LUND UNIVERSITY
School of Economics and Management

Master Programme in Economic History

Influence of Parents' Involvement on Children's Education: A Study of Tertiary Education in European Countries

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Abstract: This Master Thesis analyzes how beneficial parental involvement is for third level education of an individual. Effects derived from parental behavior are measured based on new data on a larger scale compared to previous research, and by exploiting so far unused involvement variables. For the measurement a logit regression is applied to European Value Study data, for a selection of thirteen countries across Europe. Through this approach with micro level data, evidence for different effects regarding magnitude and direction, in various countries and between the parents, has been found. It can be concluded that while involvement of the parents has a positive impact on the attainment of third level education, the effect varies between countries due to country specific differences.

Key words: Education, parental influence, tertiary education, cross-European, European Value Study

Website www.ehl.lu.se

Preface

The general idea for this master thesis in Economic History at Lund University arose after the course "Human Capital in a Historical Perspective" demonstrating the importance of education and the accumulation of human capital. In particular this course drew my attention to the relevance of parents for the development of an individual. However, the given literature did not fully deliver evidence for effects of interaction between parents and their children. This was the starting point, to look deeper in how parental behavior influences children's educations success, and to analyze how parental behavior could foster education of their children.

In the process of this work, the following people have supported me above the ordinary and I would like to thank them for their feedback, great discussions and their reassurance in times of concern: Gabriele Welt, Rita Maklakova, and Gesa Langer. Besides them, I thank Prof. Anders Nielson, my supervisor of this work, for having taken the time and provided great feedback. Additionally, I thank Prof. Raquel Carrasco, who gave me great feedback about technical aspects of the regressions. Also, I thank all fellow students for interesting discussions and other friends, who cleared my mind from time to time.

List of Content

List of Tables

List of Equations

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1. Introduction

What determines a person's education? Is it all determined by genetics or is it driven by soft factors such as social environment? Whereas the first question is still subject to a broad discussion, there is more clarity around the second one. While biological factors play so far an unclear role, previous research was able to provide distinct and testable evidence of the effect of the environment on a person's education.[1] This thesis continues, goes further and focuses on the effect and importance of parents for the education of an individual, with a special emphasis on the fact if an individual attains third level education.

1.1. Research Problem and Question

The question, what determines a person's education, can be seen as the wider research problem, since I was eager in understanding the processes that leads to education. If one would fully understand what determines education, policy implications could be formulated and higher education levels could be achieved. In the past years researchers, such as Becker (1962), Becker and Tomes (1994) or Coleman (1988), were able to find evidence for some determining factors. Even though a variety of research has covered some of the effects provided through the parents, I believe additional work is necessary taking into account a broader geography, more recent data as well as additional explanatory variables.

Therefore I adduct previous research results as a foundation for my work, which indicate not only a strong influence of hard factors, such as income, but also show effects from parental behavior or involvement on the child's education. Yet, these findings have usually been limited to only few countries and often lack the integration of intergenerational interactions. Therefore my research problem includes geographical comparison and intergenerational relations into the analysis of an individual's education.

From this research problem, I derive an explicit research question. I define involvement as the interaction between parents and their children, which follows previous work (Coleman, 1988; Hoover-Dempsey & Sandler, 1997; Woessmann, 2004). The presence of parents along the development of their children is a basic requirement for involvement. Other new variables in the field of involvement need to be exploited. Factors like parental income or education cannot be seen as

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1 That mentioned previous work is discussed in detail in section 2.1.

involvement, because there is no direct interaction. Nonetheless, I consider the other parental factors, such as their education, in my analysis, as previous research has shown their importance. Regarding country differences, I analyze and compare several countries, and extend previously constructed models, which were limited in their country selection. Therefore I state the research question as: How beneficial is parental involvement for the attainment of third level education across different European countries?

1.2. Objective and Scope of the Study

Empirical and a variety of theoretical approaches have already been explored in past research to explain the effect of parental involvement on children's education. Nevertheless, I believe that the scope, especially in the empirical field, has not been exhaustive. Additionally, I refer to Becker and Tomes who acknowledge the "high value of empirical and statistical work" in this research field (Becker & Tomes, 1994, p. 292). I follow the reasoning of those authors that theoretic models might appear to be fitting, but need to be tested with real empirical data.

In order to answer the research question, previous research, theoretical and empirical, is examined, a suitable model constructed and later applied to real world micro level data. Since I am interested to make a comparison between countries and show if there are differences in the effect of involvement, cross country data is necessary. Thereby, I can assess if the same level of involvement has a different outcome in various countries.

With the European Value Study data I used a data set, which contains a variety of countries across Europe, with geographical and historical differences (EVS, 2011). Mainly, this data set offers crucial variables regarding the parental involvement, alongside needed control variables for known explanatory factors. Since this data set provides all European countries, I am able to compare a variety of them and present differences in size and direction of the involvement effects. I notice however, that this data set is only cross-sectional and therefore does not contain a time component.[2]

Regarding the education of the individual, this thesis is limited to third level education attainment. For this I follow the International Standard Classifications of Education by the United Nations (UNESCO, 1997). In this classification, third level education is defined as a Bachelor degree or higher, and also other degrees similar to them. This limitation has two main motivations. Firstly, in the past most research was focused on first or second level education, but third level education was under represented. Therefore, I aim to contribute to new approaches and results in this field. Secondly, in relation to first and second level education, third level education is more comparable

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2 The time component is partly covered by an age variable of each individual, which is utilized.

across countries, and at the same time, more differences between the countries regarding the involvement effects are expected (OECD, 2009). Nonetheless, I acknowledge that this focus on third level is a limitation towards accounting for the real world. This approach is necessary to make this study feasible regarding data volumes. Additionally, in respect to practicability, I limited the scope of the data set to a choice of countries. The limitation decision is discussed in detail in section 3.2.

1.3. Outline of the Thesis

This thesis is divided into six parts, which build on each other. After this introduction the second chapter deals with previous research on what determines education. From this past work a theoretical model is constructed. The third chapter deals with the date set presenting the chosen variables and possible limitations. In the fourth chapter the theoretical model and the data are combined. Different combinations of variables with their advantages, as well as drawbacks, are discussed. In the fifth chapter I show my results and analyze the quality of the chosen model. Finally, in the sixth chapter a conclusion is drawn from the presented results and possible implications and limitations are illustrated.

2. Previous Research and Construction of a Theoretical Model

In this theoretical part, first of all I present previous research, which informs the formulation of the theoretical model at the end of this chapter and used throughout the thesis. Because the concept of human capital is not only present in economics, but also in other disciplines like educational, sociological or psychological research, the following research also takes an interdisciplinary approach. Before I focus on the simple theoretical model I apply, I discuss basic ideas about country differences in research on education.

2.1. Discussion of Previous Research

Becker (1962), theoretically as well as empirically, found clear evidence, that people invest time and money in their knowledge if they expect a higher financial return (Becker, 1962). In his early work, Becker also considered that some investment could be paid by another party, e.g. a company invests in training for their employees. Yet, Becker did not account for interaction between generations, since his work was mostly driven by the on-job-training scenario.

Many years later, in 1994, Becker and Tomes delivered a compelling work for the relationship between parents and their children (Becker & Tomes, 1994). Under the general assumption that parents want to maximize their utility by also taking care of their children, those parents transfer some of their financial facilities towards their children. Further on Becker and Tome found evidence that the motivation of the parents is driven by the idea that financial possibilities will in fact increase human capital of the children. On the contrary, they also found indications that if parents are limited in their financial options, so are the educational options of their children. Becker and Tome concluded that behavioral aspects are needed to model the interaction between generations. However, the authors limited the impact of behavior on the utility maximization and the financial transfer.

Twelve years before Becker and Tomes (1994) work, questions on interactions have already been asked. Fuller, Manski, and Wise saw a relationship between parents and children, and that every child is biased differently through the behavior of their parents (Fuller, Manski, & Wise, 1982). However, the authors concluded that they are uncertain how to explicitly model such interactions. Mostly, they were concerned about where to put the boundaries of the observation and also what could overall be observed and measured.

While the presented research could be seen as a classic in the field of human capital, even more recent research in the economic field did not fully cover the role of behavior or interactions between parents and children and the following effect on the children's education. For example Goldin and Katz provided a detailed look on the development of human capital, with a focus on

the United States (Goldin & Katz, 2009). Even though the impact of financial possibilities and the financial transfer between generations is discussed widely, the role of interactions between parents and children is rather uncovered. The same conclusion is also legit for the work by Schwartz, who also only covered financial aspects of the interaction (Schwartz, 1985).

As previously mentioned, since human capital is analyzed in a variety of research field, an interdisciplinary approach is chosen. According to Bourdieu and Passeron, who stated that there is a relationship between parents and their children, this connection is not only limited to biological factors but also to social factors (Bourdieu & Passeron, 1990)[3]. Even though the authors worked with economic models, they did not provide a clear method how this relationship is working.

While economist mostly talk about human, financial or physical capital, Coleman coming from the field of sociology also acknowledged social capital (Coleman, 1988). This social capital, according to Coleman, consists of past and possible future interactions between people. He was able to conduct empirical analysis in which he found evidence that a higher social capital is beneficial for a higher human capital. For this he compared the social capital of a person and their high school results or dropout.

While Coleman (1988) investigated separately the social capital provided through the family and through the class individuals interact with, Breen, Luijkx, Müller, and Pollak focused on the social class only (Breen, Luijkx, Müller, & Pollak, 2009b). In contrast to Coleman they found evidence that at least the influence of the social class on the education of a child is decreasing in most European countries. However, they only focused on the social class and not on the impact through the behavior of the parents.[4]

Also in educational research there is a broad variety of authors relevant for my research demonstrating that there is a clear positive connection between parental involvement and a child's education. Perna and Titus picked up the ideas and models from Coleman (1988) and found clear evidence that parental involvement led to a higher chance of college enrollment, when controlling for known factors (Perna, 2000; Perna & Titus, 2005).[5] However, Perna and Titus based their study on the United States only and their results varied heavily between different ethnic groups.

A rather applied approach towards the explanation of parental involvement in the education of their children is by Hoover-Dempsey and Sandler, and Green, Walker, Hoover-Dempsey, and Sandler (Green, Walker, Hoover-Dempsey, & Sandler, 2007; Hoover-Dempsey & Sandler, 1995,

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3 This is the reference to the latest version of their book, the first version was published in 1977.
4 Interestingly, the results for the United States differ from Europe, showing that social class still does matter towards the education of the child (Rowan-Kenyon, Bell, & Perna, 2008).
5 Other known factors have been financial or physical capital.

1997). They concluded that, before everything else, parents need to have an intrinsic motivation to positively influence their child. Only then they start a process which leads to more knowledge, skills and personal abilities for the child (Hoover-Dempsey & Sandler, 1997). Even though the authors are very detailed and clear in their explanation of involvement, they delivered no real empirical evidence for their conclusion in the two papers. It gets even more unclear when the motivation of the parents is questioned, since there is no unambiguous result (Green et al., 2007).

Additionally, since I examine different countries, I take a look towards previous research in the field of education systems across Europe and previous findings of cross European differences in education research. Through previous findings I provide an overview which countries stand out in any comparison. According to Müller and Karle any school system consists of a series of steps through different institutions (Müller & Karle, 1993). Each step needs to be completed successfully prior to proceed. Otherwise the child drops out or finishes with some form of certificate.[6]

Based on the given definition of a school system I proceed with Müller and Karle (1993). They drew two major conclusions, from observing different education systems across Europe[7], with a focus on equality and permeability. Firstly, in all countries the social class played an important role for the attained education (Müller & Karle, 1993). Even though some countries are more equal and less depending on a social class, this dependency was a general factor overall. Secondly, the authors concluded that differences in the school system between countries are driven by historic, political or institutional events or decisions. Differences between Germany, England, Hungary or Sweden are following these conclusions (Müller & Karle, 1993, p. 16 f.).

While Müller and Karle (1993) listed those differences in detail, I am more focused on their results, since the motivation of this thesis lies within the description of the parental involvement – the choice of countries is rather an auxiliary means along the analysis. Those results by Müller and Karle are backed up by Breen, Luijkx, Müller, and Pollak. They found similar results in 2009 while observing education systems across Europe (Breen, Luijkx, Müller, & Pollak, 2009a) with a focus on gender differences, additionally to the previous focus on equality and permeability. The results, according to the authors, were that the social class is still an important influence on the attained education throughout all the observed countries.[8] However, countries like Germany, France, Italy, and Poland are more unequal, compared to Great Britain, Sweden, and the Netherlands (Breen et

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6 It is a fair assumption, that this description by Müller and Karle (1993) can be seen as common knowledge. Nonetheless, I establish a basis for following authors, by summing up their basics.

7 Müller and Karle (1993) observe England, France, (West) Germany, Hungary, North Ireland, Ireland, Poland, Scotland, and Sweden.

8 Breen, Luijkx, Müller, and Pollak (2009b) focus on France, Germany, Great Britain, Italy, Netherlands, Poland, and Sweden.

al., 2009a, p. 16). Regarding the difference in gender, they concluded that there might be a positive bias towards males, especially in lower social classes.

