematics grades.

Parental monitoring is added to the second motel and shows that parental monitoring (β = .016) does not significantly add to the explained variance in mathematics grades in Bucharest.

The third model adds time spent with parents and shows that, controlling for the variables discussed above, there is a week positive relation between time spent with parents (β = .046, p < .05) and grades in mathematics.

Parental support is the variable that is added in the fourth model. It shows a week significant positive addition to grades in mathematics (β = .048, p < .05)

The fifth and final model adds intergenerational closure (β = -.004) to the fourth model and shows no significant effect of intergenerational closure on mathematics grades in Bucharest. The variables gender (β = .173, p < .01), age (β = -.105, p < .01), education of parents (β = .169, p < .01), school absence (β = -.052, p < .05) and parental support (β = .048, p < .05), have significant effect on grades in mathematics in Bucharest when other variables in the models are accounted for.

Checking the assumptions of the regression models for Bucharest. The assumption of normality for the residuals holds, as can be seen in figure 2.The residuals are approximately bell shaped around 0. The Durbin – Watson test was 1.76, which is within acceptable limits, showing that there is no unusual strong correlation between the residual terms. None of the predictor variables has an unusually strong correlation and the average of the variance inflation factor is 1.137, indicating that the assumption of no multicollinearity holds (Field A. , 2009).

The values of the standardized residuals against the standardized predicted values should be a random array of dots evenly dispersed around zero. Figure 3 shows that the dots in the graph do not funnel out, thus indicating that the assumptions of both linearity and homoscedasticity hold (Field A. , 2009). All the assumptions hold for the regression models for the city data in Bucharest.

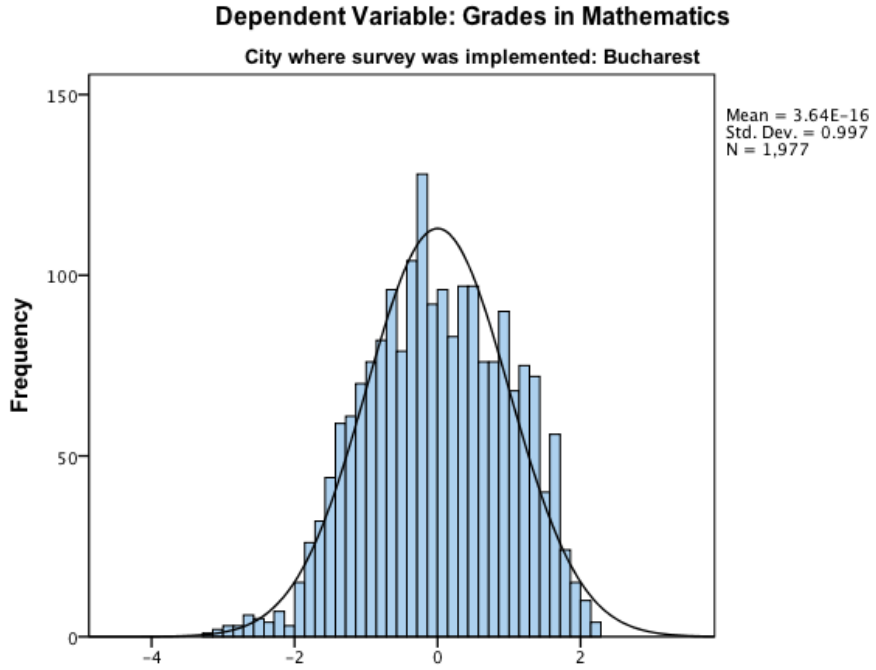

Figure 2. Standardized residuals against the standardized predicted values: Bucharest

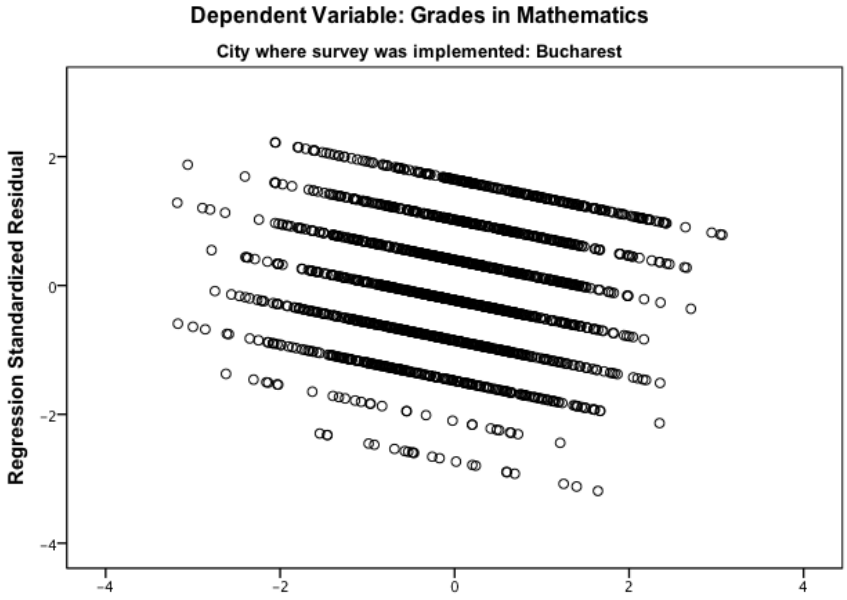

Figure 3. Regression standardized residuals: Bucharest

Results for Jurmala

Table 10. Multivariate linear regression models, predicting mathematics achievement in Jurmala.

City = Jurmala					
	Model 1	Model 2	Model 3	Model 4	Model 5
	β	β	β	β	β
Gender	.102*	.095*	.097*	.096*	.088
Age	-.140**	-.136**	-.134**	-.132**	-.122**
Family structure	-.100*	-.097*	-.091	-.093	-.108*
Family financial status	-.039	-.040	-.044	-.041	-.031
Education of parents	.183**	.178**	.181**	.184**	.170**
School absence	-.197**	-.193**	-.184**	-.182**	-.170**
Parental monitoring		.036	.014	.018	.064
Time spent with parents			.071	.079	.100
Parental support				-.027	.002
Intergenerational closure					-.182**

β = Beta, standardized coefficient. * p < .05 ** p < .01.

In Table 10 the multivariate linear regression models are presented predicting the effect on the variable "grades in mathematics" for Jurmala. The results show that in Jurmala, family structure, education of parents, school absence and intergenerational closure have significant effect on grades in mathematics, when influences of other variables in the models have been accounted for.

Model 1 shows that in Jurmala, age (β = -.140, p < .01) has a significant negative effect on grades in mathematics and being absent from school also has significant negative effect (β = -.197, p < .01). Family structure (β = -.100, p < .05) has negative effect on mathematics, meaning that children who live with both biological parents are more likely to do well in mathematics than children living in other arrangements. Also,

higher education level of parents (β = .183, p < .01) has significant positive effects on mathematics grades in Jurmala.

In Model 2, 3, and 4, parental monitoring (β = .036), time spent with parents (β = .071), and parental support (β = -.027), are added respectively. The results show that increased parental monitoring, more time spent with parents or more support from parents does not have significantly positive effect on students' mathematics grades in Jurmala.

The fifth and final model adds intergenerational closure (β = -.182, p < .01) to the fourth model and shows a significant negative effect of intergenerational closure on mathematics grades in Jurmala. The variables family structure (β = -.108, p < .01), education of parents (β = .170, p < .01), school absence (β = -.170, p < .01) and intergenerational closure (β = -.182, p < .01), have significant effect on grades in mathematics in Jurmala when other variables in the models are accounted for.

Checking the assumptions of the regression models for Jurmala. All assumptions for regression are met in the regression models for Jurmala. The assumption of normality for the residuals is acceptable as the histogram (figure 4) shows an approximate bell shape around 0.

The Durbin – Watson test was 1.96, which is well within acceptable limits, showing that there is no unusual strong correlation between the residual terms. None of the predictor variables has an unusual strong correlation and the average of the variance

inflation factor is 1.133, indicating that the assumption of no multicolinearity holds (Field A. , 2009).

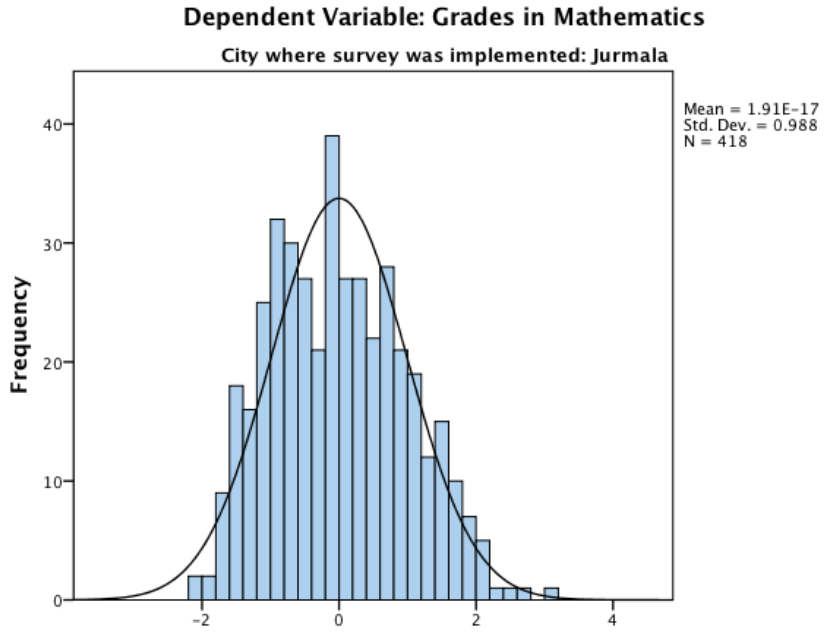

Figure 4. Regression standardized residuals: Jurmala

The values of the standardized residuals against the standardized predicted values (figure 5) show a random array of dots evenly dispersed around zero, thus indicating that the assumptions of both linearity and homoscedasticity hold (Field A. , 2009).

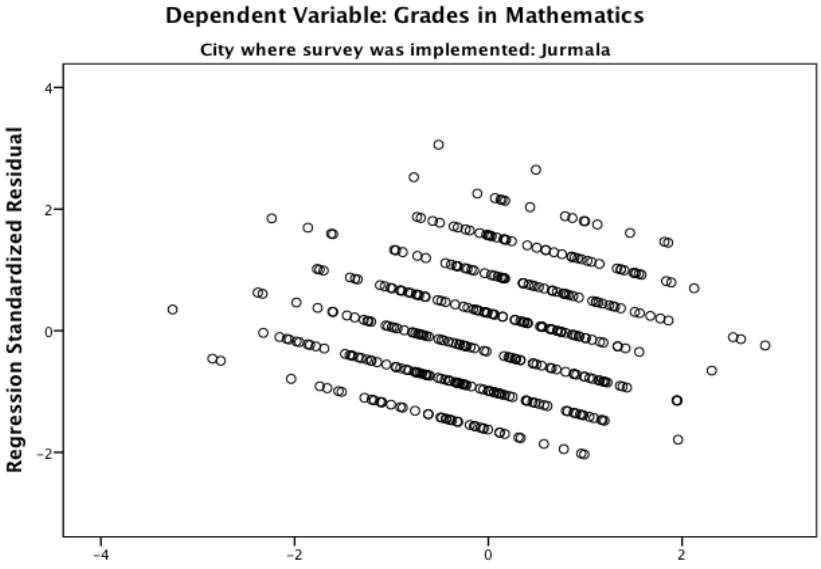

Figure 5. Standardized residuals against the standardized predicted values: Jurmala

Results for Kaunas

Table 11. Multivariate linear regression models, predicting mathematics achievement in Kaunas.

City = Kaunas					
	Model 1	Model 2	Model 3	Model 4	Model 5
	β	β	β	β	β
Gender	.178**	.156**	.157**	.157**	.154**
Age	-.051*	-.052*	-.052*	-.052*	-.052*
Family structure	-.068**	-.071**	-.067**	-.067**	-.067**
Family financial status	.039*	.036	.032	.031	.031
Education of parents	.212**	.207**	.208**	.208**	.207**
School absence	-.259**	-.251**	-.248**	-.248**	-.247**
Parental monitoring		.085**	.075**	.075**	.084**
Time spent with parents			.039	.039	.041
Parental support				.002	.006
Intergenerational closure					-.026

β = Beta, standardized coefficient. * $p < .05$, ** $p < .01$

In Table 11, the multivariate linear regression models are presented predicting the effect on the variable "grades in mathematics" for Kaunas. The results show that in Kaunas, gender, age, family structure, education of parents, school absence, and parental monitoring have significant effect on grades in mathematics, when influences of other variables in the models have been accounted for.

Looking at model 1, the results show that in Kaunas being a girl (β = .178, $p < .01$) has positive effect on mathematics grades, age (β = -.051, $p < .05$) has a week negative effect and being absent from school has significant effect and considerably strong effect (β = -.259, $p < .01$). Family structure (β = -.068, $p < .01$) has negative effect on mathematics, meaning that children who live with both biological parents are more likely to do well in mathematics than children living in other arrangements. Also,

better family financial status (β = .039, p < .05) has a week positive effects on mathematics grades and parents' education level (β = .212, p < .01) has a significant positive effect on grades in mathematics in Kaunas.

The second model adds parental monitoring to the base model and shows that parental monitoring (β = .085, p < .01) has significant positive association with mathematics grades in Kaunas.

The third, forth and fifth models add the variables time spent with parents (β = .039), parental support (β = .002) and intergenerational closure (β = -.026) respectively. The results show that none of those variables have effect on grades in mathematics in Kaunas.

The variables gender (β = .154, p < .01), age(β = -.052, p < .05), family structure (β = -.067, p < .01), education of parents (β = .207, p < .01), school absence β = -.247, p < .01), parental monitoring (β = .084, p < .01), have significant effect on grades in mathematics in Kaunas when other variables in the models are held constant.

Checking the assumptions of the regression models for Kaunas. No assumptions for the regression models were violated. The assumption of normality for the residuals is acceptable as the histogram (figure 6) shows an approximate bell shape around 0. The Durbin – Watson test was 1.87, which is well within acceptable limits, showing that there is no unusual strong correlation between the residual terms. None of the predictor variables has an unusual strong correlation and the average of the variance

inflation factor is 1.122, indicating that the assumption of no multicolinearity holds (Field A. , 2009).

Figure 7 shows the values of the standardized residuals against the standardized predicted values are a random array of dots evenly dispersed around zero, thus indicating that the assumptions of both linearity and homoscedasticity hold (Field A. , 2009).

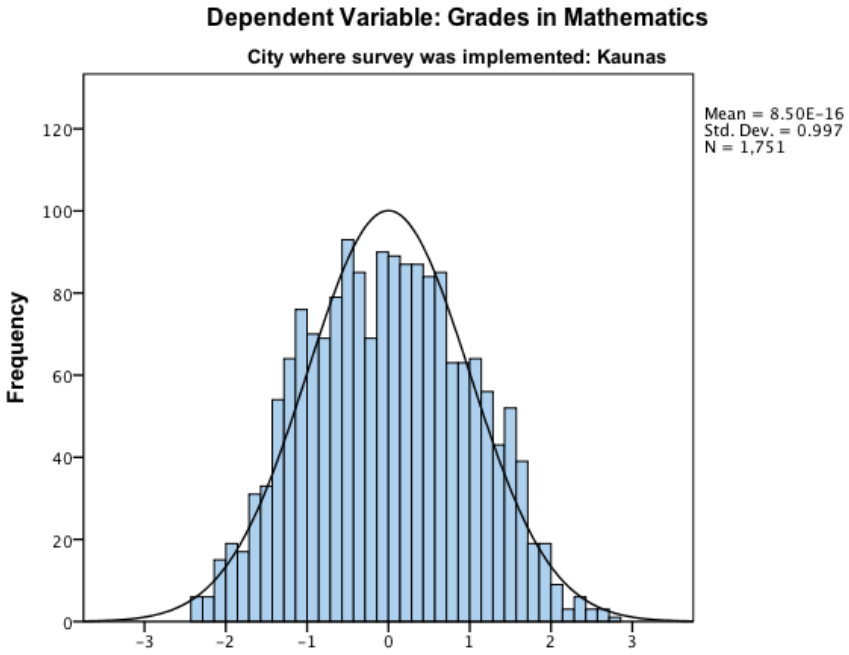

Figure 6. Standardized residuals against the standardized predicted values

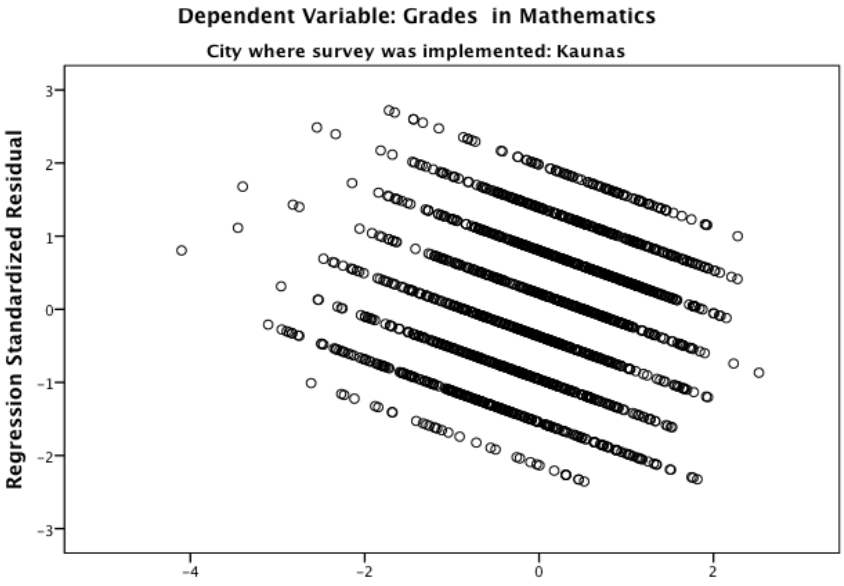

Figure 7. Regression standardized residuals: Kaunas

Results for Klaipeda

In Table 12 the multivariate linear regression models are presented predicting the effect on the variable "grades in mathematics" for Klaipeda. The results show that in Kaunas, gender, family structure, education of parents, school absence, and parental monitoring have significant effect on grades in mathematics, when influences of other variables in the models have been accounted for.

Table 12. Multivariate linear regression models, predicting mathematics achievement in Klaipeda.

City = Klaipeda					
	Model 1	Model 2	Model 3	Model 4	Model 5
	β	β	β	β	β
Gender	.118**	.094**	.096**	.098**	.095**
Age	-.048	-.045	-.042	-.041	-.040
Family structure	-.074*	-.073*	-.067*	-.063*	-.064*
Family financial status	-.014	-.021	-.024	-.030	-.030
Education of parents	.158**	.156**	.155**	.152**	.150**
School absence	-.245**	-.234**	-.230**	-.230**	-.228**
Parental monitoring		.117**	.099**	.092**	.109**
Time spent with parents			.058	.050	.055*
Parental support				.041	.045
Intergenerational closure					-.043

β = Beta, standardized coefficient. * p < .05, ** p < .01

Model 1 shows that being a girl (β = .118, p < .01) has positive effect on mathematics grades in Klaipeda and being absent from school has significant effect (β = -.245, p < .01). Family structure (β = -.074, p < .05) has negative effect on mathematics, meaning that children who live with both biological parents are more likely to do well in

mathematics than children living in other arrangements. Parents' education level (β = .158, p < .01) has a positive effect on mathematics grades in Klaipeda.

The second model adds parental monitoring to the base model and shows that parental monitoring (β = .117, p < .01) has significant positive effect on grades in mathematics in Klaipeda.

The third, forth and fifth models add the variables time spent with parents (β = .058), parental support (β = .041) and intergenerational closure (β = -.043) respectively. The results show that none of those variables have effect on grades in mathematics in Klaipeda.

The variables that show significant effect on mathematics grades when other variables in the models are held constant are gender (β = .095, p < .01), family structure (β = -.064, p < .05), education of parents (β = .150, p < .01), school absence β = -.228, p < .01) and parental monitoring (β = .109, p < .01).

Checking the assumptions of the regression models for Klaipeda. The assumption of normality for the residuals is held. Figure 8 shows an approximate bell shape around 0. The Durbin – Watson test was 1.94, which is well within acceptable limits, showing that there is no unusual strong correlation between the residual terms. None of the predictor variables has an unusual strong correlation and the average of the variance inflation factor is 1.135, indicating that the assumption of no multicolinearity holds (Field A. , 2009).

The values of the standardized residuals against the standardized predicted values should be a random array of dots evenly dispersed around zero. Figure 9 shows that the dots in the graph do not funnel out, thus indicating that the assumptions of both linearity and homoscedasticity hold (Field A. , 2009).