Another interesting progress in the recent 15 to 20 years was the development of the Program for International Student Assessment (PISA), which can be seen as an example for broad and comparable student evaluation tests all over Europe. This development had an impact, as suggested by Kyvik, on the school systems all over Europe (Kyvik, 2004). Before, historical systems have been established, but due to better comparability, those systems began to align with each other. The author sees this development especially in the fields of second and third level education. Kyvik argued that, partly due to comparable tests, systems across Europe have adjusted to each other and the inequality between countries was reduced regardless the inequality for various social classes in each country (Kyvik, 2004). This trend was seen in Nordic Countries, such as Norway or Finland, as well as in Austria. Analogue results were produced by Grek, who found adjustments after the launch of PISA mainly in Germany or Belgium, but at the same time none in England (Grek, 2009). However, the described progress is only observable in recent years and still researchers argue, that further adjustments to the school systems are necessary (Osborne & Dillon, 2008).

Supplementary to the work by Becker and Tomes (1994), Coleman (1988) or Breen et al. (2009b), I refer to Woessmann, who acknowledged that the familial background plays a significant factor in the attainment of educational level (Woessmann, 2004). He found evidence that the family background of a person has the biggest impact in Germany and England, while in Belgium or France even unequal background will lead to similar educational outcomes. However, it is important to notice that Woessmann only examined West European countries and besides common factors, such as parent's education, gender or age, he limited the family background to the fact how many books are possessed by the household (Woessmann, 2004, p. 10). Also, his findings on inequality are in contrast to some of the results by Breen et al. (2009a), especially in the interpretation for Great Britain or England.[9]

2.2. Construction of a Theoretical Model

Following the argument by Becker and Tomes (1994), I consider for any further empirical analysis the necessity of a theoretical model, taking into account a broad variety of parental factors. The questions for the theoretic model are: What components need to be included in the model, and which econometric model should be chosen to calculate the effect of involvement? This line of thought follows earlier work (Perna, 2000; Schwartz, 1985; Woessmann, 2004). Therefore I start

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9 It is important to notice: While Woessmann (2004) used Great Britain, Breen et al. (2009b) used only England.

by deducting a theoretical model. Afterwards I fill this model with components necessary to explain the effects of parental involvement.

2.2.1 Dependent Variable and Regression Method

Since I am interested if an individual[10] attains a third level education degree or not, this must be the dependent variable in my model. Also, I am only considering the attainment as a "0" or "1" answer, so there are only two options: The child did attain third level or not. This simplistic model, containing only two characteristics, has its benefits due to its relative easy interpretation. Since the dependent variable is expressed as a dummy variable, I use a logit regression model. This decision is similar to earlier work (e.g. Perna, 2000; Schwartz, 1985).

Following, I motivate the choice for a logit regression model in contrast to a probit regression model. There is only a marginal difference between those two models (Gujarati, 2003). However, the logistic distribution features fatter tales for extreme values. In the decision towards logit or probit regression, I follow the conclusion by Gujarati who gives the logit regression an advantage due to its "mathematical simplicity" (Gujarati, 2003, p. 617).

2.2.2 Independent Variables

Now that the regression model and the dependent variable are chosen, I focus on the independent and the control variables. Since I primarily analyze the effect of parental involvement on the education decision, I use one or more variables showing this involvement. This idea is present in most of the discussed previous literature, however Coleman's specifications are very clear and serve as a distinct example (Coleman, 1988).[11] Given the logit regression, I am not bound to a special kind of variables and various variables could be included simultaneously. If and what kind of variables indicating involvement is discussed in chapter four considering econometric aspects.

Additionally I consider further independent variables used as control variables. They account for other factors which could – and in previous research have been shown to – influence the education of the child.

Firstly, I address the parental education level. The idea is that if parents have a higher education level their children are more likely to obtain a higher level as well. This idea is common in research and well documented (Erikson & Jonsson, 1996; Goldin & Katz, 2009; Perna, 2000). To sum up

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10 This work used the generic female form. This implies the individual, child or person can be female as well as male. However, for readability only the female form is mentioned.
11 Even though the basic idea for such a modeling was conducted earlier, the work by Coleman (1988) helped to refine it.

the mechanism between parental education and child education, the basic factors are better assistance for the child, additional knowledge, additional financial possibilities[12] and a higher likelihood of involvement[13].

Secondly, as mentioned above, I control for financial possibilities. This does not mean that I control strictly for the income of the family, but I have some kind of measurement for the financial possibilities. This line of thought is, like before, derived from earlier work (Becker & Tomes, 1994; Choy, 2001; Goldin & Katz, 2009; Perna, 2000; Rowan-Kenyon et al., 2008). Based on those findings, I argue that higher financial possibilities of parents are positively related to higher education of their children.

Thirdly, in the regression a control variable for different ethnic groups, e.g. for migration, is included. It was shown that different ethnic groups produce diverse education results, if all other factors are kept constant (Perna, 2000; Perna & Titus, 2005).

Lastly, I consider different results between females and males. This was for example shown in the work by Goldin and Katz (2009). While they have delivered evidence that in the beginning of the 20th century males were more likely to attain higher education, females have caught up in recent years. And even though their results are mainly focused on the United States, I still see a necessity to control for gender differences, also considering the results by Breen et al. (2009a).

This theoretical approach only describes the necessary components in the proposed logit regression model. So far no decision on specific variables has been completed. This is done in chapter three dealing with the data and the chosen variables, and chapter four showing how those variables are exploited. However, I still want to present a formal approach, with the following formula:

Equation 1: Basic formal logit regression model

$$y_i = \beta_0 + \beta_1 x_i + \cdots + \beta_j x_i + \varepsilon_i$$
$$with\ i = 1, \dots, n;$$
$$and\ j = 1, \dots, number\ of\ independnet\ variables;$$

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12 Of course, additional financial possibly on its own improve the child's education. This is discussed in the next paragraph.
13 The argument for a higher likelihood of involvement is derived from Erikson and Jonsson (1996), even though they deliver very little empirical evidence for it.

2.2.3 Country Selection

Since the regression model addresses different countries, I consider which countries to include in the model. This consideration is based on previous research, since Breen et al. (2009a), Kyvik (2004), and Woessmann (2004) have found diversified countries with special characteristics.

In the past England was proven to represent a country, which did not change in recent years under the influence of PISA, and at the same time provided larger differences between social backgrounds. The last stated factor is also applicable for Germany. In addition to England and Germany, and based on the results by Müller and Karle (1993), I also observe Hungary and Sweden, since their education systems vary historically, although in their outcome on inequality regarding different social classes, this variation is only small.

Additionally, following Breen et al. (2009b), countries like France, Italy or Portugal are considered, since their inequality due to social factors could be picked up in the dependent variable as well as influenced by the indepent variables. On the other side, Nordic countries, such as Sweden, Norway or Finland, which have shown that the attainment of an education level is less dependent on the social background, are considered as counterparts. Interestingly Woessmann (2004) considered France as one of the more equal countries, with less social dependency. This opposition between the authors is an additional reason to include France.

Also, East European countries were under represented in previous studies. If reliable data is available, such countries – but at least Poland or Hungary – are added. The idea is that those countries represent a different historical background compared to most West European countries. As admited by Müller and Karle (1993) or Kyvik (2004), such historical differences are influencial towards education systems. Through this, different results regarding the effects of parentel involvement are possible in those regions.

3. Data: European Value Study 2008

In this chapter I present the used data. For the empirical analysis, I use the European Value Study (EVS) data set from 2008 (EVS, 2011; EVS & GESIS, 2013)[14]. Since this data set is not common in the field of economic history, the next part shows how and by whom it was inquired. Afterwards the data is described in detail and the quality is discussed.

As augmented earlier, I have chosen this study and data set mainly because it covers interesting variable regarding the involvement of the parents, while also observing for other important control variables. Since I want to analyze the effects in different European countries, this data set delivers all desired countries, which are mentioned before. Besides this, the data set has not been exploited in my field of research and therefore I am able to conclude new results.

3.1. Data Source and Inquiry

The European Value Study survey and data set is, according to the Guidelines of the EVS, the "most comprehensive research project on human values in Europe" (EVS, 2010, p. 5). The data is collected across Europe on a large, individual scale. In this process individuals were asked about their values regarding work, family, politics, religion or society and additionally about their demographic characteristics. The program was initiated by the European Value System Study Group (EVSSG) and the first data set was conducted in 1981 (EVS, 2010). Since then every nine years a new data set was compiled with recurring but also additional questions each period. This is due to a variation of main research goals and accompanying questions every nine years. Also, over time the numbers of observed countries has risen from 16 countries in 1981 to 47 countries in 2008 (EVS & GESIS, 2010).

This thesis uses the latest data set from 2008 wave, since it contains interesting variables regarding the involvement of the parents, which were not asked before. And while the report officially is from 2008, the time frame of the conduction reached from 2008 until 2010, depending on the observed country. The EVSSG constructed a master questionnaire in English language, which was afterwards translated into the language(s)[15] of each observed country. This translation process was, according to the method report, closely monitored. The translation of the questions was done by the WebTrans platform from Gallup Europe.

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14 It might seem odd, that the reports for the data, as well as the data set date back to 2011 or 2013. However, in this analysis I used the most recent available versions, for the reports as well as for the data set. Nonetheless, it is still the study from 2008.

15 For Example: In Germany the questions were only translated to German. However, in Belgium a translation to Flemish (Dutch) and French was necessary. Other examples for multi languages are: Switzerland (German, Italian, and French) or Ukraine (Ukrainian and Russian). For details see the Method Report (EVS & GESIS, 2010, p. 22).

The data collection process was quite elaborately, since in all countries, with the exception of Sweden and Finland, face-to-face interviews were conducted.[16] The sampling procedure was a "reprehensive multi-stage or stratified random sample" of the population in the country, for all adults, 18 year or older, regardless of their nationality, citizenship or language, as long as they are permanent residents (EVS, 2010, p. 13; EVS & GESIS, 2010, p. 23). The sample size is over 1,500 observations in all countries, except countries with a relatively small population size. Those countries are listed in Table 15 in the Appendix (p. 46).

For the sampling method I refer to the guidelines of the 2008 EVS (EVS, 2010). As mentioned before, mostly face-to-face interviews were conducted with a high priority regarding the randomization of the observations. The approach for the selection process was firstly a look at the population registry data, secondly an address sample and thirdly a random walk (all according to EVS, 2010, p. 13). The selection in the household was done either through the last birthday method or the closest birthday to a randomly chosen month.[17] Also, if the individual was not reached at first, three additional attempts occurred. Only then a new individual was picked and the previous addressed household was marked as not participating.

All data sets, as well as documentations such as guidelines, variable or method reports are publicly available for research purposes after initial registration at the EVS and GESIS (Leibniz-Institute for the Social Sciences) website or its online catalogue (ZACAT).

3.2. Data Description

This sub-chapter is dealing with the chosen data from the European Value Study of 2008. It is important to notice that, since I am interested in the demographic variables, I reduced the original data set accordingly as well as recoded some of the variables.[18] However, qualities and characteristics of the later stated variables are based on or at least derived from the EVS variable report (EVS & GESIS, 2013).

3.2.1 Country Selection

At the beginning of the data description, I present the chosen countries. This decision was mostly based on previous research (see section 2.1), since those results provided evidence and explanations for country variations. Different cultural and historically developments were considered, while at the same time a variation of first and second level school systems were incorporated.

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16 Finland was observed through an internet panel and Sweden through postal survey. This was due to logistic reasons.
17 Last birthday means the latest birthday in relation to the inquiry. The closest birthday needs in advance a preset month and the birthday, which is the closest to this month, is chosen.
18 Data set as well as Stata-Do-file are available on request.

As an unintended, but nonetheless useful result, those countries represent a wide variety of geographic areas across Europe. The chosen countries and their original sample size are displayed in the Appendix in Table 16 (p. 47).

3.2.2 Dependent Variable: Individuals' Education Level

The most important variable is the dependent variable in my regression analysis. Considering the presented question from chapter two, I need a variable which is able to determine if a person has attained third level education or not. As such a variable is not directly present in the EVS data set, I created it using the variable v336[19], which indicates the education level based on the ISCED classification (EVS & GESIS, 2013, p. 822; UNESCO, 1997). Also variable v335, which lists the age at which the individual has finished her full time education, was considered (EVS & GESIS, 2013, p. 818). This was necessary, since I had to limit the data set to those individuals who have finished their education process. Individuals, which might have attained a higher education level in the future, were not recorded as such in this data set. Therefore the sample size was reduced and only individuals are listed for whom their age – at the moment of observation – is above their age at which they finished their education process.

This dependent variable is presented in the following table for each observed country. It has to be interpreted as a dummy variable, in which no third level education has the characteristics "0", while individuals with third level education receive the characteristics "1".

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19 Variables in the form of "v336" are derived from the data set respectively the variable report. To make the presented results reproducible, the identification numbers from the variable are used in this work. Additionally, a list of all used variables, which are derived from the EVS (2013), is listed in the Appendix, see Table 10 (p. 36).

Table 1: Number of observations in the EVS 2008 with attained third level education

Country	No third level education	Third level education	Total
Austria	1,113	288	1,401
Belgium	952	469	1,421
Finland	327	617	944
France	986	421	1,407
Germany	1,505	517	2,022
Great Britain	1,031	377	1,408
Hungary	1,060	334	1,394
Italy	1,005	229	1,234
Netherland	893	595	1,488
Norway	426	495	921
Poland	908	322	1,230
Portugal	1,313	126	1,439
Sweden	403	549	952
Total	11,922	5,339	17,261

Source: Information taken out of the EVS 2008 data set (EVS, 2011).

3.2.3 Involvement of the Parents

Following, I focus on those variables which determine the involvement of the parents towards the children. For me the most basic form of involvement is that individuals, and in this case the parents, are present. In most previous work this condition was implicated. However, since this analysis has a focus on empirical work, I tested for the presence of the parents. For this reasons two variables are derived from the EVS (2011) data set.

Firstly, I checked if the parents have divorced before the full time school education has been finished. This was done with the contribution of the variable for divorce and the individuals age at which her parents got divorced (Variable 331a and 331b in EVS & GESIS, 2013, pp. 806-809). Again variable v335, which lists the age at which the individual has finished her full time education, was utilized. Through the combination of all variables a new variable was created measuring if an individual experienced parent's divorce before the end of the education process. And while a divorce does not compulsory lead to the absence of one of the parents, it is highly likely that the interaction and involvement might be reduced. The variable has dummy characteristics, which indicate "1" if this individual experienced a divorce before the end of her education process.

Secondly, I used the variable v354, which indicates if the individual has lived with her parents at the age of 14 (EVS & GESIS, 2013, p. 1021). Possible answers in this categorical variable reach from "yes, with both parents", over either mother or father only, to "no, I did not live with my

parents". Since this variable covers not the years between the age of 14 and the possible later end of the education process, both variables are considered in later stated regression models to decide which to include, since they observe the same effect. Also, both variables are listed in detail in the Appendix under Table 24 and Table 25 (p. 53).

Another variable exploited to measure the involvement of the parents is whether mother (v361) or father (v365) talked to their child about politics at the age of 14 (EVS & GESIS, 2013, p. 1090 & 1098). Each categorical variable is divided into four steps, which cover different intensities. These variables are seen as a proxy for the interaction between parents and children. Also, a topic such as politics could be considered as more worthwhile.

Two other additional variables, which were considered in this context, specify if the mother or father followed the news (Variable 362 and 366 in EVS & GESIS, 2013, p. 1092 & 1100). Parents following the news are better informed and can therefore more elaborate talk to their children, which enhances the knowledge of the children (Brothers, Fortner, & Mayer, 1991; Neuman, 1976).

Furthermore and following the same logic, I controlled for variables which indicate if the mother or father read books (Variable 360 and 364 EVS & GESIS, 2013, p. 1088 & 1096). Besides the additional knowledge attainment from reading books, which is beneficial for the involvement. Woessmann (2004) concluded that if the parents owned more books, this has a positive impact on the education results of children. And even though the listed variables cannot indicate how many books were owned, through the categorical nuance regarding if the mother/father has read books, I am able to measure similar effects.

All those interaction variables are listed for the observed countries in the Appendix under Table 18 to Table 23 (p. 49-51). Also, in contrast to other variables, those variables measuring the involvement were observed for mother and father completely. Therefore, there is no reduced sample size for the side of the mother.

When controlling for correlations of those variables listed in the table below, it is interesting that all variables of one gender are correlated, while there is much lower correlation between genders.

Table 2: Correlation table between different involvement factors, derived from EVS 2008

Involvement factor	Mother books	Father books	Mother news	Father news	Mother discusses politics	Father discusses politics
Mother books	1.0000					
Father books	0.3938	1.0000				
Mother news	0.7600	0.3535	1.0000			
Father news	0.3349	0.9050	0.3935	1.0000		
Mother discusses politics	0.8220	0.3617	0.8218	0.3533	1.0000	
Father discusses politics	0.3320	0.9210	0.3524	0.9314	0.3843	1.0000

<u>*Source*</u>*: Own calculation for the correlations, with involved variables out of the EVS 2008.*

Two aspects need to be considered. Firstly, this correlation can be imprecise, since the calculation is for all observed countries. This means, in some of the countries the correlation between the genders might be larger. Because I observe a variety of countries, this effect is likely to be canceled out in this overview. Secondly, this overview confirms that it is important to not to include all possible involvement variables at the same time, since this leads to econometric problems in the results.

A possible solution for correlation in between variables is to construct a new variable which combines those previously stated regarding the involvement of the parents. Since all variables, but especially the politic discussion and the book reading, have the same characteristics and magnitudes in their value, I added them up equivalently. This new variable indicates the involvement on a finer distribution. For instance: In the data set a "Yes" answer, to the question if the mother read books, is equal to the value three. If this value is combined with the answer "A little bit", with the value two, for the question if the mother talked about politics with the child, this results in the new value five. Because both original variables reach from zero to three, the new constructed variable of involvement has a scope from zero to six.[20] Since this new created variable, which is compound for both genders (mother and father), captures most of the interaction of the parents, I present them in the following tables.

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20 There is no 8th step, since the sum of the value "0" (no problem) for variable v363 with "0" (no problem) for the variable v367, does only create "0" in the new variable. Therefore the range is from "0" to "6".

Table 3: Combination of previous involvement variables into a new variable measuring the involved of the mother

	Involvement of the <u>mother</u>: 0 (no interaction) to 6 (high interaction)								
Country	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**Missing**	**Total**
Austria	282	193	244	282	132	108	40	120	1,401
Belgium	454	212	251	295	63	29	29	88	1,421
Finland	109	164	210	215	99	43	18	86	944
France	329	248	269	281	104	43	18	115	1,407
Germany	354	252	314	357	270	156	102	217	2,022
Great Britain	336	143	136	436	89	56	86	126	1,408
Hungary	299	192	178	384	145	77	41	78	1,394
Italy	463	183	108	247	59	32	43	99	1,234
Netherland	472	137	123	392	107	79	89	89	1,488
Norway	169	90	126	238	116	65	77	40	921
Poland	254	162	226	253	152	70	49	64	1,230
Portugal	759	124	88	128	32	15	17	276	1,439
Sweden	129	128	145	193	123	88	53	93	952
Total	4,409	2,228	2,418	3,701	1,491	861	662	1,491	17,261

<u>*Source*</u>*: Own calculations. Two variables of the EVS 2008 data set were added up and listed.*

Table 4: Combination of previous involvement variables into a new variable measuring the involved of the father

	Involvement of the <u>father</u>: 0 (no interaction) to 6 (high interaction)								
Country	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**Missing**	**Total**
Austria	294	182	196	199	129	88	62	251	1,401
Belgium	467	194	192	228	75	44	50	171	1,421
Finland	128	120	158	167	97	49	33	192	944
France	365	183	210	225	84	48	49	243	1,407
Germany	388	247	336	227	193	115	121	395	2,022
Great Britain	395	119	125	257	93	52	107	260	1,408
Hungary	381	151	170	230	126	57	54	225	1,394
Italy	442	153	98	200	66	50	76	149	1,234
Netherland	446	139	125	297	117	94	135	135	1,488
Norway	131	108	104	164	120	66	96	132	921
Poland	289	143	209	186	137	61	73	132	1,230
Portugal	625	143	129	132	47	26	24	313	1,439
Sweden	155	113	112	147	107	58	55	205	952
Total	4,506	1,995	2,164	2,659	1,391	808	935	2,803	17,261

<u>*Source*</u>*: Own calculations. Two variables of the EVS 2008 data set were added up and listed.*

The variable if the mother/father talked about politics was included, since there is a direct interaction towards the child. The decision to include the variable regarding the books is based on previous work by Woessmann (2004). On the other side, the question if the mother/father watched the news was not included in this combined variable, because there is neither an obvious interaction with the individual, nor did previous work pointed in this direction.

3.2.4 Financial Possibilities of the Parents

In previous research, authors have shown that higher financial possibilities from the parents are beneficial towards the education of the children. Unfortunately, there is no explicit variable for the financial power included in the EVS (2011) data set. Though two variables were exploited as an appropriate proxy. Firstly the variable v367, indicating whether individual's parents "had problems replacing broken things" (EVS & GESIS, 2013, p. 1102). I consider this an indicator variable, which has four categorical steps, for the financial possibilities of a family. If the parents had problems replacing things, there is reason to believe that they also had financial problems.

In the same logic I introduce variable v363, which indicates the individual's response to the question if her parents "had problem making ends meet" (EVS & GESIS, 2013, p. 1094). This question, with its four categorical steps, also delivers an indicator for the financial power of the parents. I combined these two variables in one, describing if the parents had financial problems. This was necessary as these variables are highly (0.7) correlated and would harm the quality of the results if included separately in my regression. The new created variable has seven steps, which is achieved by adding up the previous two variables. All three stated variables can be seen in detail in the Appendix (p. 54f.) under Table 26 to Table 28 for all observed countries.

3.2.5 Parents' Education Level

It was widely discussed in previous research, as well as in chapter two, that a higher education level of the parents is beneficial for the education level of the child. Therefore I have to check for the education of the parents. This was done through the variable v355 (EVS & GESIS, 2013, p. 1023). This indicates the parents' education level, following the same ISCED classification as before. So the categorical variation reaches from non-education to second stage of tertiary education[21].

It is however important to notice, that the variable has a focus on the father of the individual. For instance: If the person lived with mother and father, the education level of the father is recorded. Singly in the case in which the child lived only with her mother, the education of the mother is observed. For this reason I constructed a new variable which combines the earlier listed variable

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21 Second stage of tertiary education is a master degree or higher.

v354, regarding with whom an individual lived, with the given variables about the education level of the parents. Thereby I identified the cases in which the education of the mother was recorded. However, the sample size was small since in many countries the number of observations, in which the mother's education is observed, was relatively low (< 200). I have to conclude, even in the case of divorce, children rarely live completely without the father.

Nevertheless, all variables considering the education of the parents are listed in the Appendix in Table 29 to Table 32 (p. 57-58). Thus, it needs to be stated, that for the majority, only the education level of the father is observed. Also, I need to keep in mind the significantly smaller sample size, if only the mother's education is considered.

3.2.6 Parents' Occupation

Besides the parental education, the occupation of the parents matter for the child's education (Goldin & Katz, 2009). While there is not necessarily a direct influence, the occupation is a proxy for the financial possibilities. This proxy is possible for the income level, since European Socio-economic Classification, on which the EVS classification of occupations is based, gives a categorical listing of jobs (EVS & GESIS, 2013, p. 1076; Rose & Harrison, 2014). The nuances of the variable v357ESeC reach in nine steps from routine jobs, over lower technical occupations and intermediate occupations, to higher management jobs.

As well as for the parents' education, the listed variable does mainly account for the occupation of the father. And only if the father was not present, the occupation of the mother is recorded. The data also reveals that the distribution of jobs vary across different European countries. All those distribution are listed in the Table 33 to Table 36 in the Appendix (p. 59-60).

3.2.7 Foreign Nationality

As stated by Perna and Titus (2005), not only the social background is important for the education, but also if an individual is part of a special ethnic group or minority. For this reason I also account, if an observation in the data set is part of a minority. This was done through the variable v304, which indicates if an individual has the nationality of the country in which the inquiry was conducted (EVS & GESIS, 2013, p. 741). I recoded the variable insofar as, that if the person would not have the nationality of the country in which the question was asked, she would receive the characteristics "1", otherwise "0". This dummy variable is therefore able to indicate if a person is foreign in the state she is living in. However, this does not mean that the person lived in this country when she obtained her education. For instance, it might be possible that the individual was born in country (A) in 1960, finished her education in 1985, and moved to country (B) in 1990. The variable above would indicate that the person is foreign and belongs to a minority, but this did not influence the education process.

The characteristics of this variable are presented in the Appendix in Table 37 (p. 62). This table shows that the numbers of people with a foreign nationality is relatively low. In countries like Hungary or Italy, there were no foreigners observed.

3.2.8 Control Variables: Gender and Age

Finally I have to address other control variables – gender and age. For the gender difference, I can refer to multiple previous research, e.g. by Goldin and Katz (2009), Breen et al. (2009a) or Woessmann (2004), who found clear evidence that there is a difference between females and males in attaining an education level. For this reason I also controlled for such effects with the gender variable (v302) out of the EVS (2011) data set. This is a dummy variables, which indicates "1" if the person is female (EVS & GESIS, 2013, p. 733).[22]

Additionally the age of the individual was considered, since there might be difference between generations. Such a change over time, without assuming any direction, is reasonable and was previously used, e.g. by Woessmann (2004). Therefore, I adapted the age variable provided by the EVS, which is a continuous variable counting the years, and regrouped it in four different age groups: Under 35 years of age, between 35 and 49 years, between 50 and 65 years, and above 65 years. The observations are well distributed in these groups and the clusters represent generation developments over time.

Both, the gender and the age variable, are listed for each country in the Appendix in Table 38 and Table 39 (p. 63).

3.3. Data Quality and Shortcomings

It is important to reflect the quality of the data and also consider limitations or shortcomings. The European Value Study was able to provide solid indications to trust the quality of the data, since they undertook large efforts to "guarantee high quality" (EVS, 2010, p. 8). This is partly due to the carefully chosen randomization procedure discussed earlier in this chapter, and also partly due to the professionally realized questioning and translation process. For those two reasons and in combination with long experience, since it was the fourth wave of study, I have high trust in the data quality. Therefore I do not doubt the data set provided, but need to consider the shortcomings of those data.

In the perfect data set every question would be defined and asked, specifically for one analysis, without any speculation or limitation. However, this does not reflect reality and every possible data set might lack some variables of interest. Since the only other option is to collect the data on my

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22 This variable was recoded, compared to the EVS (2011) data set. In the EVS data set the question was for gender. However, I cleaned for missing observations and redefined it to a variable asking for the female gender.

own – which is in this scope and with this country selection not feasible – I had to accept some drawbacks, since the presented data set is still very applicable and has not yet been exploited in this field of study. Nonetheless, the drawbacks have to be stated.