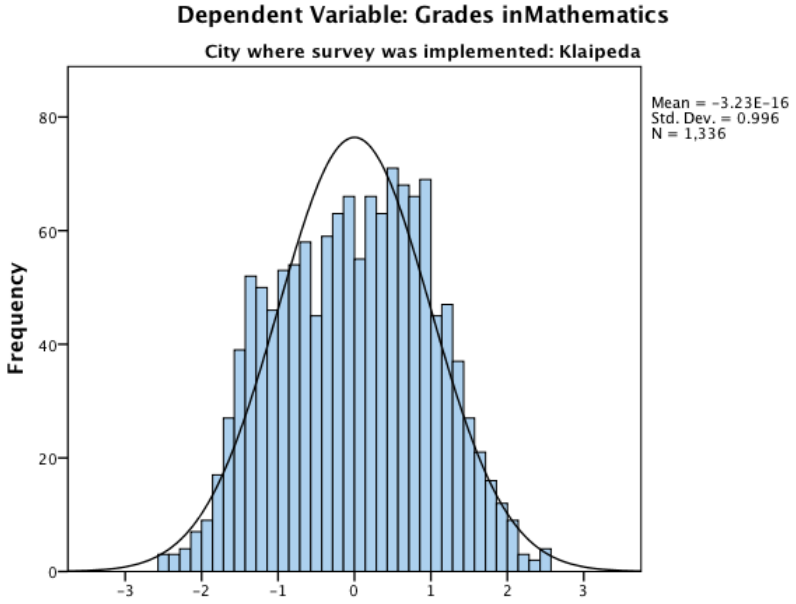

Figure 8. Regression standardized residuals: Klaipeda

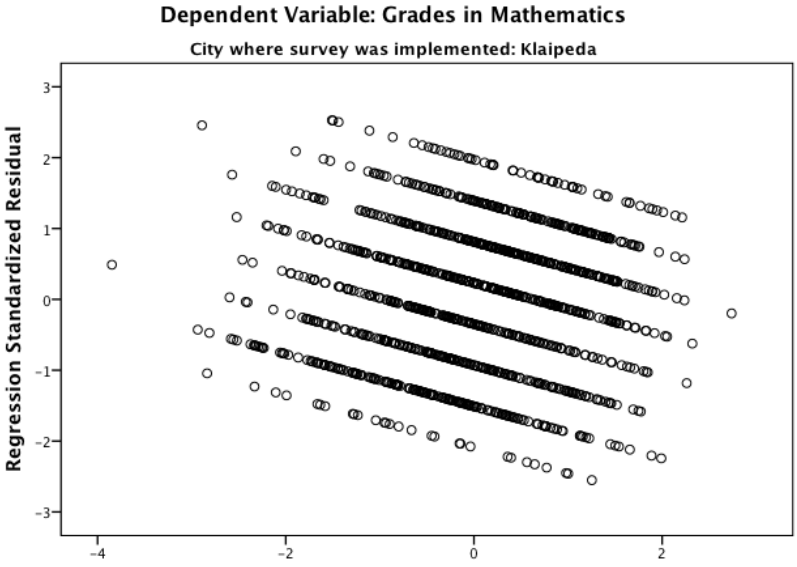

Figure 9. Standardized residuals against the standardized predicted values: Klaipeda

Results for Reykjavík

Looking at model 1, the results show that in Reykjavík being a girl (β = .080, p < .01) has week positive effect on mathematics grades, age (β = -.055, p < .05) has a week negative effect and being absent from school has significant effect and quite a strong effect (β = -.187, p < .01). Family structure (β = -.101, p < .01) has negative effect on mathematics, meaning that children who live with both biological parents are more likely to do well in mathematics than children living in other arrangements. Also, better family financial status (β = .074, p < .01) has significant positive effects on mathematics grades and so does parents education level (β = .211, p < .01).

Table 13. Multivariate linear regression models, predicting mathematics achievement in Reykjavík.

City = Reykjavík	Model 1	Model 2	Model 3	Model 4	Model 5
	β	β	β	β	β
Gender	.080**	.047*	.049*	.043	.040
Age	-.055*	-.052*	-.050*	-.046*	-.046*
Family structure	-.109**	-.096**	-.089**	-.082**	-.079**
Family financial status	.074**	.076**	.070**	.061**	.060*
Education of parents	.211**	.199**	.198**	.188**	.187**
School absence	-.187**	-.169**	-.164**	-.159**	-.158**
Parental monitoring		.161**	.146**	.130**	.122**
Time spent with parents			.066**	.041	.036
Parental support				.102**	.095**
Intergenerational closure					.038

β = Beta, standardized coefficient. * p < .05, ** p < .01

The second model adds parental monitoring to the base model and shows that parental

monitoring (β = .161, p < .01) has significant positive association with mathematics grades in Reykjavík.

The third model adds time spent with parents to the second model and shows that there is a week positive relation between time spent with parents (β = .066, p < .01) and grades in mathematics in Reykjavík.

The fourth model adds parental support to the third model and shows significant positive relations between grades in mathematics and parental support (β = .102, p < .01) in Reykjavík.

The fifth and final model adds intergenerational closure (β = .038) to the fourth model and shows no significant effect of intergenerational closure on mathematics grades in Reykjavík. The variables family structure (β = -.079, p < .01), family financial status (β = .060, p < .05), education of parents β = .187, p < .01), school absence β = -.158, p < .01), parental monitoring (β = .122, p < .01), and parental support (β = -.095, p < .01), have significant effect on grades in mathematics in Reykjavík when other variables in the models are accounted for.

Checking the assumptions of the regression models for Reykjavík. All assumptions for the regression models were met. The assumption of normality for the residuals is acceptable as the histogram (figure 10) shows an approximate bell shape around 0.

The Durbin – Watson test was 1.83, which is well within acceptable limits, showing that there is no unusual strong correlation between the residual terms. None of

the predictor variables has an unusual strong correlation and the average of the variance inflation factor is 1.138, indicating that the assumption of no multicolinearity holds (Field A. , 2009).

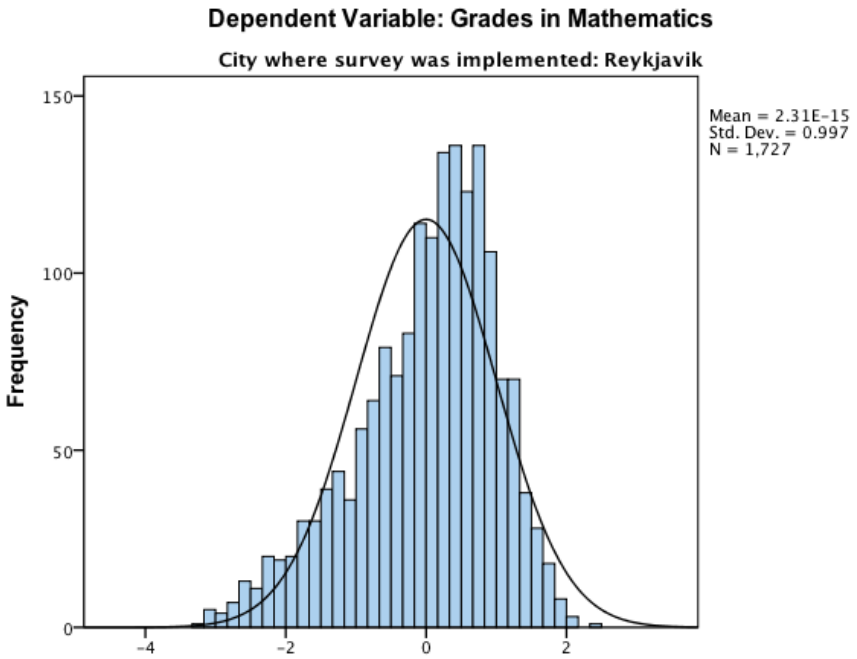

Figure 10. Regression standardized residuals: Reykjavik

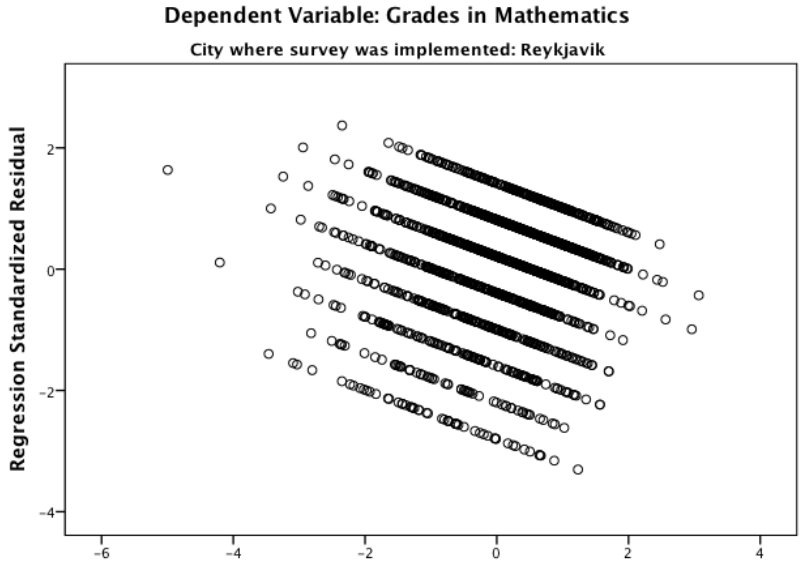

Figure 11. Standardized residuals against the standardized predicted values: Reykjavik

The values of the standardized residuals against the standardized predicted values should be a random array of dots evenly dispersed around zero. Figure 11 shows that the dots in the graph do not funnel out, thus indicating that the assumptions of both linearity and homoscedasticity hold (Field A. , 2009).

Results for Riga

In Table 14 the multivariate linear regression models are presented predicting the effect on the variable "grades in mathematics" for Riga. The results show that in Riga, age, family structure, education of parents, school absence and parental support have significant effect on grades in mathematics, when other variables in the models are held constant.

Table 14. Multivariate linear regression models, predicting mathematics achievement in Riga.

City = Riga					
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**
	β	***β***	***β***	***β***	***β***
Gender	.041	.033	.035	.036	.036
Age	-.095**	-.096**	-.094**	-.094**	-.094**
Family structure	-.072**	-.071**	-.066	-.061**	-.061**
Family financial status	-.030	-.032	-.034	-.041	-.041
Education of parents	.184**	.183**	.182**	.177**	.177**
School absence	-.151**	-.149**	-.146**	-.147**	-.147**
Parental monitoring		.038	.028	.015	.015
Time spent with parents			.032	.018	.018
Parental support				.069**	.069**
Intergenerational closure					.000

β = Beta, standardized coefficient. * p < .05, ** p < .01

Model 1 shows that in Riga age (β = -.095, p < .01) has week negative effect on mathematics grades, and being absent from school has significant negative effect (β = -.151, p < .01). In Riga, children who live with both biological parents (β = -.072, p < .01) are more likely to do better in mathematics and so do children who have parents with higher education level (β = .184, p < .01).

In the second model parental monitoring is added to the base model and shows that parental monitoring (β = .038) has no significant effect on grades mathematics in Riga. The third model adds time spent with parents to the second model and also shows that there is no significant relation between time spent with parents (β = .032) and grades in mathematics in Riga.

The fourth model adds parental support to the third model and shows significant positive relations between grades in mathematics and parental support (β = .069, p < .01) in Riga.

The fifth and final model adds intergenerational closure (β = .000) to the fourth model and shows no effect of intergenerational closure on mathematics grades in Riga. The variables age (β = -.094, p < .01), family structure (β = -.061, p < .01), education of parents (β = .177, p < .01), school absence (β = -.1476, p < .01), parental support (β = .069, p < .01) have significant effect on grades in mathematics in Riga when other variables in the models are accounted for.

Checking the assumptions of the regression models for Riga. All assumptions for the regression models were met. The assumption of normality for the residuals is acceptable as the histogram (figure 12) shows an approximate bell shape around 0.

The Durbin – Watson test was 1.89, which is well within acceptable limits, showing that there is no unusual strong correlation between the residual terms. None of the predictor variables has an unusual strong correlation and the average of the variance inflation factor is 1.12, indicating that the assumption of no multicolinearity holds (Field A. , 2009).

The values of the standardized residuals against the standardized predicted values should be a random array of dots evenly dispersed around zero. Figure 13 shows that the dots in the graph do not funnel out, thus indicating that the assumptions of both linearity and homoscedasticity hold (Field A. , 2009).

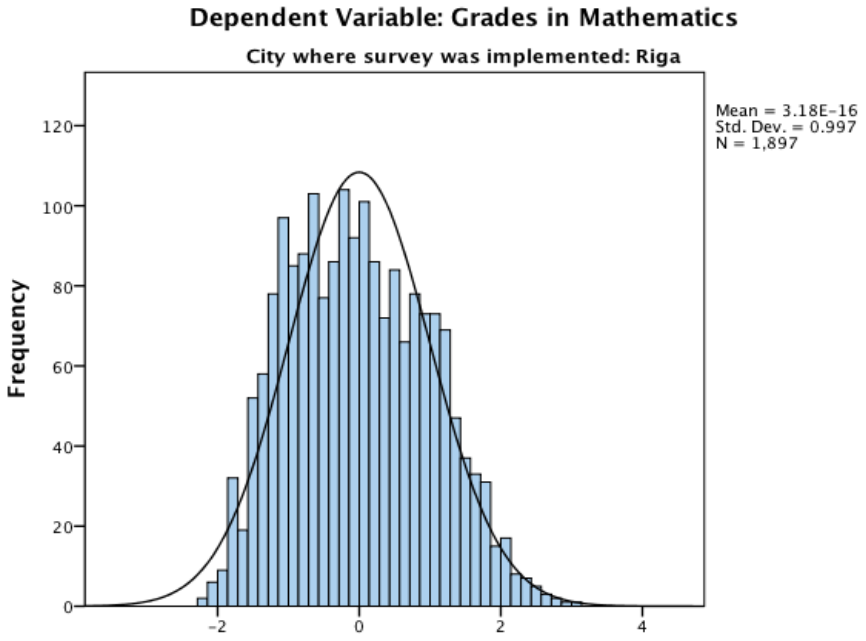

Figure 12. Regression standardized residuals: Riga

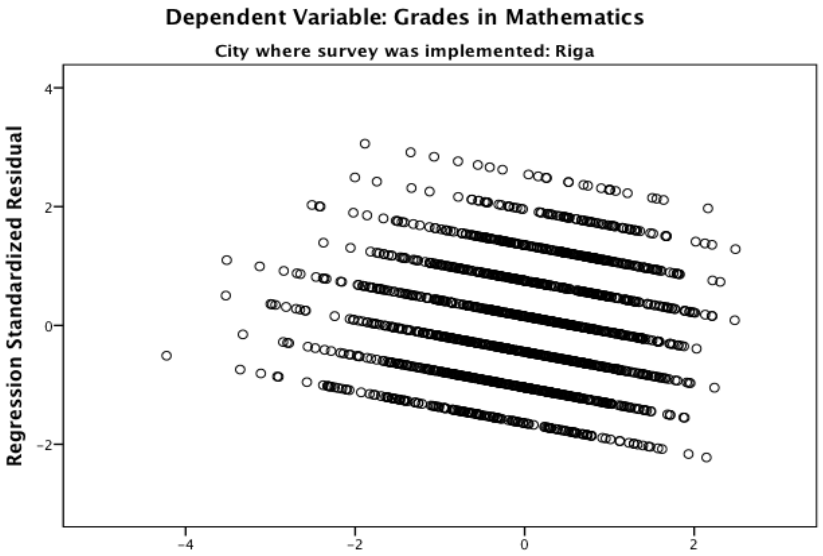

Figure 13. Standardized residuals against the standardized predicted values: Riga

Results for Sofia

Table 15. Multivariate linear regression models, predicting mathematics achievement in Sofia

City = Sofia					
	Model 1	Model 2	Model 3	Model 4	Model 5
	β	*β*	*β*	*β*	*β*
Gender	.123**	.105**	.105**	.105**	.105**
Age	-.019	-.021	-.019	-.019	-.021
Family structure	-.077**	-.069**	-.062**	-.062**	-.062**
Family financial status	.022	.019	.019	.018	.018
Education of parents	.145**	.146**	.148**	.147**	.146**
School absence	-.172**	-.168**	-.158**	-.158**	-.156**
Parental monitoring		.107**	.086**	.085**	.096**
Time spent with parents			.080**	.078**	.079**
Parental support				.006	.009
Intergenerational closure					-.031

β = Beta, standardized coefficient. * p < .05, ** p < .01

In Table 15 the multivariate linear regression models are presented predicting the effect on the variable "grades in mathematics" for Sofia. The results show that in Sofia, family structure, education of parents, school absence, parental monitoring and time spent with parents have significant effect on grades in mathematics, when the effect of other variables in the models have been accounted for.

Looking at model 1, the results show that in Sofia family structure (β = -.077, p < .001) has week negative effect on mathematics grades, and being absent from school has significant negative effect (β = -.172, p < .01). The education level of parents (β = .145, p < .01) has a significant positive effect on grades in Mathematics and being a girl (β = .123, p < .01) also realties positively with mathematics grades in Sofia.

In the second model parental monitoring is added to the base model and shows that parental monitoring (β = .107, p < .01) has significant effect on grades mathematics in Sofia.

The third model adds time spent with parents to the second model and also shows that there is significant relation between time spent with parents (β = . 080, p < .01) and grades in mathematics in Riga.

The fourth and fifth models add parental support (β = .006) and intergenerational closure (β = -.031) to the models respectively, showing no effect of either variable on grades in mathematics in Sofia.

The variables family structure (β = -.062, p < .01), education of parents (β = .156,

$p < .01$), school absence ($\beta = -.156$, $p < .01$), parental monitoring ($\beta = .096$, $p < .01$) and time spent with parents ($\beta = .079$, $p < .01$), have significant effect on grades in mathematics in Sofia when other variables in the models are accounted for.

Checking the assumptions of the regression models for Sofia. The assumption of normality for the residuals is acceptable as the histogram (figure 14) shows an approximate bell shape around 0.

The Durbin – Watson test was 1.76, which is well within acceptable limits, showing that there is no unusual strong correlation between the residual terms. None of the predictor variables has an unusual strong correlation and the average of the variance inflation factor is 1.132, indicating that the assumption of no multicolinearity holds (Field A. , 2009).

The values of the standardized residuals against the standardized predicted values should be a random array of dots evenly dispersed around zero. Figure 15 shows that the dots in the graph do not funnel out, thus indicating that the assumptions of both linearity and homoscedasticity hold (Field A. , 2009).

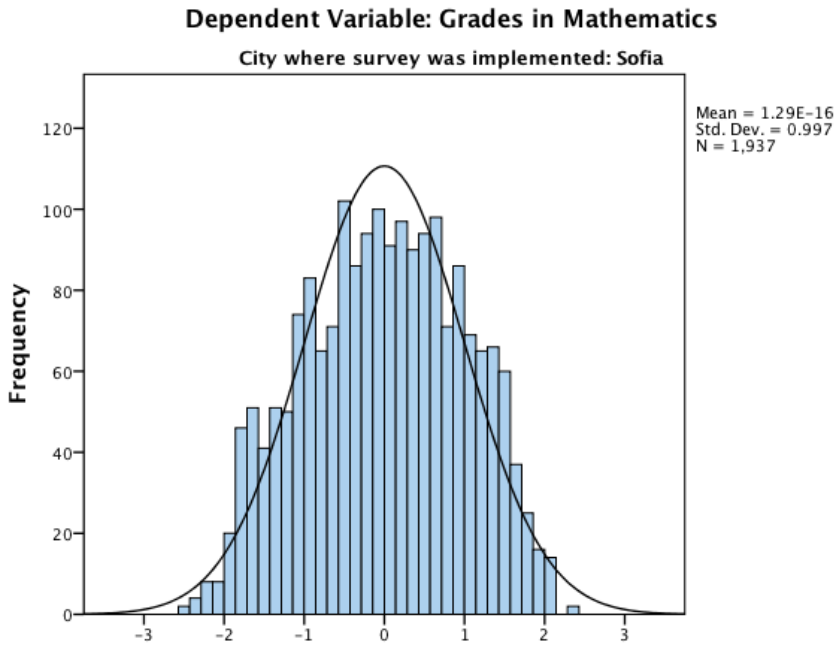

Figure 14. Regression standardized residuals: Sofia

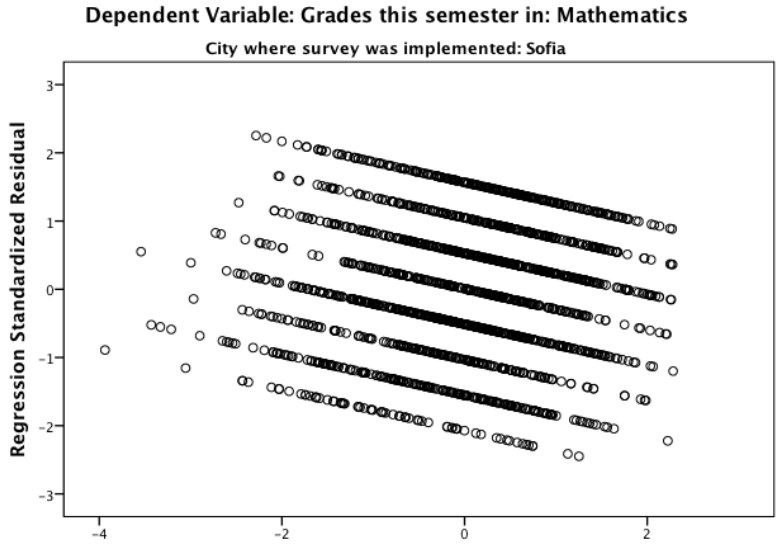

Figure 15. Standardized residuals against the standardized predicted values: Sofia

Results for Vilnius

In Table 16 the multivariate linear regression models are presented predicting the

Table 16. Multivariate linear regression models, predicting mathematics achievement in Vilnius.

City = Vilnius					
	Model 1	Model 2	Model 3	Model 4	Model 5
	β	β	β	β	β
Gender	.074**	.063**	.063**	.063**	.060*
Age	-.104**	-.105**	-.105**	-.104**	-.106**
Family structure	-.026	-.023	-.019	-.019	-.022
Family financial status	.016	.016	.014	.016	.018
Education of parents	.150**	.151**	.150**	.152**	.145**
School absence	-.245**	-.236**	-.232**	-.232**	-.228**
Parental monitoring		.060*	.047	.049	.071**
Time spent with parents			.046	.048	.053
Parental support				-.012	.002
Intergenerational closure					-.072**

β = Beta, standardized coefficient. * p < .05, ** p < .01

effect on the variable "grades in mathematics" for Vilnius. The results show that in Riga, age, education of parents, school absence and intergenerational closure have significant effect on grades in mathematics, when other variables in the models are held constant.

Model 1 shows that in Vilnius, age (β = -.104, p < .01) has a significant negative effect on grades in mathematics and being absent from school also has significant negative effect and quite strong effect (β = -.245, p < .01). Being a girl (β = -.074, p < .01) has a positive effect on grades in Mathematics and so does the education level of parents (β = .150, p < .01).

In Model 2, 3, and 4, parental monitoring (β = .060, p < .05), time spent with

parents (β = .046), and parental support (β = -.012), are added respectively. The results show that increased parental monitoring shows a small positive effect on mathematics grades but more time spent with parents and more support from parents does not have significantly positive effect on students' mathematics grades in Vilnius.