Firstly, it would be beneficial to have the education of both parents at the same time. So far the education level of the mother is only available, if the father was not present. While I have sufficient number of observations for the education of the father, greater numbers are lacking for the mother side. If this is available it would better reflect the real world and a more reliable model could be constructed. However, I still believe the education parameters attained are a reliable indication.[23]

Secondly, the financial possibilities are measured through different proxies. Ideally a question would be asked, if the parents had problems financing the education of the child. Since I have three different variables which account for this financial potential, this dependency between financial possibilities and education is still observed clearly in the regression analysis.

Thirdly, it would be beneficial for my analysis, if I had more interaction variables between the parents and the individual. More variables would indicate the interaction more clearly and through this better regression results could be attained. However, the presented previous research part has shown that there is a huge problem in attaining such data on an individual, large scale level. And while other authors draw results for the involvement of parents only from the number of books in the household, e.g. Woessmann (2004), the listed methods above indicate an improvement.

Fourthly, additional information about migration, ethnic groups or minorities would be helpful. If an individual had a characteristic, that clearly indicates if she was part of a minority at the time of the education process, it would be more likely to observe differences between sociological groups, as stated by Parma and Titus (2005). However, the given variable above might still give an indication, with the possible limitation due to its sample size.

Fifthly, there can be a drawback of omitted variables. This shortcoming is not easily adjustable, since I am using an individual data set, in which I am unable to add micro data. For instance: Ceja has provided evidence that siblings could replace the role of parents in the development of a child (Ceja, 2006). Analogue results were provided by Wilks, who also acknowledge the importance of same-age friends, siblings, and other family members for the development of a child (Wilks, 1986). And while both authors state that the parents are the most important, I am still lacking information about the wider social environment of each observed individual.

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23 Similar thoughts are appropriate regarding the parental occupation.

Finally, the chosen data set does not account for the previous school development of each individual. So it is unobserved for example, if the individual attended a private or public second level school. Besides this, the data set does not provide information if a person received private teaching or the like.[24] Furthermore, I cannot observe how the individual performed in his previous schooling. It is a fair assumption, that an individual who only writes very good or good grades is more likely to attain third level education, and the other way around for those performing poorly in second level. However, this information is not present and therefore embodies a limitation. Through those and other unobserved and therefore omitted variables, the overall fit of the model might suffer and relationships can be undetected.

In general, even though I have to acknowledge, that the chosen data set has some drawback and limitations, especially considering possible unobserved variables, I still believe the most important factors are included and all possible variables were considered. Also, the effect of those unobserved variables is partly picked up by other variables and partly by the constant in the regression process. Nevertheless, drawbacks, especially regarding omitted variables, could harm the statistical significance of the regression and this possibility is acknowledge and picked up in section 6.2 and 6.3.

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24 Even though this characteristic might be partly covered by the financial possibilities.

4. Methods

In this chapter I develop different models to capture the relationship between third level education and parental factor in the best way by describing and comparing various models. The second part of this chapter deals with the varieties of those models and possible benefits as well as drawbacks for my analysis.

4.1. Development and Description of Models

I have already described that two or more different variables measure the same effect in the data set. For instance, the financial possibilities were observed through the variable regarding making ends meet or through replacing broken things. Both are used to measure the same effect, since they correlate, but they are not a perfect substitute. For this reason, there is a temptation to include both variables in a regression analysis. However, since they still share a lot of information, such an approach would harm the regression results, regarding the statistical significance of the results.

There are several solutions to this problem. Firstly, if there is more than one variable describing a factor considered relevant for the analysis, it is beneficial to combine them into a new variable. This approach was used for example for the financial power or the involvement indication. A second option is to run a variation of regression models. Through the comparison of those results it is possible to observe, if specific coefficients represents a true relationship between two factors, e.g. between parents' education and individuals' education, or if this relationship is only due to the chosen variables.

To give an example, I refer to the following table, where the correlation of education of the parents with different involvement variables is presented.

Table 5: Correlation table between education of parent and involvement, derived from EVS 2008

	Mother talked about politics	Mother followed the news	Mother read books
Education level Mother	0.0670	0.0467	0.0533
	Father talked about politics	Father followed the news	Father read books
Education level Father	0.7511	0.7354	0.7241

<u>*Source*</u>: *Own calculation for the correlations, with involved variables out of the EVS 2008.*

In this table I observe that the education of the father and his involvement are correlated with each other. Including both, education and involvement, needs to be considered carefully, due to the correlation. Therefore additional testing is therefore shown in chapter five. Surprisingly, there

is no correlation between the education of the mother and her involvement. This is most likely due to the smaller sample size for the observation of the mother.

4.1.1 Basic Regression Models

Prior to the inclusion of specific variable, a basic regression model is assembled based on theoretic ideas. The following model is not data driven but by theoretical aspects, derived by earlier work and conclusions through combinations of previous research. I limit the first basic model to few variables, which were mentioned in all previous results, including the dependent variable, if the individual attained third level education. Since all previous literature was clear on the effect of the parental education level regarding the influence on the child's education, I include this component in the basic model. This follows the argumentation by Goldin and Katz (2009), Perna (2000), and Erikson and Jonsson (1996). Also, since I consider age[25] as well as gender as a control variable, those two components are installed.

The regression model can be stated like this:

Equation 2: Basic logit regression model incl. parents' education, age, and gender

$$Third\ level\ education_i = Education\ of\ Parents_i + Age\ Group_i + Gender_i + \varepsilon_i$$

As indicated earlier there are different ways how the component "Education of Parents" can be included. Firstly, only the education of the mother, secondly, only the education of the father, and thirdly, the education of a combination not controlling with whom the individual has lived in her childhood. Also, the education variable as well as the age variable must be included as categorical variables, since the steps are not equal in their value. If these characteristics are considered, I end up with the following regression model[26]:

Equation 3: Basic logit regression model with variable characteristics

$$Third\ level\ education_i = i.Education\ of\ Parents_i + i.Age\ Group_i + Gender_i + \varepsilon_i$$

For the further development of the regression model and as shown in Equation 3, I use the combined education variable, which utilizes the data from mother and father, due to the a higher sample size. This is further discussed in sub-chapter 4.2.

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25 The earlier presented age groups are used.
26 The "i." in front of the variable indicates a categorical variable, while the index "i" after the variable indicates, that this is for one individual.

4.1.2 Country Modulation

In general there are two[27] different approaches for the modeling of a logit regression when dealing with different groups, e.g. countries. The first option is that I analyze each country separately and run every regression on its own. The second option is that I pool the data of the countries and combine them into one model.

Regarding their output, in both scenarios I receive the same coefficients and could interpret them exactly equally – as log odds, since it is a logit regression. By pooling all the countries in one regression I had to assume that the variance of the error term is equal in all of the countries (Gould, 2005; Gujarati, 2003). However, I am concerned by this assumption as this would mean that all unobserved variables or effects have to be the same in all countries. While this assumption might be valid for a homogenous group, such as Scandinavian countries and following the prejudice that they are similar, I have to doubt this in other constellations. For instance, the combination of countries like Sweden, England, Poland, and Portugal present a more heterogeneous group. Especially when considering section 3.2, in which I state that some variables might be omitted. This increases the error term and such a constellation does not have to be found equally in all countries.

More of a technical concern with the pooling method is the construction of dummy variables for all thirteen countries for my regression. For these reasons I have chosen to focus on individual regressions for each country. Nonetheless, I still apply the same models to every country, since I compare the output coefficients among each other. Adding a specification regarding the county changes Equation 3 to:[28]

Equation 4: Equation 3 with a country component

$$Third\ level\ education_{i,c} = i.Education\ of\ Parents_{i,c} + i.Age\ Group_{i,c} + Gender_{i,c} + \varepsilon_{i,c}$$

4.1.3 Additional Variable: Financial Problems, Parental Occupation and Foreign Nationality

The next addition to my equation are the financial possibilities or in my case financial problems of the parents. Following Becker and Tomes (1994), Choy (2001) or Perna (2000), a higher income has a positive effect on the education. Since I measure the financial problems, the assumption is that higher financial problems have a negative effect on the attainment of third level education. Also, since there is only a relative low correlation[29] between financial problems and education of the parents, I do not see any reason to exclude the education, as two different effects are measured.

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27 I excluded a third option: Pooling the countries, but without the drawbacks. This third option is technically far more complex, especially when applying for thirteen countries. For technical aspects see Gould (2005).
28 The index "c" after the variable indicates that this is for one country.
29 It is a correlation of 0.3.

I have shown, referring to Rose and Harrison (2014), that the occupation is a proxy for financial possibilities, which would replace the variable for financial problems. Different pretests and theoretical consideration showed that the variable for financial problems is better suited for this model, in contrast the occupation. This is discussed in sub-chapter 4.2.

Following, I add the foreign nationality component. However, chapter three as well as Table 37 (p. 62), where the variable is listed, showed that the sample size for those with a foreign nationality is relatively small. However, I still evaluate a regression model testing for an effect of foreign nationality. This is due to the fact that previous research, e.g. Perna and Titus (2005), was explicit about a negative effect, if an individual belongs to another nationality.

The regression model can be written like this:

Equation 5: Equation 4 with addition of financial problems and the nationality

$$Third\ level\ education_{i,c}$$
$$= Nationality_{i,c} + i.Financial\ Problems\ Parents_{i,c}$$
$$+ i.Education\ of\ Parents_{i,c} + i.Age\ Group_{i,c} + Gender_{i,c} + \varepsilon_{i,c}$$

4.1.4 Regression Models with Involvement

Since I have only remodeled previous results so far, I now include the interaction variables between parents and the later observed individuals. The first factor, which was also considered in earlier work, is the presence of parents.

Build on Equation 5, I include the variable for divorce. This is a dummy variable which indicates, if the parents of the individual got divorced before the end of the education process. With respect to the previous research, my a priori assumption derived from the work by Perna (2000) is that a divorce has a negative effect on the likelihood an individual attains third level education.

Of main interest for my research question are the variables which only measure the interaction between parents and the individual – the parental involvement besides the presence. The first variable is related to the question, if parents talked to the individual about politics. As mentioned earlier, I can include only the behavior of the mother, only the behavior of the father, or both. This is possible since the two variables do not correlate with each other and do measure diverse effects. However, I do not include the second variable regarding if the mother/father read books alongside the variable for political discussion, since those two components are correlated, measure the same effect and are supplements to each other, as stated earlier. To include both values simultaneously, I use the newly constructed involvement variable, which catches the effects for the book reading as well as the politic discussion.

At this point I limit the regression model to the following and state that I need to control, if the inclusion of involvement and education at the same time is appropriate.

Equation 6: Equation 5 with involvement variables – final regression model

$$Third\ level\ education_{i,c}$$
$$= i.Involvement\ of\ Parents_{i,c} + Divorce_{i,c} + Nationality_{i,c}$$
$$+ i.Financial\ Problems\ Parents_{i,c} + i.Education\ of\ Parents_{i,c}$$
$$+ i.Age\ Group_{i,c} + Gender_{i,c} + \varepsilon_{i,c}$$

4.2. Discussion of Different Models

The aim is a parsimonious regression model, which is able to describe what determines the attainment of third level education. This means as much factors as needed should be specified, but at the same time, I avoid an over specification, since this harms the explanatory power of the model and decreases the statistical significance of the results. Additionally, running several regressions would lead to an incomprehensible amount of regression outputs.

As mentioned, it is possible to change various variables in some of the presented models. Theoretically, it is no problem to replace variables, like the occupation with the financial problems, since the assumption is that they both capture the same effect. However this flock of options leads to an unmanageable amount of possibilities, which is not constructive, regarding the one desired final regression model. Components of the various equations (models) stated above, such as parental education or the financial possibilities, have been successfully analyzed in the past, while the factor parental involvement was less present in these results.

At this point I am choosing a final regression model and the included variables which focus on the matter of my research question: How beneficial parental involvement is for the attainment of third level education across different European countries. The regression model is based on the stated model in Equation 6. In the remainder of this chapter I motivate my choice of variables over others.

4.2.1 Sample Size Problems if Father and Mother are Observed Separately

As discussed earlier the variable for divorce can be replaced by a measuring if the individual has lived with one, both or none of her parents. I stick with the variable for divorce, since for the other variable the sample size of staying only with the mother or none of the parents is so small, that it is omitted in any regression. Additionally, I do not separate both parents and do not observe their education separately, but acknowledge the parents as a unit, and therefore combine the provided education for both parents. While this might be a drawback, since otherwise the education of both parents could be observed separately, I combine both, mother and father, in one variable. This approach is chosen, since this limits the problems of a low sample size of the mother and still takes care of their characteristics instead of dropping them.

4.2.2 Utilization of Financial Problems vs. Occupation of Parents

Theoretically it is possible to use either the occupation or the financial problems of the parents, as a proxy for financial possibilities. However, the self-created variable of the financial problems is chosen. The reasoning is that while the occupation list might reflect a similar nuance to income, this does not have to be equal to financial possibilities. Also, the ranking of occupation is mainly based on education, measured in another variable, and based on previous assumptions by other authors. The variable for financial problems on the other side is not biased by any other author, but just a response of the individual.

4.2.3 Inclusion of Involvement and Education Simultaneously

As shown previously, there is a correlation between education of the parents and their involvement towards the individual. So it might be possible that, by including the education level of the parents, the effect of the involvement is already fully captured in the results – and vice versa. For this reason I have considered three different models, which are all based on Equation 6.