The fifth and final model adds intergenerational closure (β = -.072, p < .01) to the fourth model and shows a significant negative effect of intergenerational closure on mathematics grades in Vilnius. The variables gender (β = .060, p < .05) age (β = -.106, p < .01), education of parents (β = .145, p < .01), school absence (β = -.228, p < .01) and intergenerational closure (β = -.072, p < .01), have significant effect on grades in mathematics in Vilnius when other variables in the models are accounted for

Checking the assumptions of the regression models for Vilnius. All assumptions for regression are met in the regression models for Vilnius. The assumption of normality for the residuals is acceptable as the histogram (figure 15) shows an approximate bell shape around 0.

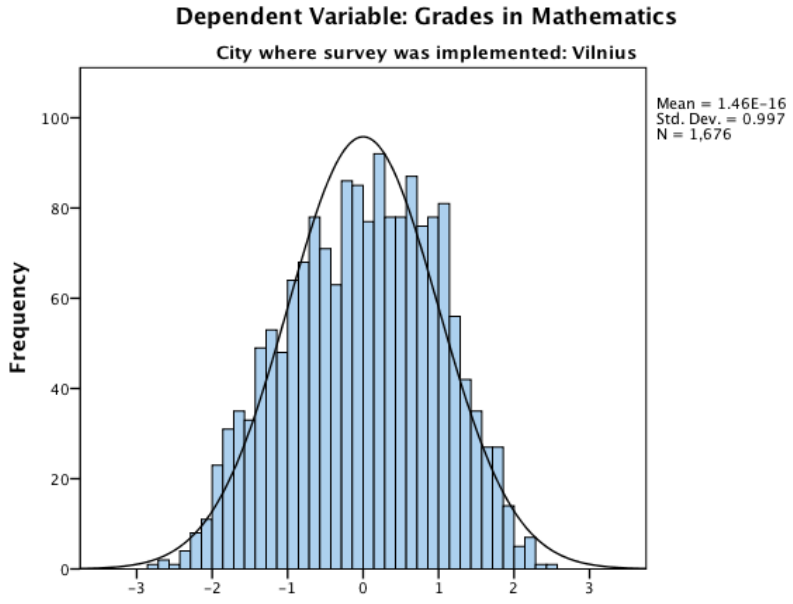

Figure 16. Regression standardized residuals: Vilnius

The Durbin – Watson test was 1.86, which is well within acceptable limits, showing that there is no unusual strong correlation between the residual terms. None of the predictor variables has an unusual strong correlation and the average of the variance inflation factor is 1.126, indicating that the assumption of no multicolinearity holds (Field A. , 2009).

The values of the standardized residuals against the standardized predicted values (figure 17) show a random array of dots evenly dispersed around zero, thus indicating that the assumptions of both linearity and homoscedasticity hold (Field A. , 2009).

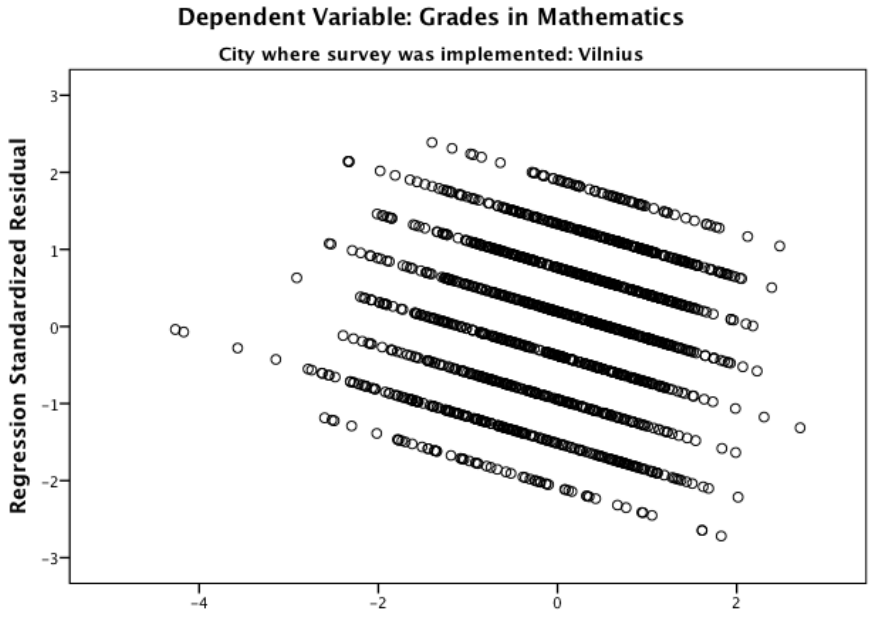

Figure 17. Standardized residuals against the standardized predicted values: Vilnius

Research question II (b)

To answer how much the cumulative variance of mathematics achievement is explained by the social capital measures we look at R^2 values of the regression models. The R^2 gives a measure of how much of the variability in the outcome is accounted for by the predictors. Table # gives the R^2 values for the model at each step for each city data.

Table 17. Explained variance in mathematics grades

	Bucharest	Jurmala	Kaunas	Klaipeda	Reykjavik	Riga	Sofia	Vilnius
Base model	.078	.113	.172	.117	.128	.073	.068	.113
Model 2	.079	.115	.179	.130	.151	.074	.079	.117
Model 3	.080	.119	.180	.133	.155	.075	.084	.119
Model 4	.082	.120	.180	.134	.163	.078	.084	.119
Model 5	.082	.147	.181	.136	.164	.078	.084	.123

Looking at Bucharest we see that the cumulated variance of mathematics grades explained by gender, age, family structure, education of parents and school absence is .078 or 7.8%. After adding the other four social capital measures the explained variance in mathematics grades is 8.2% in Bucharest. In Jurmala the base model explains 11.3% of the variance in mathematics grades and the explained variance is 14.7% when all the social capital measures have been added to the models. For Kaunas the variance in mathematics achievement explained by gender, age family structure, parents education level and absence from school is 17.2% and after adding other the other social capital measures the explained variance increases very little. In Klaipeda gender, family structure, school absence and parental education provides 11.7% of the explained

variance in mathematics grades and with the other four social capital measures the explained variance in the grades is 13.6%. In Riga and Sofia the explained variance in mathematics grades by the social capital measures is relatively small or only 7.8% and 8.4% respectively. In Reykjavík the gender, age, family structure, education of parents and school absence provide explanation for 12.8% of the variance in mathematics grades and with the other four social capital measures, parental support, time spent with parents, parental monitoring and intergenerational closure, 16.4% of the variance is explained. In Vilnius the base model explains 11.3% of the variance and the other four measures ad little to the explained variance, with total of 12.3% explained with all the measures in the model.

To test whether the cumulative variance explained in mathematics grades is significantly different between the cities we compare the R-values of the regression models by first adjusting R so that its sampling distribution is normal by using Fishter's z transformation and calculate the z-score of the difference between the correlations to see if the difference is significant. We calculate the difference with

$$Z_{difference} = \frac{Z_{R1} - Z_{R2}}{\sqrt{\frac{1}{N_1 - 3} + \frac{1}{N_2 - 3}}}$$

where Z_R is the transformed R and N is the sample size. The results can be seen in table 18.

There is no statistical difference in the effect of social capital measures on the explained variance of mathematics grades between Reykjavik, Jurmala, Kaunas and Klaipeda. There is also no significant difference between Sofia, Bucharest and Riga but

the effect of social capital on mathematics achievement is significantly lower in those cities then it is in Reykjavik, Jurmala, Kaunas and Klaipeda. Vilnius is not significantly different from Jurmala and Klaipeda but the explained variance in mathematics grades in Vilnius, is significantly different from that found in all the other cities.

Table 18. **$Z_{difference}$ scores . Significance in explained variance between cities.**

	Bucharest	Jurmala	Kaunas	Klaipeda	Reykjavik	Riga	Sofia
Jurmala	2.44**						
Kaunas	5.79**	1.08					
Klaipeda	3.58**	0.34	2.21**				
Reykjavik	4.81**	0.68	0.62	1.57			
Riga	0.04	2.31**	5.69**	3.03**	4.79**		
Sofia	0.44	2.08**	5.34**	2.66**	4.40**	0.04	
Vilnius	2.49**	0.79	3.05**	0.66	2.28**	2.46**	2.07**

* $p < .05$, ** $p < .01$

CHAPTER V

DISCUSSION AND CONCLUSION

Summary

The purpose of this study was to examine the impact of social capital on mathematics achievement in different European cities. The study uses data from the 2008 *Youth in Europe* survey, carried out by the Icelandic Center for Social Research and Analysis. The sample in the current study came from eight of the eleven cities yielding responses from 17,312 adolescences. The cities under study were: Bucharest in Romania, Kaunas, Klaípéda and Vilnius in Lithuania, Reykjavík in Iceland, Riga and Jurmala in Latvia and Sofia in Bulgaria. The participants were students in 9^{th} and 10^{th} grade of local secondary schools in each city. The theoretical framework of the study builds on social capital theory presented in 1988 by the American sociologist James Coleman. Coleman argued that social capital in both family and community is a key factor in the creation of human capital, meaning that children that possess more social capital in their lives will do better in school (Coleman J. S., 1988). Several prior studies have empirically supported the theory, showing that communities high in social capital are better able to realize common values and support accepted community goals (Dika & Singh, 2002; Morgan & Todd, 2009; Thorlindsson, Bjarnason, & Sigfusdottir, 2007). Ever since the Equality of Educational Opportunity, study in 1966 was conducted on over half a million students in 4000 schools, it has been known that schools do not work as great equalizers in society.

The report from the study better known as the "Coleman report" indicated several groundbreaking findings, including that schools were not the greatest contributors to students' academic achievement. Instead the report stated that students' family social environment was the greatest determiner of their academic success, which opened up a whole new spectrum in the discussion about school achievement and possible ways of enhancing students´ school performance (Viadero, 2006).

Almost all of the studies supporting Coleman´s theory have been carried out in the United States (Carbonaro, 1998; Dafur, Parcel, & Troutman, 2013; Israel, Beaulieu, & Hartless, 2001; Morgan & Sørensen, 1999; Morgan & Todd, 2009; Sun, 1998, 1999). The current study adds to the knowledge in the field by examining whether the theory holds across cultures by analyzing data from eight European cities.

Four theoretically distinct forms of parental relations are used as an indication of social capital, namely, parental monitoring, parental support, time spent with parents, and intergenerational closure in the form of parents knowing their children´s friends and parents knowing the parents of their children´s friends. In addition to these distinct measures the current study also analyses the effects of other important family background variables that Coleman indeed included in his theory. Grades in mathematics for the semester were used as an outcome variable. A preliminary study was conducted to support the use of self-reported mathematics grades in this study and found that using self-reported grades in research is justifiable.

The current study proposed two main research questions:

1.
    a. Is parental monitoring associated positively with mathematics achievement?
    b. Is parental support associated positively with mathematics achievement?
    c. Is time spent with parents associated positively with mathematics achievement?
    d. Does intergenerational closure in the form of (a) parents knowing the friends of their children and (b) parents knowing the parents of their children's friends, associate positively with mathematics achievement?
2.
    a. Is the statistical association of social capital indicators in 1a-1d and mathematics achievement different in magnitude across the eight cities and if so how?
    b. Based on the combined social capital measures across the eight European cities, what is the cumulative variance explained in mathematics achievement and how does it differ between the cities?

The first question is answered by examining the bivariate correlations between each of the independent variables and the outcome variable within each city. The second question is answered by using a multiple ordinary least squares regression to determine

the effect of the independent variables on mathematics grades and significant tests to determine the difference between the cities.

Research Question I

The study showed that most of the social capital variables; parental monitoring, parental support, and time spent with parents, associate positively with mathematics grades in all the participating cities. In general parental monitoring had the strongest association with mathematics grades, followed by time spent with parents and parental support. The correlation of these parental factors with mathematics grades was highest in Reykjavik for all three variables, supporting the findings of Kristjansson and Sigfusdottir (2009) who showed that these parental factors are important for adolescents' academic achievement in Iceland. The current study, however, does not find that intergenerational closure associates positively with grades in mathematics, except in Reykjavik. In fact it shows a negative association with mathematics grades in four out of the eight cities in this study and the association was insignificant in the other cities.

Research Question II (a)

When looking at the effect of social capital on mathematics grades in the eight cities while controlling for other variables such as family structure, education of parents and family financial status, which have been known to strongly affect school achievement, the effects on mathematics grades are moderate and almost nonexistent in some cities. For example out of the four social capital variables only parental support shows a small positive effect on mathematics grades in Riga while in Reykjavík parental

monitoring, time spent with parents and parental support all have significant effects on grades in mathematics. The effects of intergenerational closure, in the form of parents knowing their children's friends and the parents of their children's friends does not have a significant positive effect on grades in mathematics in any of the eight cities when the effects of other family variables are held constant. Intergenerational closure does in fact have significant negative effect on grades in mathematics in both Jurmala and in Vilnius.

When considering the family background variables, education of parents contributed significantly to grades in mathematics in each of the eight cities in this study. Education of parents was the only family background variable that had strong significant effect across all the eight cities with the strongest effect in Kaunas and Reykjavík, stressing that children with parents with higher education levels do in fact show higher achievement in mathematics across cultures. This influence of parents education level on mathematics grades is consistent with the literature that has shown that parents' level of education is one of the greatest predictor for students' achievement (Davis-Kean, 2005; Haveman & Wolfe, 1995; Israel, Beaulieu, & Hartless, 2001; Magnuson, 2007; Sirin, 2005).

Family structure also has significant effect on mathematics grades in six out of the eight cities in this study. This indicates that across cultures, children who live with both biological parents are more likely to do well in mathematics than children living with single parents or in other arrangements. These findings support other studies that have shown that nearly all non-intact family structure variables are negatively associated with educational outcomes (Börklund & Sandstrum, 2007; Coleman,1988; Downey, 1994; Parcel & Dafur, 2001; Parcel & Menaghan, 1994). However, family financial status did

not show any significant effect on grades in mathematics in most of the cities in this study. It was only in Reykjavik that higher financial status showed significant effect on mathematics achievement.

Girls performed better in mathematics in all the cities and the difference between the genders was significant in all the cities except Reykjavík and Riga. The difference is in favor of girls even though this study uses self-reported grades where boys have been shown to exaggerate their grades more than girls. Findings from recent studies carried out in the United States have shown that gender difference in mathematics achievement has been largely eliminated, with the difference between the genders in high school becoming insignificant (Else-Quest, Linn, & Hyde, 2010). This study supports prior findings and in fact shows that girls outperform boys on self - reported school grades in all the cities in this study.

Research Question II (b)

Based on the model fit coefficients (R^2), the Kaunas city data explained the largest variation in mathematics grades. There we see that 18% of the variation in mathematics grades is explained by social capital variables and the control variables. In Reykjavík it explained similarly much or 17% and 15% in Jurmala and 14% in Klaipeda. In the larger cities; Bucharest, Sofia and Riga, the explained variance was less or only around 8%.

Conclusion

Coleman (1993) believed that parents who spent time and effort involved in their children´s lives greatly enhanced their children's academic and intellectual performance in school. He referred to this capital as: "the relationship between children and parents" that promotes success in the field of education (Schneider & Coleman, 1993). Other research regarding parental involvement has found moderate relationship between parental involvement and academic achievement (Fan & Chen, 2001; Kristjansson & Sigfusdottir, 2009; Jeynes, 2007). Some studies also found that the effects of parental support on achievement were greater when students' GPA represented academic achievement, rather than a subject specific indicator such as mathematics achievement (Fan & Chen, 2001). The findings of the current study do not fully support Coleman´s theory of social capital, showing that the effects of the social capital variables on mathematics achievement are much weaker in some of the European cities, than prior studies in the US have revealed. Surprisingly, the effects of intergenerational closure, that Coleman stressed as a key variable in affecting children's academic achievement, is non-existing or even negative in many of the cities under study. A few possible explanations for this lack of effect come to mind. First, the effect of closure has predominantly been tested in a US context and might play a different role in the United States then it does in Europe. As pointed out before (Thorlindsson et al., 2007) the effects of social capital on individual outcomes depend on such collective characteristics as normative consensus and the intensity of the norms. In the US, the importance of education for succeeding in life is undisputed. All parents are aware and in fact constantly confronted with messages

about the importance of college education for their children. Indeed, US parents are a diverse group who many are not in a position to act on these norms, even though the norms are in place in society. It is quite possible that in Eastern European cities, these norms are weaker and the importance of education not as widely accepted as the road to success. One could therefore argue that the norms that promote learning are not shared within these cities and their social networks may in some cases activate norms that work against academic achievement like we see in Jurmala and Vilnius.

Another possible explanation, linked to the prior one, is that many of the cities under study have gone through rapid changes in the last two decades, resulting in a range of social problems, such as high levels of inequality and unemployment, very likely resulting in diminished social capital. This is supported by the fact that social capital variables had the greatest effect on mathematics grades in Reykjavík, which is the city in this study with the least amount of inequality and highest standard of living.

A third explanation may be that Coleman´s (1987) theory was supported by studies showing that in Catholic schools students did better because their parents shared norms that promoted achievement, making analysis of this form of social capital perhaps more suited for small networks that are tied to norms within a local religious community rather than for large cities. One finding from the current study supporting that explanation is the fact that the effects of social capital on mathematics achievement is greater in smaller cities than large cities.

Fourth, the social networks of the students themselves may diminish the effect of norms shared between parents. In recent years social networking has increased to a large

extent in most countries, with young people having more and more access to social networking sides through Internet use. This kind of social networking is likely to increase the density of student friendship networks, which in turn could decrease the effect of norms shared by parental networks. This gives rise to Leonard's (2005) view that Coleman missed out on exploring how children´s networks might facilitate the development of social capital between themselves rather then between children and adults (Leonard, 2005).

Recommendations

This study had some limitations that should be noted. First, the data used is cross-sectional data, which does not provide causal evidence, meaning that only the correlation between the variables can be determined but not the causal direction of that relationship. Second, achievement in mathematics was measured with self-reported grades and may therefore be less reliable then actual grades, especially for low achieving students. Third, even though the questionnaire were translated and back translated in each country, further validation of the questionnaires is needed to be able to say with more certainty that participants in different cities understand the questions in the same way. Fifth, seven out of eight cities in this study are located in Eastern European post- communist countries and have gone through rapid change in recent years. Only Reykjavík is located in a country that receives a high grade on the United Nation development index. It would have given a broader idea of the cultural effect of social capital on mathematics achievement if the data would have contained more cities from central and Western Europe.

In general this study provides an insight into the role of social capital in mathematics achievement across cultures, showing that important factors in predicting mathematics achievement, in a certain culture may not work in a similar way in a different place. This highlights the need for culturally diverse empirical tests of ideas about school reform, as what works in one place may not necessarily work elsewhere. Explanations for the lack of an association between social capital, specifically intergenerational closure, and mathematics achievement have been put forth. Future studies should further disentangle the complex link between networks and norms and their role in the creation of social capital in different cultures. For social capital to have a positive impact on mathematics achievement, the importance of mathematics must be shared by communities in question. Future studies should aim at linking the individual and the community, hence getting a wider picture of the existing norms within each society and how they are connected to individual level performance. Also, future research should provide a longitudinal aspect of the effects of social capital on mathematics achievement. Last but not least, the importance of examining peer group norms and networks and how they potentially interfere with parental norms being transferred from one generation to another.

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Appendix A

Correlation tables for study variables for each city

City where survey was implemented = Bucharest

		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Grades in Mathematics	Pearson Sig. (2- N	1 2611										
2. Gender	Pearson Sig. (2- N	.176** .000 2591	1 2634									
3. Age	Pearson Sig. (2- N	- .000 2608	-.027 .162 2631	1 2654								
3. Family financial status	Pearson Sig. (2- N	.068** .000 2603	- .000 2623	- .002 2643	1 2646							
4. Family structure	Pearson Sig. (2- N	-.027 .167 2584	.058** .003 2605	.070** .000 2625	- .000 2617	1 2628						
5. Education of parents	Pearson Sig. (2- N	.165** .000 2579	- .000 2600	- .013 2620	.256** .000 2615	.016 .415 2595	1 2623					
School absence	Pearson Sig. (2- N	- .003 2116	- .002 2124	.060** .006 2138	.035 .105 2133	.051* .020 2117	.026 .223 2116	1 2139				
6. Parental monitoring	Pearson Sig. (2- N	.075** .000 2602	.218** .000 2624	-.005 .795 2644	.020 .303 2637	-.010 .615 2619	.015 .450 2613	- .000 2133	1 2647			
7. Time spent with parents	Pearson Sig. (2- N	.085** .000 2581	.083** .000 2603	- .000 2623	.022 .250 2615	- .000 2598	-.032 .101 2594	- .000 2121	.284** .000 2621	1 2626		
8. Parental support	Pearson Sig. (2- N	.083** .000 2559	.009 .662 2580	- .000 2599	.201** .000 2592	- .000 2576	.155** .000 2572	-.017 .434 2105	.186** .000 2596	.256** .000 2575	1 2602	
9.Intergenerational closure	Pearson Sig. (2- N	.048* .015 2568	.090** .000 2588	- .004 2607	.057** .004 2601	- .028 2582	-.034 .089 2576	.002 .921 2105	.417** .000 2607	.205** .000 2585	.209** .000 2563	1 2610