The first model only contains the involvement of the parents. The second model instead contains only the education of the parents. And the third model utilizes both components. This stepwise approach was chosen in early considerations, to control for the best results regarding the explanatory power. The conclusion is that a model with both, involvement and education of the parents, is advisable, as stated in Equation 6. This is proven in chapter five.

5. Results of the Analysis

Applying a logit regression allows for a relative simple[30] interpretation of the coefficient. Through the mathematical properties the coefficient are the log odds. Therefore, a one unit increase of the dependent variables changes the independent variables around the logged value of the coefficient in percent (Feinstein & Thomas, 2002). This characteristic is explained more clearly in the next sub-chapter, where I present the regression results.

5.1. Results of Regression Model and Country Grouping

To present the results as descriptive as possible I focus on the coefficient, the standard error and the statistical significance. To give an indication how the later shown results are derived, I use the following example, which is based on the final regression model (as in Equation 6) for Germany.

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30 Relative simple compared to a probit regression.

Table 6: Full logit regression results for Germany, based on Equation 6 and the applicable EVS 2008 data

Germany	**Independent variable: Third level education attainment**		
Variable	**Variable category**	**Coefficient**	**Standard Error**
Involvement of mother (Higher values indicate a higher involvement. Category 0 is used as reference.)	1	0.4854 *	0.2653
	2	0.5663 **	0.2560
	3	0.5081 **	0.2489
	4	0.6195 **	0.2739
	5	0.7653 **	0.3100
	6	1.4210 ***	0.3881
Involvement of father (Higher values indicate a higher involvement. Category 0 is used as reference.)	1	-0.4341 *	0.2574
	2	-0.1450	0.2289
	3	0.2837	0.2436
	4	0.3726	0.2565
	5	0.2667	0.3033
	6	0.6697 **	0.3217
Education of parents (Higher values indicate a higher education. Category 1 is used as reference.)	2	0.8207	0.6670
	3	1.1116 **	0.6548
	4	1.4961	0.9750
	5	2.4832 ***	0.6714
	6	2.0253	1.3221
Divorced parents		0.6751	0.6159
Foreign nationality		0.5494	0.4222
Financial Problems of the parents (Higher values indicate more problems. Category 0 is used as reference.)	1	0.2344	0.2289
	2	-0.1670	0.1870
	3	-0.4606 **	0.2379
	4	-0.4465 *	0.2454
	5	0.2694	0.3302
	6	-0.1043	0.3651
Age Groups (Category 2 is used as reference)	<35 years	-1.0657 ***	0.2130
	50 – 65 years	0.2981 **	0.1689
	>= 66 years	0.3997 **	0.1928
Gender (Female)		-0.6379 ***	0.1343
Constant		-2.5578 ***	0.6870
Number of observations: 1,428 || Pseudo R²: 0.1586			

<u>*Stars*</u>*: The coefficient as well as the standard error are rounded to four decimal places. The stars indicate the level of significance: *** = significance at 1% level; ** = significance at 5% level; * = significance at 10% level.*

<u>*Source*</u>*: Own regression, based on the formula stated in Equation 6 and the EVS 2008 data for the applicable country.*

The involvement of the mother and the father is a categorical variable and in the regression a reference category was determined. In this case, the lowest involvement was set as the reference, so the results of the other categories need to be seen in reference to the lowest category. The zero category was chosen, since I am interested in the effect of more involvement. Also, the observations are evenly distributed among all categories.

The coefficient are interpretable as log odds. The value for each step is always in reference to the category zero. To give an example from the presented output for Germany: If the involvement of the mother would rise from zero to two, the logged odds that the individual attains third level education would rise around 0.57. However, if the involvement would rise over all by four points (now at level four) than the log odds to attain third level education would be 0.62 higher. Statements about the effect size between two categories, if one is not the reference, are not easily readable in the table. In the example the difference between the levels two and four is higher than 0.05[31]. Nonetheless, without further calculation it is possible to state that the increase of involvement makes it, in this example, more likely that an individual attains third level education.

Other variables, which are not categorical, have dummy characteristics. For instance the variable about divorce, which indicated if the individual witnessed the divorce of the parents before her educational process was finished. The variable takes the value "1" if a divorce was the case. Surprisingly the result is that, if an individual witnessed a divorce, her logged odds of attaining third level education is 0.67 higher.

All those statements need to be seen as ceteris paribus. To continue the above example, the log odds of third level education is only 0.57 higher for an individual with a mother's involvement level of two, if all other variable are kept constant. While the coefficients for divorce are not statistically significant, this is achieved for most values of the involvement variables. Therefore I can trust the obtained coefficients.

Even when focusing on one country, the amount of provided data is enormous. The main reason for this is not the number of included variables, but that most of them are categorical variables, which are treated differently, compared to continuous variables. Therefore I limit the presented data in the following, to make the results more appealing. For this reason the full regression results of all considered countries can be seen in an analogue form in the Appendix in Table 40 to Table 52 (p. 64-76).

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[31] It is an increase of around 0.10.

Below, I zoom in on obtained results for the involvement variables, since they are in the focus of my analysis. Also, I combine them into new tables, to group different countries with same characteristics.

Also, the log odds could be transformed, to be interpreted directly as odds. This is possible with Stata or through mathematical calculations (Feinstein & Thomas, 2002). After this, the new coefficients are directly interpretable as changes of the likelihood, regarding the attainment of third level education. However, in this thesis the log odds are presented. Besides this, statements for log odds and odds present the same indication and interpretation regarding direction of effects.

5.1.1 Verifying of Regression Model

I have decided to choose the stated model in Equation 6 as basis of my regression models. Nonetheless, I have considered to excluding variables in Equation 6 due to the fear that I could decrease the explanatory power of the model by including too many variables, in regard to multi-collinearity. However, different tests[32] have shown that there is no problem in including the parental involvement alongside the parental education to explain if an individual attains third level education.

To test my assumptions made in chapter four about the reduce adequacy of my coefficient if I include both components – parental education alongside parental involvement – I checked the coefficient and qualities of each model. There I observe, that the final model show in general the same directions as the models with only one component, I can trust the results. This trust is due to the fact, that the inclusion of both components only discounts the effect of the education, earlier measured by the involvement – and vice versa. As an example of this, I have listed the coefficients of three different regression models for Germany side by side in the following table.

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32 Performed test contained: Testing for correlation, hetero-/homoscedasticity, and for multicollinearity.

Table 7: Logit regression results for Germany, analog to Table 6, with and without parental involvement and education

Germany	**Independent variable: Third level education attainment**			
Variable	**Variable category**	**Coefficient – full model**	**Coefficient – w/o parental education**	**Coefficient – w/o parental involvement**
Involvement of mother (Higher values indicate a higher involvement. Category 0 is used as reference.)	1	0.4854 *	0.6947 ***	
	2	0.5663 **	0.6590 ***	
	3	0.5081 **	0.6785 ***	
	4	0.6195 **	0.7374 ***	
	5	0.7653 **	0.8993 ***	
	6	1.4210 ***	1.5856 ***	
Involvement of father (Higher values indicate a higher involvement. Category 0 is used as reference.)	1	-0.4341 *	-0.4027	
	2	-0.1450	0.0157	
	3	0.2837	0.4061 *	
	4	0.3726	0.6091 **	
	5	0.2667	0.6543 **	
	6	0.6697 **	1.1072 ***	
Education of parents (Higher values indicate a higher education. Category 1 is used as reference.)	2	0.8207		0.9354
	3	1.1116 **		1.3266 **
	4	1.4961		1.7095 *
	5	2.4832 ***		2.9098 ***
	6	2.0253		3.0638 **
Divorced parents		0.6751	0.6183	0.8029
Foreign nationality		0.5494	0.3867	0.4670
Financial Problems of the parents (Higher values indicate more problems. Category 0 is used as reference.)	1	0.2344	0.0875	0.1573
	2	-0.1670	-0.2999 *	-0.3552 **
	3	-0.4606 **	-0.6980 ***	-0.6351 ***
	4	-0.4465 *	-0.7183 ***	-0.6612 ***
	5	0.2694	-0.0581	-0.0386
	6	-0.1043	-0.5475	-0.3140
Age Groups (Category 2 is used as reference)	<35 years	-1.0657 ***	-0.9538 ***	-0.9402 ***
	50 – 65 years	0.2981 **	0.1865	0.2897 *
	>= 66 years	0.3997 **	0.1955	0.4124 **
Gender (Female)		-0.6379 ***	-0.6311 ***	-0.5710 ***
Constant		-2.5578 ***	-1.2730 ***	-2.1293 ***
Number of observations:		1,428	1,428	1,428
Pseudo R²:		0.1586	0.1112	0.1280

<u>*Source*</u>*: Own regressions, based on a variation of Equation 6 and the applicable EVS 2008 data.*

By including both variables, the amplitude of the coefficient is reduced but mostly stays in the same direction. The exemptions are the second level for the involvement of the father and the fifth level of financial problems of the parents. While the direction changes in those cases, the transition of the value itself is rather small. The argument is the same for the significance, which is reduced in the full model. Since in the reduced model the effect of education for instance is recorded by the involvement, this variable has more explanatory power and the significance is higher. The lower significance is therefore no problem.

5.1.2 Parental Involvement Results by Country Groups

Since I focus on the parental involvement and how this effects the third level education attainment, I am also centering my attention in the following results on those coefficients.

Generally there is a tendency that a higher involvement equals higher log odds of attaining third level education. While all presented results are in respect to the reference category (in my case no involvement (0) from mother/father) I can often observe an increase or at least movement sideways of the log odds for third level education with an increase of involvement. So, often not only the step from none to low (around level 1-2) involvement results in a higher log odds, but also the step from low to high involvement (5-6).

Several countries follow a similar pattern, hence I group their results together. Countries mostly belong to different pattern, depending if father's or mother's involvement is considered. Following I describe the three patterns, whereas discussion and interpretation are exploited in Chapter 6.

The first pattern I observe is a continuous rise. With a higher level of involvement, the log odds that the individual attains third level education rises. In the following tables I list the coefficients and standard errors of those countries following this pattern.[33]

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33 For instance: Table 8 shows the coefficient for Austria to Sweden. In those countries the coefficients grow relative linear with increasing involvement of the mother. The stars indicate the significance level, with the same characteristics as before. The value in parenthesis is the standard error.

Table 8: Coefficient for the involvement variable of the mother, for the group of countries with a continuous growth pattern

Level of in-volvement of <u>mother</u>	All countries	Austria	Finland	Germany	Great Britain	Italy	Sweden
1	0.3512 *** (0.075)	0.1782 (0.334)	0.0930 (0.323)	0.4854 * (0.265)	-0.8194 ** (0.384)	0.0497 (0.325)	-0.2299 (0.319)
2	0.3631 *** (0.074)	0.3083 (0.314)	-0.1324 (0.316)	0.5663 ** (0.256)	-0.4869 (0.367)	0.2634 (0.358)	-0.6709 ** (0.319)
3	0.5348 *** (0.066)	0.3515 (0.311)	0.1455 (0.313)	0.5081 ** (0.249)	-0.1558 (0.274)	0.7469 *** (0.267)	-0.1648 (0.301)
4	0.5348 *** (0.085)	0.4184 (0.359)	0.4498 (0.424)	0.6195 ** (0.274)	0.3025 (0.366)	0.7193 * (0.388)	0.1313 (0.355)
5	0.5950 *** (0.103)	1.0804 *** (0.368)	0.7044 (0.581)	0.7653 ** (0.310)	0.1436 (0.440)	0.4729 (0.527)	0.4714 (0.423)
6	0.9835 *** (0.120)	1.2131 ** (0.536)	0.5778 (0.873)	1.4210 *** (0.388)	0.6494 (0.353)	1.4457 *** (0.480)	0.5975 (0.510)

<u>*Source*</u>: *Own regressions, based on the formula stated in Equation 6 and the applicable EVS 2008 data set. Further on, the coefficients are derived from the full regression output of each country. This is listed in the Appendix in Table 40 to Table 52 (p. 60-72).*

Table 9: Coefficient for the involvement variable of the father, for the group of countries with a continuous growth pattern

Level of involve-ment of <u>father</u>	All countries	Germany	Netherlands	Norway	Poland
1	0.3576 *** (0.073)	-0.4341 * (0.257)	0.5217 ** (0.239)	0.2667 (0.297)	0.1374 (0.337)
2	0.3771 *** (0.071)	-0.1450 (0.229)	0.5806 ** (0.246)	0.3590 (0.310)	0.0470 (0.308)
3	0.4080 *** (0.068)	0.2837 (0.244)	0.2140 (0.195)	0.1390 (0.269)	0.4761 (0.304)
4	0.6825 *** (0.082)	0.3726 (0.257)	0.8192 *** (0.255)	0.6366 ** (0.307)	0.5410 (0.345)
5	0.6853 *** (0.099)	0.2667 (0.303)	0.8064 *** (0.289)	0.7729 ** (0.372)	0.8964 ** (0.420)
6	0.8397 *** (0.100)	0.6697 ** (0.322)	0.9667 *** (0.272)	1.0444 *** (0.349)	0.7209 * (0.442)

<u>*Source*</u>: *See Table 8.*

Both tables do not contain the same countries, since I included the involvement variables in the regression model for mother and for father separately and their results vary. The presented effects indicate, that this approach is necessary, since there are large differences between the role of the father and the mother. While in Germany and in the combined countries the effect is similar for father and mother, there are otherwise differences by country and by parent regarding the involvement. Even for Germany I deduct a variation between mother and father: The positive effect

of involvement on third level education attainment is initial from the mother. Whereas the first and second level of involvement from the father are less beneficial than none involvement.

In all the listed countries in Table 8 and 9, the results indicate that a higher involvement of the mother/father leads to higher log odds of attaining third level education. Interestingly, often the high level values deliver statistically significant results.

The second pattern I detect has the form, strongly simplified, of a horizontal line. This means, in contrast to before, there is no continuous increase of the log odds for third level education linked to a higher level of involvement. However, it is important to notice that there is an increase from level zero, the reference category, to level one in most of the in Table 10 and 11 listed countries. After this initial increase, there is no stable growth in the log odds. As before, the effects for mother and father vary.

Table 10: Coefficient for the involvement variable of the mother, for the group of countries with a linear horizontal pattern

Level of involve-ment of <u>mother</u>	Belgium	Hungary	Netherland	Poland
1	0.2096 (0.238)	0.4063 (0.379)	0.4739 ** (0.240)	0.7885 ** (0.390)
2	0.0317 (0.231)	0.9325 *** (0.362)	0.1471 (0.251)	0.9175 ** (0.371)
3	0.6291 *** (0.216)	1.3191 *** (0.327)	0.2757 (0.182)	1.3017 *** (0.356)
4	0.7830 ** (0.369)	1.3172 *** (0.392)	0.4998 * (0.266)	1.2230 *** (0.400)
5	-0.1037 (0.570)	1.6823 *** (0.444)	0.3660 (0.321)	1.1202 ** (0.479)
6	0.7845 (0.515)	0.1617 (0.609)	0.6582 ** (0.316)	1.1682 ** (0.538)

<u>Source</u>: *See Table 8.*

Table 11: Coefficient for the involvement variable of the father, for the group of countries with a linear horizontal pattern

Level of involve-ment of <u>father</u>	Austria	Belgium	France	Italy	Sweden
1	0.0088 (0.311)	0.3312 (0.232)	-0.0617 (0.279)	0.9055 *** (0.308)	0.5122 * (0.294)
2	0.4039 (0.294)	0.1922 (0.241)	0.2562 (0.252)	0.6887 * (0.361)	0.5885 ** (0.294)
3	0.0923 (0.307)	0.4540 ** (0.219)	0.2987 (0.256)	0.1670 (0.305)	0.2504 (0.284)
4	0.7903 ** (0.327)	0.3668 (0.349)	0.3518 (0.329)	0.8482 ** (0.379)	1.0606 *** (0.342)
5	0.2012 (0.376)	1.4167 *** (0.444)	0.8684 ** (0.399)	0.8642 ** (0.422)	1.2301 ** (0.482)
6	0.4640 (0.430)	0.7501 * (0.403)	0.0161 (0.418)	0.6818 * (0.396)	0.6848 (0.427)

<u>Source</u>: See Table 8.

The third pattern I observe has as U-shape. This means there are higher log odds for third level education at low and high levels of involvement, but a rather low in-between. A clear example for this case are the coefficients for the mother in France. In this case the increase from level zero to one boosts the log odd, but afterwards the log odds drop until the higher levels of involvement are reached, when they increase again.

Table 12: Coefficient for the involvement variable of the mother, for the group of countries with a U-shape pattern

Level of involvement of <u>mother</u>	France	Norway	Portugal
1	0.2392 (0.258)	0.8735 *** (0.309)	-0.0530 (0.401)
2	-0.0806 (0.254)	0.2461 (0.284)	1.3116 *** (0.412)
3	-0.0860 (0.253)	0.5239 ** (0.244)	0.5815 (0.410)
4	0.0640 (0.330)	0.3001 (0.306)	0.6735 (0.700)
5	0.2423 (0.482)	0.9595 ** (0.394)	0.3769 (1.013)
6	1.2916 * (0.775)	0.6707 * (0.374)	1.7457 ** (0.258)

<u>Source</u>: See Table 8.

Table 13: Coefficient for the involvement variable of the father, for the group of countries with a U-shape pattern

Level of involve-ment of <u>father</u>	Finland	Great Britain	Hungary	Portugal
1	0.4048 (0.313)	0.6659 * (0.356)	0.4065 (0.300)	1.3958 *** (0.398)
2	0.5099 * (0.294)	0.3866 (0.349)	0.1848 (0.284)	-0.4947 (0.529)
3	0.1530 (0.287)	0.5954 ** (0.274)	0.0122 (0.271)	0.9603 ** (0.443)
4	0.1994 (0.359)	0.5803 (0.366)	0.2802 (0.335)	1.1717 ** (0.581)
5	0.2120 (0.444)	0.1426 (0.440)	-0.0583 (0.432)	0.7313 (0.706)
6	0.5302 (0.602)	1.1074 *** (0.353)	1.0366 ** (0.499)	1.5419 ** (0.751)

<u>Source</u>: *See Table 8.*

Overall, the previous tables show that there are some major differences between the observed countries. For example, while in Belgium or Portugal a high involvement of the father, in comparison to none, will double or more the log odds of third level education, this cannot be seen in Germany or Italy, where the log odds only rise around 50 percent. Also, besides the extreme values the role and importance of the mother and father varies between the countries. I do not see a distinct pattern for the two genders.

Lastly, while the values and their distribution vary across countries and the parents, I also observe different significance levels. These levels indicate how trustworthy the obtained results are. In general, I deduct high levels of significance for the low and especially for the high involvement levels across countries. This leads to the conclusion that the attained results from the upper and lower end of the involvement levels are reliable. Relating to the U-shaped form, this also means, that those low coefficients for medium involvement are often not statistically significant.

5.2. Sensitivity Analysis

In sub-chapter 5.1 I discussed why I have chosen the model from Equation 6. This previous pre-tested assumption is confirmed by larger scale testing (see Table 7). I see clear evidence, that including education of the parents alongside the involvement does not change the direction of the coefficient, merely decreases the value.

Also, when comparing the results from the Pseudo R^2 of the regressions, it is uniform that a regression with involvement variables alongside the parental education variable attained the highest

Pseudo R^2 across all countries. This indicates, that the chosen model has, at least within the specified theoretical parameters, the best explanatory power for the data. And while I do not fully rely on the results of the R^2, this measurement delivers one indication. Those results are shown in the following table:

Table 14: Pseudo R² results of different regression models based on Equation 6, with or without parental involvement/education

	Pseudo R² from different regression models			
Country	**R² - Equation 6**	**R² - Regression w/ involvement (w/o education)**	**R² - Regression w/ education (w/o involvement)**	**# Observations**
All Countries	0.1501	0.1093	0.1271	12,529
Austria	0.1323	0.0962	0.0993	1,022
Belgium	0.2342	0.1613	0.2098	1,122
Finland	0.0555	0.0363	0.0426	636
France	0.2100	0.1506	0.1994	954
Germany	0.1586	0.1112	0.1280	1,428
Great Britain	0.1885	0.1502	0.1504	700
Hungary	0.2273	0.1334	0.1914	1,096
Italy	0.2030	0.1471	0.1645	950
Netherland	0.1864	0.1483	0.1605	1,201
Norway	0.1232	0.1035	0.0905	748
Poland	0.2480	0.1985	0.2127	983
Portugal	0.3094	0.2851	0.2252	997
Sweden	0.1244	0.1031	0.0824	668

Source: Own regressions, based on a variation of Equation 6 and the applicable EVS 2008 data. Different Pseudo R² were taken from regression output of each country and variation of Equation 6.

At the same time this table shows that there are significant differences between the countries. While the model is fitting well for countries like Belgium, France, Hungary, Poland or Portugal, it seems that the model does not fully reflect the data of other countries, such as Finland and the other observed Scandinavian countries. This possible limitations is discussed in chapter six.

Besides the stated above, I rely on the collinearity diagnostic in this logit regression model.[34] With this diagnostic I can measure the variance inflation factor (VIF) an indication for problems

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34 The calculation in done in STATA, the package "collin" needs to be implemented. Other tests, familiar from the OLS-regression are not applicable.

regarding multicollinearity. The rule of thumb, where a VIF over five represent a problem of multicollinearity, is adapted.[35] I do not find any VIF over the value of two. Therefore I consider multicollinearity not as a problem. Table 53 with different VIF values is found in the Appendix (p. 77).

Additionally, problems on heteroskedasticity have been reflected, but since I apply a logit regression model, I do not consider heteroskedasticity as a problem. Even though heteroskedasticity can occur in the chosen regression method, the testing and further fixation is not fully developed or instable (Gujarati, 2003). Therefore, I have to acknowledge, that heteroskedasticity could occur, but in absence of better options I rely on my results.

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35 Rule of thumb is derived from Gujarati (Gujarati, 2003).

6. Conclusion

Now that I presented my regression results, I discuss them further on and list observed limitations and drawbacks. Finally, I describe the contributions of my thesis to the research. Also, I present proposals for further research based on my findings and shortcomings.

6.1. Discussion and Interpretation of Results

Regarding the stated research question, how beneficial parental involvement is for the attainment of third level education across different European countries, I detect that the degree of the benefit depends massively on the observed country and also on the considered parent. The research question can only be answered if I consult the three different patterns, since the interpretation varies between them.

Even though the results of "All countries", a combination of all countries in one regression, are significant, I do not interpret them into depth, since the different patterns have shown too many variation across Europe.

The first pattern follows the a priori assumption that a higher level of involvement from either the mother or the father leads to a higher attainment of third level education. This continuous increase in the log odds, always in contrast to the reference category, is often statistically significant, especially for the higher involvement levels. I interpret these results as followed: In those countries an involvement of the mother/father is beneficial, because other factors might not be able to compensate if the parents are passive. While in most countries this is only the case for one parent, the result for Germany is striking. In Germany a high level of involvement from both, mother and father, is highly beneficial for third level education. It appears that, if such a behavior is missing from either side, it cannot be compensated through other institutions and factors.

Regarding the second pattern I adduce two interpretations. Firstly, in those countries there is an increase of the log odds from the reference category to the first level of involvement. So individuals do benefit from some involvement, but the level does not matter. The reason could be that every level of involvement starts the necessary process for third level education. But secondly, if this process for third level education is started, it does not matter if additional involvement is introduced. The only country in which this pattern is fitting for both parents is Belgium. This means that only a little involvement of both parents is needed in Belgium. After this initial boost, the log odds fluctuate around a mean value.

For the third observed patter, the U-shape, in the beginning I was not able to find an obvious reason and therefore no rational interpretation. There is no clear reason that a low and high involvement leads to a higher log odd of third level education, and the levels in-between do not. Also, I did not found a distinct pattern in the group of the U-shape. Therefore I examined all variables, which were included in the regression. This investigation showed that the reason for the U-shape lies within the construction of the involvement variable. This variable was combined from two components, firstly about politic discussions and secondly about the reading of books. If those two variables are included separately in the model, they indicate a different direction. In the case of the mother in France, each additional level of politic discussion is beneficial, the opposite is the case for book reading. This result is surprising for me, but consistently found in all cases of the U-shape. Only in the case of Portugal both, father and mother, show the U-shape. This pattern can be seen as a drawback and is further discussed in sub-chapter 6.2.

With regard to the research question, the presented results give a good indication that a higher involvement, by the mother as well as by the father, leads to a higher attainment of third level education. This is fortified by the high significance levels for those high involvement coefficients. While in some countries the log odds for third level education rises continuously with increases of the involvement, in other countries there is only one boost in the log odds from zero involvement to some involvement. A possible interpretation for the different patterns lie within the structural differences, such as school systems, in the observed countries.

Also, it is important to notice, that there are massive differences between the effects of mother and father. Additionally, in most countries the effect through involvement has a different pattern for each parent. Possible explanations can lie within the education system or cultural differences. However, this needs to be discussed in further research. Nonetheless, I am able to provide quantifiable evidence on how beneficial, in most cases positively linked, parental involvement is for an individual to attain third level education.

6.2. Limitations and Drawbacks

The presented results go mostly along the a priori assumptions, that a higher involvement of the parents is beneficial for the education. However, there are drawbacks from the realized analysis and eliminating those would possibly improve the results. Firstly, the education of both parents should be fully recorded. Secondly, a specific question should be asked, if the parents had problems to finance the education of the individual. Thirdly, additional data is needed, to quantify if the individual was foreign in the country at the time she was in her education process. The lack of this information possibly reduces the quality of the results and an improvement could further improve the quality of the results.

Regarding the U-shape I have discussed, that the main reason lies within the variable for book reading. Since the work is driven by theory and not data, I do not want to exclude this variable, simply because it is not fitting. Nonetheless, the results raise questions, which could be the starting point of further investigation.

6.3. Contribution to Research and Proposals for Further Research

Contribution wise, I have shown that there is clear indication of a positive relationship between involvement of the parents and third level educational success. This was done on a larger, cross-European scale, with micro level data which have not been utilized for this purpose before. Also, variation across Europe were observed and countries with similar results were grouped. This delivered differences in the magnitude of effect through involvement on the third level education.

Regarding possible further research, I suggest three approaches. Firstly, the existent data set could be improved to reduce the possible drawbacks and through this to increase the quality of the results. For instance, information of school performance, before third level, could be added to the model. Secondly, I have identified the most relevant components, but it is still a fair assumption that new, so far omitted, variables could be included in the modeling. Thirdly and lastly, if those new results, with an enhanced models, still follow the here provided results, the attention should be on why there are those country differences. For this a deeper observation of the school systems is desirable. Also, analog regression model to them performed in this analysis could be applied to first and second level education, to show comparisons. With this further research, fully reliable politic implications could be formulated to boost the education level on every level.