Correlation is significant at the 0.01 level (2-tailed).**

Correlation is significant at the 0.05 level (2-tailed).*

City where survey was implemented = Jurmala

		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Grades in Mathematics	Pearson	1										
	Sig. (2-											
	N	556										
2. Gender	Pearson	.117**	1									
	Sig. (2-	.006										
	N	555	566									
3. Age	Pearson	-.000	.023	1								
	Sig. (2-	.000	.590									
	N	555	565	566								
3. Family financial status	Pearson	-.076	-.014	-.056	1							
	Sig. (2-	.076	.014	.184								
	N	551	560	560	561							
4. Family structure	Pearson	-.001	.010	.072	-.035	1						
	Sig. (2-	.001	.813	.086	.035							
	N	555	565	565	560	566						
5. Education of parents	Pearson	.204**	-.055	-.049	.008	.003	1					
	Sig. (2-	.000	.199	.248	.848	.945						
	N	540	550	550	546	551	551					
School absence	Pearson	-.000	-.027	-.032	.008	.040	.000	1				
	Sig. (2-	.000	.567	.497	.861	.396	.992					
	N	437	441	441	441	442	432	442				
6. Parental monitoring	Pearson	.108*	.208**	-.022	.033	-.043	.083	-.012	1			
	Sig. (2-	.011	.000	.022	.442	.043	.053	.012				
	N	551	561	561	557	561	547	441	562			
7. Time spent with parents	Pearson	.123**	.048	-.007	.086*	-.006	.009	-.001	.354**	1		
	Sig. (2-	.004	.255	.007	.041	.006	.830	.001	.000			
	N	554	564	564	559	564	549	440	560	565		
8. Parental support	Pearson	.047	.000	.057	.151**	-.035	.097*	.004	.234**	.301**	1	
	Sig. (2-	.275	.996	.177	.000	.035	.023	.937	.000	.000		
	N	552	561	561	556	561	547	440	558	561	562	
9.Intergenerational closure	Pearson	-.007	.026	-.017	.106*	-.002	.017	-.004	.313**	.259**	.206**	1
	Sig. (2-	.007	.545	.683	.012	.002	.700	.927	.000	.000	.000	
	N	551	561	561	556	561	547	438	557	561	558	562

Correlation is significant at the 0.01 level (2-tailed).**

Correlation is significant at the 0.05 level (2-tailed).*

City where survey was implemented = Kaunas

		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Grades in Mathematics	Pearson Sig. (2- N	1 2548										
2. Gender	Pearson Sig. (2- N	.162** .000 2508	1 2527									
3. Age	Pearson Sig. (2- N	- .000 2535	- .033 2519	1 2553								
3. Family financial status	Pearson Sig. (2- N	.092** .000 2536	-.005 .807 2516	- .009 2542	1 2555							
4. Family structure	Pearson Sig. (2- N	- .000 2537	.024 .234 2521	.043* .032 2547	- .000 2545	1 2556						
5. Education of parents	Pearson Sig. (2- N	.241** .000 2470	-.031 .130 2455	- .000 2478	.176** .000 2477	- .004 2482	1 2486					
School absence	Pearson Sig. (2- N	- .000 1973	.013 .556 1951	.067** .003 1970	-.022 .321 1975	.097** .000 1973	- .000 1931	1 1981				
6. Parental monitoring	Pearson Sig. (2- N	.135** .000 2448	.256** .000 2428	-.007 .731 2450	.036 .079 2454	-.007 .716 2453	.048* .020 2388	- .000 1904	1 2464			
7. Time spent with parents	Pearson Sig. (2- N	.103** .000 2440	.050* .013 2416	-.003 .878 2443	.113** .000 2444	- .000 2444	.037 .071 2380	- .000 1901	.274** .000 2441	1 2455		
8. Parental support	Pearson Sig. (2- N	.066** .001 2473	.004 .828 2452	- .000 2479	.170** .000 2478	- .000 2480	.088** .000 2414	- .014 1925	.208** .000 2397	.245** .000 2390	1 2489	
9.Intergenerational closure	Pearson Sig. (2- N	- .029 2433	.018 .376 2414	.000 .981 2437	.040 .051 2441	-.031 .129 2439	-.023 .271 2375	-.027 .247 1895	.384** .000 2442	.184** .000 2426	.237** .000 2384	1 2449

Correlation is significant at the 0.01 level (2-tailed).**

Correlation is significant at the 0.05 level (2-tailed).*

City where survey was implemented = Klaipeda

		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Grades in Mathematics	Pearson Sig. (2- N	1 1871										
2. Gender	Pearson Sig. (2- N	.126** .000 1847	1 1873									
3. Age	Pearson Sig. (2- N	- .000 1861	- .000 1870	1 1888								
3. Family financial status	Pearson Sig. (2- N	.009 .700 1854	-.031 .178 1853	- .035 1868	1 1878							
4. Family structure	Pearson Sig. (2- N	- .000 1858	.029 .214 1867	.021 .369 1882	- .000 1866	1 1885						
5. Education of parents	Pearson Sig. (2- N	.206** .000 1805	.024 .317 1809	- .003 1824	.151** .000 1813	-.010 .655 1824	1 1827					
School absence	Pearson Sig. (2- N	- .000 1424	-.022 .399 1417	.038 .148 1429	.027 .309 1424	.090** .001 1426	- .014 1399	1 1436				
6. Parental monitoring	Pearson Sig. (2- N	.174** .000 1849	.211** .000 1848	- .006 1864	.074** .001 1858	-.044 .058 1861	.043 .065 1806	- .001 1426	1 1873			
7. Time spent with parents	Pearson Sig. (2- N	.136** .000 1849	.052* .026 1848	- .000 1863	.072** .002 1855	- .000 1859	.048* .040 1806	- .000 1427	.315** .000 1861	1 1872		
8. Parental support	Pearson Sig. (2- N	.083** .000 1842	-.012 .593 1841	- .035 1856	.188** .000 1852	- .000 1853	.105** .000 1799	-.041 .119 1428	.216** .000 1852	.272** .000 1853	1 1865	
9.Intergenerational closure	Pearson Sig. (2- N	.030 .198 1842	.018 .443 1841	-.025 .289 1857	.079** .001 1850	- .011 1854	-.010 .657 1799	-.007 .780 1424	.406** .000 1862	.247** .000 1854	.209** .000 1845	1 1866

Correlation is significant at the 0.01 level (2-tailed).**

Correlation is significant at the 0.05 level (2-tailed).*

City where survey was implemented=Reykjavik

		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Grades in Mathematics	Pearson Sig. (2- N	1 2082										
2. Gender	Pearson Sig. (2- N	.042 .057 2053	1 2076									
3. Age	Pearson Sig. (2- N	- .000 2076	- .014 2073	1 2099								
3. Family financial status	Pearson Sig. (2- N	.143** .000 2053	- .003 2047	-.017 .442 2070	1 2075							
4. Family structure	Pearson Sig. (2- N	- .000 2068	.008 .712 2065	.032 .148 2088	- .000 2062	1 2091						
5. Education of parents	Pearson Sig. (2- N	.229** .000 2037	- .006 2035	- .000 2056	.194** .000 2032	- .000 2048	1 2059					
School absence	Pearson Sig. (2- N	- .000 1879	.121** .000 1875	.019 .411 1895	-.042 .072 1874	.151** .000 1887	- .001 1862	1 1899				
6. Parental monitoring	Pearson Sig. (2- N	.206** .000 2059	.171** .000 2052	-.027 .212 2075	.032 .152 2054	- .000 2068	.088** .000 2036	- .000 1882	1 2081			
7. Time spent with parents	Pearson Sig. (2- N	.167** .000 2061	.005 .823 2052	- .047 2074	.127** .000 2050	- .000 2067	.066** .003 2037	- .000 1879	.240** .000 2065	1 2081		
8. Parental support	Pearson Sig. (2- N	.242** .000 2035	.075** .001 2030	- .003 2049	.163** .000 2028	- .000 2043	.164** .000 2013	- .000 1859	.233** .000 2040	.346** .000 2039	1 2054	
9.Intergenerational closure	Pearson Sig. (2- N	.153** .000 2044	.144** .000 2038	-.041 .060 2059	.109** .000 2037	- .000 2051	.065** .003 2021	- .001 1868	.327** .000 2055	.235** .000 2049	.275** .000 2025	1 2065

Correlation is significant at the 0.01 level (2-tailed).**

Correlation is significant at the 0.05 level (2-tailed).*

City where survey was implemented = Rika

		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Grades in Mathematics	Pearson Sig. (2- N	1 2627										
2. Gender	Pearson Sig. (2- N	.039* .048 2626	1 2678									
3. Age	Pearson Sig. (2- N	- .000 2622	- .030 2673	1 2674								
3. Family financial status	Pearson Sig. (2- N	-.006 .751 2609	- .000 2658	- .003 2654	1 2659							
4. Family structure	Pearson Sig. (2- N	- .001 2618	.059** .002 2669	.024 .206 2665	- .000 2651	1 2670						
5. Education of parents	Pearson Sig. (2- N	.181** .000 2537	-.023 .248 2586	-.029 .141 2582	.131** .000 2573	-.029 .134 2580	1 2587					
School absence	Pearson Sig. (2- N	- .000 2029	.007 .754 2060	.042 .055 2058	-.031 .161 2046	.047* .034 2054	- .041 1989	1 2061				
6. Parental monitoring	Pearson Sig. (2- N	.050* .010 2605	.216** .000 2655	-.001 .970 2651	.016 .421 2637	-.004 .855 2647	.025 .211 2566	- .022 2049	1 2656			
7. Time spent with parents	Pearson Sig. (2- N	.092** .000 2605	.012 .547 2655	- .000 2651	.083** .000 2637	- .000 2647	.044* .025 2567	- .000 2047	.293** .000 2641	1 2656		
8. Parental support	Pearson Sig. (2- N	.114** .000 2598	.014 .478 2645	-.029 .132 2641	.161** .000 2630	- .000 2638	.123** .000 2560	-.043 .054 2038	.248** .000 2634	.277** .000 2633	1 2646	
9.Intergenerational closure	Pearson Sig. (2- N	.040* .043 2586	- .040 2635	- .012 2632	.104** .000 2617	- .000 2627	-.014 .478 2546	.000 .989 2035	.362** .000 2626	.203** .000 2620	.202** .000 2614	1 2636

Correlation is significant at the 0.01 level (2-tailed).**

Correlation is significant at the 0.05 level (2-tailed).*

City where survey was implemented = Sofia

		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Grades in Mathematics	Pearson Sig. (2- N	1 2629										
2. Gender	Pearson Sig. (2- N	.110** .000 2629	1 2668									
3. Age	Pearson Sig. (2- N	-.036 .062 2629	-.004 .833 2668	1 2668								
3. Family financial status	Pearson Sig. (2- N	.038 .056 2599	.011 .569 2634	.005 .802 2634	1 2634							
4. Family structure	Pearson Sig. (2- N	- .000 2616	.044* .023 2654	.004 .824 2654	- .000 2621	1 2654						
5. Education of parents	Pearson Sig. (2- N	.153** .000 2587	- .000 2624	.002 .925 2624	.100** .000 2593	.006 .743 2613	1 2624					
School absence	Pearson Sig. (2- N	- .000 2105	.064** .003 2116	.057** .008 2116	-.008 .725 2096	.049* .023 2106	- .038 2077	1 2116				
6. Parental monitoring	Pearson Sig. (2- N	.116** .000 2580	.165** .000 2609	.022 .268 2609	.034 .081 2580	- .009 2598	-.035 .079 2569	-.022 .310 2090	1 2609			
7. Time spent with parents	Pearson Sig. (2- N	.127** .000 2576	.036 .070 2605	-.033 .096 2605	.045* .024 2577	- .000 2594	-.005 .805 2565	- .000 2093	.284** .000 2573	1 2605		
8. Parental support	Pearson Sig. (2- N	.072** .000 2551	.014 .480 2580	.001 .945 2580	.213** .000 2552	- .003 2571	.043* .028 2544	- .015 2069	.278** .000 2549	.401** .000 2548	1 2580	
9.Intergenerational closure	Pearson Sig. (2- N	-.008 .679 2542	.076** .000 2570	- .033 2570	.046* .020 2542	-.012 .537 2559	- .001 2531	.042 .056 2063	.388** .000 2555	.178** .000 2538	.226** .000 2513	1 2570