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Appendix

List of countries with under 1,500 observations

Table 15: Countries out of EVS 2008 with a sample size of under 1,500 observations

Country	Sample Size
Northern Cyprus	500
Northern Ireland	500
Iceland	808
Cyprus	1,000
Ireland	1,013
Norway	1,090
Finland	1,134
Sweden	1,187
Switzerland	1,272
Germany	1,004 for East Germany 1,071 for West Germany

Germany: There is no separation in the final data set between East and West Germany, which would be odd in the year 2008. But since those surveys were conducted already before the reunification of Germany this circumstance is embossed historically. However, in the final data set this problem was dealt with, since the weight of the population for each side is considered.

Source: Derived from EVS method report (EVS & GESIS, 2010, p. 23).

List of observed countries

Table 16: Observed countries in this analysis, derived from the EVS 2008 data set

Country	Sample Size
Austria	1,509
Belgium	1,508
Finland	1,120
France	1,496
Germany	2,070
Great Britain	1,480
Hungary	1,512
Italy	1,483
Netherland	1,536
Norway	1,086
Poland	1,500
Portugal	1,549
Sweden	1,150
Total	18,999

Sample Size: The number of observations can vary compared to Table 15, since the data set has been cleaned up in-between to filter for observations with no response.

Germany: The number for Germany is higher, since each part, West and East Germany, were considered with around 1,000 observations.

Source: Derived from EVS method report (EVS & GESIS, 2010, p. 23).

<u>Used variables, derived from EVS, in this study</u>

Table 17: List of all used variables in this study, derived from the EVS 2008 data set

Variable	Content	Characteristics
country	Observed country	List of countries
age	Age of individual	Continuous numerical variable
v302	Gender of individual	Dummy variable
v304	If individual has nationality of carried out country	Dummy variable
v331a	If individual experienced divorce of parents	Dummy variable
v331b	Age of individual at which the divorce happened; only asked if v331a answered with "yes"	Continuous numerical variable
v335	Age at which individual finish full time education	Continuous numerical variable
v336	Education level of individual	Categorical variable, 7 steps according to ISCED
v354	If the individual lived with parents at the age of 14	Categorical variable, 4 options (both, mother, father, none)
v355	Education level of father/mother	Categorical variable, 7 steps according to ISCED
v357ESeC	Occupation of father/mother	Categorical variable, 9 steps according to ESeC
v360	If the mother liked to read books	Categorical variable, 4 options (yes, to some extent, a little bit, no)
v361	If the individual discussed politics with mother	Categorical variable, 4 options (yes, to some extent, a little bit, no)
v362	If the mother liked to follow the news	Categorical variable, 4 options (yes, to some extent, a little bit, no)
v363	If parents had problems making ends meet	Categorical variable, 4 options (yes, to some extent, a little bit, no)
v364	If the father liked to read books	Categorical variable, 4 options (yes, to some extent, a little bit, no)
v365	If the individual discussed politics with father	Categorical variable, 4 options (yes, to some extent, a little bit, no)
v366	If the father liked to follow the news	Categorical variable, 4 options (yes, to some extent, a little bit, no)
v367	If parents had problems replacing broken things	Categorical variable, 4 options (yes, to some extent, a little bit, no)

<u>*Characteristics:*</u> *Besides those listed characteristics, each variable could also be missing, not asked, not applicable, not answered or the individual did not know.*

<u>*Source:*</u> *Derived from EVS variable report (EVS & GESIS, 2013).*

Involvement of the Parents

Table 18: Variable regarding if the mother talked to the individual about politics, derived from EVS 2008

	Politics has been discussed with mother					
Country	No	A little bit	To some extent	Yes	Missing	Total
Austria	791	267	186	60	97	1,401
Belgium	1,049	173	66	47	86	1,421
Finland	503	253	83	27	78	944
France	971	206	97	26	107	1,407
Germany	931	493	333	121	144	2,022
Great Britain	996	143	77	95	97	1,408
Hungary	953	204	127	53	57	1,394
Italy	922	115	60	65	72	1,234
Netherland	1,030	167	104	116	71	1,488
Norway	502	176	98	107	38	921
Poland	667	302	141	71	49	1,230
Portugal	1,114	102	45	20	158	1,439
Sweden	470	215	131	64	72	952
Total	10,899	2,816	1,548	872	1,126	17,261

Source: Original data derived from EVS 2008 data set (EVS, 2011). Filter process according to stated analysis in chapter three, therefore the number of observations was reduced in relation to the original data set. Characteristics of this, and following variables, is derived from the variable report (EVS & GESIS, 2013). Quantities for each country and variable are based on own calculations and compiled in the table.

Table 19: Variable regarding if the father talked to the individual about politics, derived from EVS 2008

Country	Politics has been discussed with father					Total
	No	**A little bit**	**To some extent**	**Yes**	**Missing**	**Total**
Austria	530	271	254	117	229	1,401
Belgium	846	198	117	97	163	1,421
Finland	342	226	133	57	186	944
France	734	216	130	90	237	1,407
Germany	627	443	404	211	337	2,022
Great Britain	758	145	110	156	239	1,408
Hungary	733	206	164	80	211	1,394
Italy	687	178	94	143	132	1,234
Netherland	751	211	156	250	120	1,488
Norway	329	188	122	152	130	921
Poland	516	267	208	122	117	1,230
Portugal	932	153	71	49	234	1,439
Sweden	343	185	138	101	185	952
Total	**8,128**	**2,887**	**2,101**	**1,625**	**2,520**	**17,261**

<u>*Source*</u>*: See Table 18.*

Table 20: Variable regarding if mother followed the news, derived from EVS 2008

Country	Mother followed the news					Total
	No	**A little bit**	**To some extent**	**Yes**	**Missing**	**Total**
Austria	190	315	422	370	104	1,401
Belgium	292	315	362	359	93	1,421
Finland	41	192	446	164	101	944
France	273	267	525	226	116	1,407
Germany	332	494	552	424	220	2,022
Great Britain	260	252	258	503	135	1,408
Hungary	276	300	423	328	67	1,394
Italy	319	193	149	456	117	1,234
Netherland	261	148	259	729	91	1,488
Norway	50	114	200	518	39	921
Poland	309	306	349	196	70	1,230
Portugal	571	303	176	221	168	1,439
Sweden	47	188	286	338	93	952
Total	**3,221**	**3,387**	**4,407**	**4,832**	**1,414**	**17,261**

<u>*Source*</u>*: See Table 18.*

Table 21: Variable regarding if father followed the news, derived from EVS 2008

	Father followed the news					
Country	No	A little bit	To some extent	Yes	Missing	Total
Austria	58	121	388	610	224	1,401
Belgium	100	131	347	677	166	1,421
Finland	7	46	317	383	191	944
France	105	101	460	495	246	1,407
Germany	89	249	472	816	396	2,022
Great Britain	95	126	238	694	255	1,408
Hungary	149	180	337	515	213	1,394
Italy	156	134	148	639	157	1,234
Netherland	70	55	153	1,075	135	1,488
Norway	7	35	72	675	132	921
Poland	154	200	385	369	122	1,230
Portugal	359	236	193	403	248	1,439
Sweden	9	45	170	549	179	952
Total	1,358	1,659	3,680	7,900	2,664	17,261

<u>*Source*</u>: *See Table 18.*

Table 22: Variable regarding if mother read books, derived from EVS 2008

	Mother read books					
Country	No	A little bit	To some extent	Yes	Missing	Total
Austria	332	243	349	363	114	1,401
Belgium	513	240	268	318	82	1,421
Finland	133	241	256	238	76	944
France	354	302	318	318	115	1,407
Germany	423	386	464	542	207	2,022
Great Britain	362	154	165	608	119	1,408
Hungary	319	215	270	513	77	1,394
Italy	499	212	119	308	96	1,234
Netherland	519	146	158	578	87	1,488
Norway	210	111	177	384	39	921
Poland	279	274	289	329	59	1,230
Portugal	796	140	86	147	270	1,439
Sweden	153	176	192	348	83	952
Total	4,892	2,840	3,111	4,994	1,424	17,261

<u>*Source*</u>: *See Table 18.*

Table 23: Variable regarding if father read books, derived from EVS 2008

Country	Father read books					
	No	**A little bit**	**To some extent**	**Yes**	**Missing**	**Total**
Austria	446	270	205	234	246	1,401
Belgium	592	213	195	253	168	1,421
Finland	179	227	173	182	183	944
France	451	261	217	236	242	1,407
Germany	666	409	273	291	383	2,022
Great Britain	477	147	138	390	256	1,408
Hungary	458	204	214	296	222	1,394
Italy	581	140	107	261	145	1,234
Netherland	641	120	137	458	132	1,488
Norway	220	135	128	306	132	921
Poland	378	286	232	209	125	1,230
Portugal	709	162	102	157	309	1,439
Sweden	236	152	157	216	191	952
Total	6,034	2,726	2,278	3,489	2,734	17,261

<u>*Source*</u>: *See Table 18.*

Divorce or if lived with parents

Table 24: Variable regarding if the parents have divorced before the end of the education process, derived from EVS 2008

	Parents have divorced before end of education		
Country	**No**	**Yes**	**Total**
Austria	1309	92	1401
Belgium	1290	131	1421
Finland	809	135	944
France	1255	152	1407
Germany	1915	107	2022
Great Britain	1290	118	1408
Hungary	1274	120	1394
Italy	1214	20	1234
Netherland	1402	86	1488
Norway	782	139	921
Poland	1211	19	1230
Portugal	1411	28	1439
Sweden	794	158	952
Total	15,956	1,305	17,261

Source: See Table 18.

Table 25: Variable regarding if individuals have lived with their parents or which part, derived from EVS 2008

Country	Both parents	Only father	Only mother	No Parents	Missing	Total
Austria	1,190	20	148	41	2	1,401
Belgium	1,226	38	116	41	0	1,421
Finland	753	28	136	27	0	944
France	1,137	36	164	68	2	1,407
Germany	1,716	27	236	43	0	2,022
Great Britain	1,155	36	176	41	0	1,408
Hungary	1,179	15	168	32	0	1,394
Italy	1,126	9	71	23	5	1,234
Netherland	1,344	29	80	35	0	1,488
Norway	778	14	106	23	0	921
Poland	1,108	17	82	22	1	1,230
Portugal	1,218	26	106	89	0	1,439
Sweden	776	23	130	18	5	952
Total	14,706	318	1,719	503	15	17,261

Source: See Table 18.

Financial Possibilities of the Parents

Table 26: Variable regarding if the parents had problems makings ends meet, derived from EVS 2008

Country	Parents had problems making ends meet					Total
	No	**A little bit**	**To some extent**	**Yes**	**Missing**	
Austria	445	337	309	190	120	1,401
Belgium	768	237	236	130	50	1,421
Finland	284	325	199	66	70	944
France	434	215	407	266	85	1,407
Germany	702	509	436	227	148	2,022
Great Britain	470	211	271	356	100	1,408
Hungary	296	262	412	367	57	1,394
Italy	432	223	174	262	143	1,234
Netherland	695	145	243	356	49	1,488
Norway	426	128	210	133	24	921
Poland	369	257	361	183	60	1,230
Portugal	305	245	293	466	130	1,439
Sweden	447	191	187	70	57	952
Total	6,073	3,285	3,738	3,072	1,093	17,261

<u>*Source*</u>*: See Table 18.*

Table 27: Variable regarding if the parents had problems replacing broken things, derived from EVS 2008

Country	Parents had problems replacing broken things					Total
	No	A little bit	To some extent	Yes	Missing	
Austria	572	301	263	117	148	1,401
Belgium	789	230	228	117	57	1,421
Finland	355	301	164	40	84	944
France	545	235	335	178	114	1,407
Germany	759	484	388	152	239	2,022
Great Britain	587	189	182	245	205	1,408
Hungary	295	266	412	352	69	1,394
Italy	580	157	138	201	158	1,234
Netherland	773	147	212	296	60	1,488
Norway	432	134	200	125	30	921
Poland	601	223	148	94	164	1,230
Portugal	283	258	268	498	132	1,439
Sweden	504	167	133	40	108	952
Total	7,075	3,092	3,071	2,455	1,568	17,261

<u>*Source*</u>*: See Table 18.*

Table 28: Variable regarding if the parents had financial problems, as a combination of previous indicators out of Table 26 and 27

Country	Parents financial problems: 0 (no problems) to 6 (serious problems)								Total
	0	**1**	**2**	**3**	**4**	**5**	**6**	**Missing**	
Austria	407	119	247	121	184	69	98	156	1,401
Belgium	645	140	183	133	150	40	69	61	1,421
Finland	252	102	216	93	120	30	30	101	944
France	359	116	190	154	223	105	140	120	1,407
Germany	574	160	363	222	244	88	106	265	2,022
Great Britain	415	79	166	127	122	65	217	217	1,408
Hungary	224	57	227	129	306	79	300	72	1,394
Italy	383	114	145	103	103	51	159	176	1,234
Netherland	611	94	135	124	136	84	238	66	1,488
Norway	319	76	148	116	101	61	70	30	921
Poland	281	137	239	188	125	47	33	180	1,230
Portugal	252	42	201	83	232	57	428	144	1,439
Sweden	375	118	118	79	88	28	27	119	952
Total	5,097	1,354	2,578	1,672	2,134	804	1,915	1,707	17,261

<u>*Characteristics*</u>: *Besides those listed characteristics, each variable could also be missing, not asked, not applicable, not answered or the individual did not know – all combined in the "Missing" value. Also an example for the combination: Problems with making ends meet with "a little" (1), but had not problems replacing broken things (0), the value in the new variable, which indicated financial problems, would be 1.*

<u>*Source*</u>: *See Table 18.*

Parents' Education Level

Table 29: Education levels according to the ISCED classification

Code	Education Level
0	pre-primary education or none education
1	primary education or first stage of basic education
2	lower secondary or second stage of basic education
3	(upper) secondary education
4	post-secondary non-tertiary education
5	first stage of tertiary education
6	second stage of tertiary education
99	Individual did not know, did not answer, and questions not asked or applicable, or other missings. Also, for those tables focusing on either mother/father, this variable measures the observations of the other gender.