Correlation is significant at the 0.01 level (2-tailed).**

Correlation is significant at the 0.05 level (2-tailed).*

City where survey was implemented = Vilnius

		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Grades in Mathematics	Pearson Sig. (2- N	1 2246										
2. Gender	Pearson Sig. (2- N	.094* .000 2217	1 2234									
3. Age	Pearson Sig. (2- N	- .000 2239	- .000 2230	1 2256								
3. Family financial status	Pearson Sig. (2- N	.038 .076 2236	- .000 2224	.033 .119 2246	1 2253							
4. Family structure	Pearson Sig. (2- N	- .003 2238	.092* .000 2229	.035 .094 2251	- .000 2245	1 2255						
5. Education of parents	Pearson Sig. (2- N	.186* .000 2218	-.008 .697 2207	- .003 2229	.131* .000 2224	-.005 .799 2229	1 2233					
School absence	Pearson Sig. (2- N	- .000 1768	- .017 1757	.076* .001 1773	-.011 .650 1768	.036 .134 1772	- .005 1758	1 1777				
6. Parental monitoring	Pearson Sig. (2- N	.098* .000 2229	.163* .000 2217	-.034 .112 2239	-.006 .794 2236	-.026 .214 2238	-.015 .493 2218	- .000 1768	1 2246			
7. Time spent with parents	Pearson Sig. (2- N	.093* .000 2221	.026 .225 2209	.020 .353 2231	.065* .002 2228	- .000 2230	.005 .798 2210	- .000 1764	.267* .000 2229	1 2238		
8. Parental support	Pearson Sig. (2- N	.057* .008 2204	-.005 .812 2192	-.016 .441 2214	.210* .000 2212	- .000 2213	.150* .000 2192	- .016 1752	.241* .000 2210	.248* .000 2211	1 2221	
9.Intergenerational closure	Pearson Sig. (2- N	- .033 2219	.004 .841 2207	.005 .827 2229	.064* .002 2227	- .005 2228	- .000 2208	-.001 .982 1760	.356* .000 2229	.197* .000 2225	.258* .000 2208	1 223

Correlation is significant at the 0.01 level (2-tailed).**

Correlation is significant at the 0.05 level (2-tailed).*

Appendix B.

Questions used from the Youth in Europe survey

1. Are you a boy or a girl?

☐ Boy ☐ Girl

2. Year of birth? (Choose only ONE option)

☐ 1990
☐ 1991
☐ 1992
☐ 1993
☐ 1994
☐ 1995
☐ 1996

4. Which of the following persons live in your home? (Choose only ONE option)

☐ Both parents
☐ Mother but not father
☐ Father but not mother
☐ Mother and her partner
☐ Father and his partner
☐ I live with friends
☐ I live on my own
☐ I live in different arrangements

5. **What is the highest level of schooling your mother completed?** (If you are mostly brought up by a fostermother you answer for her) (Choose only ONE option)
   - ☐ Primary school or less
   - ☐ Started high school but has not finished
   - ☐ Graduated from high school
   - ☐ Started junior college or trade school but has not finished
   - ☐ Graduated from junior college or trade school
   - ☐ Started university but has not finished
   - ☐ Graduated from a university
   - ☐ I don't know/doesn't apply

6. **What is the highest level of schooling your father completed?** (If you are mostly brought up by a fosterfather you answer for him) (Choose only ONE option)
   - ☐ Primary school or less
   - ☐ Started high school but has not finished
   - ☐ Gratuated from high school
   - ☐ Started junior college or trade school but has not finished
   - ☐ Graduated from junior college or trade school
   - ☐ Started university but has not finished
   - ☐ Graduated from a university
   - ☐ Don't know/doesn't apply

12. **How well off financially do you think your family is in comparison to other families in your country?** (Choose only ONE option)
    - ☐ Much better off
    - ☐ Considerably better off
    - ☐ A little better off
    - ☐ Similar to others
    - ☐ A little worse off
    - ☐ Considerably worse off
    - ☐ Much worse off

17. What have your grades been in the following subjects this semester?
(Choose ONE option in BOTH categories)

	Less than 4	About 4	About 5	About 6	About 7	About 8	About 9	About 10
a) Mathematics	☐	☐	☐	☐	☐	☐	☐	☐
b) [NATIVE LANGUAGE]	☐	☐	☐	☐	☐	☐	☐	☐
c) [SECOND LANGUAGE]	☐	☐	☐	☐	☐	☐	☐	☐

18. How many whole days have you been absent from school during <u>the last 30 days</u>?
(Choose ONE option in EACH category)

	None	1 day	2 days	3-4 days	5-6 days	7 days or more
a) Because of illness	☐	☐	☐	☐	☐	☐
b) Because you "skipped" or "cut" classes	☐	☐	☐	☐	☐	☐
c) For other reasons	☐	☐	☐	☐	☐	☐

23. How easy or hard would it be for you to receive the following from your parents?
(Choose ONE option in EACH category)

	Very difficult	Rather difficult	Rather easy	Very easy
a) Caring and warmth	☐	☐	☐	☐
b) Discussions about personal affairs	☐	☐	☐	☐
c) Advice about the studies	☐	☐	☐	☐
d) Advice about other issues (projects) of yours	☐	☐	☐	☐
e) Assistance with things	☐	☐	☐	☐

25. How well does the following apply to you? (Choose ONE option in EACH category)

	Almost never	Seldom	Sometimes	Often	Almost always
a) I spend time with my parents outside school hours on working days	☐	☐	☐	☐	☐
b) I spend time with my parents during the weekends	☐	☐	☐	☐	☐

29. How well do the following statements apply to you ? (Choose ONE option in EACH category)

	Applies very well to me	Applies rather well to me	Applies rather poorly to me	Applies very poorly to me
a) My parents find it important that I do well in my studies	☐	☐	☐	☐
b) My parents set definite rules about what I can do at home	☐	☐	☐	☐
c) My parents set definite rules about what I can do outside the home	☐	☐	☐	☐
d) My parents set definite rules about when I should be home in the evening	☐	☐	☐	☐
e) My parents know whom I am with in the evenings	☐	☐	☐	☐
f) My parents know where I am in the evenings	☐	☐	☐	☐
g) My parents know my friends	☐	☐	☐	☐
h) My parents know the parents of my friends	☐	☐	☐	☐
i) My parents often talk to the parents of my friends	☐	☐	☐	☐
j) My parents and the parents of my friends sometimes meet to talk to one another	☐	☐	☐	☐

Appendix C.

Preliminary study questionnaire

To students

This questionnaire contains questions, which you are being asked to respond to. We hope you can respond to these questions as conscientiously as possible, because your responses are very important. This is completely different from examinations, *as no answers are more correct than others*. The only important thing here is for your opinions to be made known.

Most of the questions have several options to choose your answer from, and you need to choose only one of them. Put an X in the box next to the answer you have chosen. Do not use a very faint pencil, and also, do not fill the box you have chosen completely. If you change your mind, the best thing to do is to completely erase the wrong answer or completely shade the box with the wrong answer, so that no white spaces can be seen. If you feel that none of the answers provided to certain questions accurately describes your opinion or accurately suits you, choose the answer that you think is closest to the truth.

It will be impossible to trace your answers to you, in other words, no one you know, not your teachers, parents, acquaintances or friends, could ever access your personal responses. Make sure you do not write *your name or any personal identification number*s on the questionnaire sheets or on the envelope provided with it. When you have finished answering all the questions, put the questionnaire in the envelope, seal it completely, and raise your hand and wait for the teacher to indicate that you can hand in the envelope.

If you have any questions to ask about certain items, close your booklet and raise your hand. An employee or teacher will come to your desk with an unanswered version of the questionnaire to assist you without seeing your answers.

1. **Are you a boy or a girl?**

☐ Boy ☐ Girl

2. **Which of the following persons live in your home?** (Choose only ONE option)

- ☐ Both parents
- ☐ Mother but not father
- ☐ Father but not mother
- ☐ Mother and her partner
- ☐ Father and his partner
- ☐ I live with friends
- ☐ I live on my own
- ☐ I live in different arrangements

3. **What is the highest level of schooling your mother completed?** (If you are mostly brought up by a fostermother you answer for her) (Choose only ONE option)

- ☐ Primary school or less
- ☐ Started high school but has not finished
- ☐ Graduated from high school
- ☐ Started junior college or trade school but has not finished
- ☐ Graduated from junior college or trade school
- ☐ Started university but has not finished
- ☐ Graduated from a university
- ☐ I don't know/doesn't apply

4. **What is the highest level of schooling your father completed?** (If you are mostly brought up by a fosterfather you answer for him) (Choose only ONE option)

- ☐ Primary school or less
- ☐ Started high school but has not finished
- ☐ Gratuated from high school
- ☐ Started junior college or trade school but has not finished
- ☐ Graduated from junior college or trade school
- ☐ Started university but has not finished
- ☐ Graduated from a university
- ☐ Don't know/doesn't apply

5. **How well off financially do you think your family is in comparison to other families in your country?** (Choose only ONE option)

- ☐ Much better off
- ☐ Considerably better off
- ☐ A little better off
- ☐ Similar to others
- ☐ A little worse off
- ☐ Considerably worse off
- ☐ Much worse off

6. **How good do you think you are at school work, compared to other people your age?** (Choose only ONE option)

- ☐ Excellent, I am probably one of the best
- ☐ Well above average
- ☐ Above average
- ☐ Average
- ☐ Below average
- ☐ Well below average
- ☐ Poor, I am probably one of the worst off

7. **How satisfied are you with you academic achievement this past winter?** (Choose only ONE option)

Very satisfied	Rather satisfied	Rather unsatisfied	Very unsatisfied
☐	☐	☐	☐

8.

What was your final grade in the following subjects this spring?

a) Icelandic _____

b) Mathematics _____

9. **How well do the following statements apply to you ?**
(Choose ONE option in EACH category)

	Applies almost always to me	Applies often to me	Applies sometimes to me	Applies seldom to me	Applies almost never to me
a) I find the school studies pointless	☐	☐	☐	☐	☐
b) I am bored with the studies	☐	☐	☐	☐	☐
c) I am poorly prepared for classes	☐	☐	☐	☐	☐
d) I feel I do not put enough effort into the studies	☐	☐	☐	☐	☐
e) I find the studies too easy	☐	☐	☐	☐	☐
f) I find the studies too difficult	☐	☐	☐	☐	☐
g) I feel bad at school	☐	☐	☐	☐	☐
h) I want to quit school	☐	☐	☐	☐	☐
i) I want to change schools	☐	☐	☐	☐	☐
j) I get on badly with the teachers	☐	☐	☐	☐	☐

10. **What do you think you will do after graduating from this school?** (Choose only ONE option)

☐ Go to college or upper high school
☐ Go to trade school or similar
☐ Start working/looking for a job

11. **How likely do you think it is that you will attend university?** (Choose only ONE option)

Very likely	Rather likely	Rather unlikely	Very unlikely
☐	☐	☐	☐

Thank you for participating