Education Level: According to the ISCED classification (EVS & GESIS, 2013, p. 1023; UNESCO, 1997).

Zero Level: This was not used in any regression, since the number of observations was too small and the characteristic dropped.

Source: Derived from EVS variable report (EVS & GESIS, 2013).

Table 30: Variable regarding the parents' education (mother & father combined), derived from EVS 2008

Country	Education Level – mother & father combined (see Table 29)								Total
	0	**1**	**2**	**3**	**4**	**5**	**6**	**99**	
Austria	0	59	416	673	59	58	27	109	1,401
Belgium	137	415	234	299	0	191	12	133	1,421
Finland	0	421	27	198	38	163	9	88	944
France	304	352	74	274	0	136	15	252	1,407
Germany	0	57	367	1,156	17	317	7	101	2,022
Great Britain	49	210	405	82	2	140	11	509	1,408
Hungary	12	228	339	559	37	127	0	92	1,394
Italy	227	429	249	178	7	53	1	90	1,234
Netherland	54	386	523	131	38	198	8	150	1,488
Norway	11	145	379	106	84	152	4	40	921
Poland	85	382	29	549	28	89	1	67	1,230
Portugal	484	680	55	34	0	31	1	154	1,439
Sweden	40	367	176	92	113	111	9	44	952
Total	1,403	4,131	3,273	4,331	423	1,766	105	1,829	17,261

Source: See Table 18.

Table 31: Variable regarding the education only for the mother, derived from EVS 2008

	Education Level – only mother (see Table 29)								Total
Country	0	1	2	3	4	5	6	99	Total
Austria	0	7	60	56	6	7	3	1,262	1,401
Belgium	13	35	13	33	0	14	1	1,312	1,421
Finland	0	61	8	29	6	18	0	822	944
France	37	25	12	39	0	25	0	1,269	1,407
Germany	0	14	98	94	3	20	2	1,791	2,022
Great Britain	6	15	67	7	0	17	0	1,296	1,408
Hungary	1	28	43	67	6	11	0	1,238	1,394
Italy	13	25	14	10	0	5	0	1,167	1,234
Netherland	8	23	33	6	0	2	0	1,416	1,488
Norway	4	10	55	15	5	16	0	816	921
Poland	6	27	6	28	1	10	0	1,152	1,230
Portugal	49	41	4	3	0	2	0	1,340	1,439
Sweden	6	33	29	16	20	14	3	831	952
Total	143	344	442	403	47	161	9	15,712	17,261

<u>*Source*</u>*: See Table 18.*

Table 32: Variable regarding the education only for the father, derived from EVS 2008

	Education Level – only father (see Table 29)								Total
Country	0	1	2	3	4	5	6	99	Total
Austria	0	52	356	617	53	51	24	248	1,401
Belgium	124	380	221	266	0	177	11	242	1,421
Finland	0	360	19	169	32	145	9	210	944
France	267	327	62	235	0	111	15	390	1,407
Germany	0	43	269	1,062	14	297	5	332	2,022
Great Britain	43	195	338	75	2	123	11	621	1,408
Hungary	11	200	296	492	31	116	0	248	1,394
Italy	214	404	235	168	7	48	1	157	1,234
Netherland	46	363	490	125	38	196	8	222	1,488
Norway	7	135	324	91	79	136	4	145	921
Poland	79	355	23	521	27	79	1	145	1,230
Portugal	435	639	51	31	0	29	1	253	1,439
Sweden	34	334	147	76	93	97	6	165	952
Total	1,260	3,787	2,831	3,928	376	1,605	96	3,378	17,261

<u>*Source*</u>*: See Table 18.*

Parents' Occupation

Table 33: Occupation levels according to the ESeC classification

Code	Occupation
1	Routine
2	Lower technical
3	Lower sales and service
4	Lower supervisors and technicians
5	Small employers and self-employed (agriculture)
6	Small employers and self-employed (non-agriculture)
7	Intermediate occupations
8	lower managers/professionals, higher supervisory/technicians
9	large employers, higher managers/professionals
99	Individual did not know, did not answer, and questions not asked or applicable, or other missings. Also, for those tables focusing on either mother/father, this variable measures the observations of the other gender.

Occupation: According to the European Socio-economic Classification (ESeC) (EVS & GESIS, 2013, p. 1076; Rose & Harrison, 2014).

<u>*Source*</u>*: Derived from EVS variable report (EVS & GESIS, 2013).*

Table 34: Variable regarding the occupations by the parents (mother & father combined), derived from EVS 2008

Country	Occupations – mother & father combined (see Table 33)										Total
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**99**	**Total**
Austria	229	292	69	93	132	94	84	153	68	187	1,401
Belgium	207	230	71	96	95	167	78	203	123	151	1,421
Finland	114	140	39	75	134	83	20	100	83	156	944
France	232	234	41	114	48	200	55	204	141	138	1,407
Germany	315	567	50	181	58	85	94	165	110	397	2,022
Great Britain	245	266	55	81	15	78	37	211	194	226	1,408
Hungary	375	383	55	107	46	43	26	120	60	179	1,394
Italy	212	164	41	79	45	258	50	101	57	227	1,234
Netherland	185	176	36	107	11	305	68	263	173	164	1,488
Norway	90	105	39	109	110	78	53	146	94	97	921
Poland	184	354	40	36	174	20	52	91	47	232	1,230
Portugal	432	247	79	45	140	160	28	27	23	258	1,439
Sweden	113	147	55	55	62	107	37	137	86	153	952
Total	**2,933**	**3,305**	**670**	**1,178**	**1,070**	**1,678**	**682**	**1,921**	**1,259**	**2,565**	**17,261**

<u>*Source*</u>*: See Table 18.*

Table 35: Variable regarding the occupations only for the mother, derived from EVS 2008

Country	Occupations – mother only (see Table 33)										Total
	1	2	3	4	5	6	7	8	9	99	
Austria	23	9	15	13	7	7	11	15	4	1,297	1,401
Belgium	13	1	10	4	3	12	11	14	2	1,351	1,421
Finland	19	8	22	4	5	9	15	19	2	841	944
France	51	3	11	4	2	8	13	27	5	1,283	1,407
Germany	60	30	18	4	2	7	28	20	3	1,850	2,022
Great Britain	34	8	17	1	1	8	14	22	6	1,297	1,408
Hungary	47	28	6	9	4	3	7	15	3	1,272	1,394
Italy	13	6	4	1	2	12	4	6	1	1,185	1,234
Netherland	6	0	1	2	2	8	1	5	0	1,463	1,488
Norway	18	2	18	7	2	1	15	16	4	838	921
Poland	19	9	4	0	6	1	6	4	5	1,176	1,230
Portugal	33	8	4	0	3	10	3	2	1	1,375	1,439
Sweden	17	3	27	6	0	6	16	17	6	854	952
Total	353	115	157	55	39	92	144	182	42	16,082	17,261

Source: See Table 18

Table 36: Variable regarding the occupations only for the father, derived from EVS 2008

Country	Occupations – father only (see Table 33)										Total
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**99**	
Austria	206	283	54	80	125	87	73	138	64	291	1,401
Belgium	194	229	61	92	92	155	67	189	121	221	1,421
Finland	95	132	17	71	129	74	5	81	81	259	944
France	181	231	30	110	46	192	42	177	136	262	1,407
Germany	255	537	32	177	56	78	66	145	107	569	2,022
Great Britain	211	258	38	80	14	70	23	189	188	337	1,408
Hungary	328	355	49	98	42	40	19	105	57	301	1,394
Italy	199	158	37	78	43	246	46	95	56	276	1,234
Netherland	179	176	35	105	9	297	67	258	173	189	1,488
Norway	72	103	21	102	108	77	38	130	90	180	921
Poland	165	345	36	36	168	19	46	87	42	286	1,230
Portugal	399	239	75	45	137	150	25	25	22	322	1,439
Sweden	96	144	28	49	62	101	21	120	80	251	952
Total	**2,580**	**3,190**	**513**	**1,123**	**1,031**	**1,586**	**538**	**1,739**	**1,217**	**3,744**	**17,261**

<u>*Source*</u>*: See Table 18.*

Foreign Nationality

Table 37: Variable regarding if the individual has a foreign nationality compared to the observed country, derived from EVS 2008

Country	Same Nationality	Foreign Nationality	Missing	Total
Austria	1,369	32	0	1,401
Belgium	1,340	79	2	1,421
Finland	943	1	0	944
France	1,372	35	0	1,407
Germany	1,960	61	1	2,022
Great Britain	1,356	51	1	1,408
Hungary	1,394	0	0	1,394
Italy	1,234	0	0	1,234
Netherland	1,467	21	0	1,488
Norway	872	46	3	921
Poland	1,227	1	2	1,230
Portugal	1,409	30	0	1,439
Sweden	910	40	2	952
Total	16,853	397	11	17,261

<u>*Source*</u>*: See Table 18.*

Control Variables: Gender and Age

Table 38: Variable regarding the gender of the observed individuals, derived from EVS 2008

Country	Female	Male	Total
Austria	605	796	1,401
Belgium	681	740	1,421
Finland	465	479	944
France	635	772	1,407
Germany	960	1,062	2,022
Great Britain	586	822	1,408
Hungary	664	730	1,394
Italy	612	622	1,234
Netherland	663	825	1,488
Norway	463	458	921
Poland	540	690	1,230
Portugal	575	864	1,439
Sweden	451	501	952
Total	7,900	9,361	17,261

Source: See Table 18.

Table 39: Variable regarding four applied age groups for the observed individuals, derived from EVS 2008

	Age groups of the observed individuals				
Country	<= 34 years	35 – 49 years	50 – 65 years	>= 66 years	Total
Austria	376	431	344	250	1,401
Belgium	311	422	432	256	1,421
Finland	181	314	339	110	944
France	277	388	413	329	1,407
Germany	406	587	595	434	2,022
Great Britain	283	371	363	391	1,408
Hungary	408	393	374	219	1,394
Italy	276	354	351	253	1,234
Netherland	173	385	479	451	1,488
Norway	186	314	301	120	921
Poland	325	343	354	208	1,230
Portugal	236	394	349	460	1,439
Sweden	150	312	341	149	952
Total	3,588	5,008	5,035	3,630	17,261

Source: See Table 18. Also, the specific age groups are motivated in chapter 3 and based on own calculations.

Regression Results for Different Countries

Table 40: Full logit regression results for all countries combined, based on Equation 6 and the applicable EVS 2008 data

All Countries	Independent variable: Third level education attainment		
Variable	**Variable category**	**Coefficient**	**Standard Error**
Involvement of mother (Higher values indicate a higher involvement. Category 0 is used as reference.)	1	0.3512 ***	0.0745
	2	0.3631 ***	0.0736
	3	0.5348 ***	0.0662
	4	0.5348 ***	0.0854
	5	0.5950 ***	0.1031
	6	0.9835 ***	0.1200
Involvement of father (Higher values indicate a higher involvement. Category 0 is used as reference.)	1	0.3576 ***	0.0729
	2	0.3771 ***	0.0714
	3	0.4080 ***	0.0678
	4	0.6825 ***	0.0823
	5	0.6853 ***	0.0986
	6	0.8391 ***	0.0999
Education of parents (Higher values indicate a higher education. Category 1 is used as reference.)	2	1.2410 ***	0.1335
	3	1.2011 ***	0.1333
	4	2.5839 ***	0.1771
	5	2.4168 ***	0.1428
	6	3.1234 ***	0.3230
Divorced parents		0.6239 ***	0.1238
Foreign nationality		0.4111 ***	0.1418
Financial Problems of the parents (Higher values indicate more problems. Category 0 is used as reference.)	1	0.0368	0.0743
	2	-0.1952 ***	0.0601
	3	-0.3031 ***	0.0724
	4	-0.5096 ***	0.0703
	5	-0.4902 ***	0.1104
	6	-0.8025 ***	0.0921
Age Groups (Category 2 is used as reference)	<35 years	-0.2047 ***	0.0581
	50 – 65 years	-0.0741	0.0536
	>= 66 years	-0.5785 ***	0.0674
Gender (Female)		0.0207	0.0421
Constant		-2.4100 ***	0.1401
Number of observations: 12,5296 || Pseudo R²: 0,1501			

<u>*Source*</u>*: See Table 6.*

Table 41: Full logit regression results for Austria, based on Equation 6 and the applicable EVS 2008 data

Austria	Independent variable: Third level education attainment		
Variable	**Variable category**	**Coefficient**	**Standard Error**
Involvement of mother (Higher values indicate a higher involvement. Category 0 is used as reference.)	1	0.1782	0.3337
	2	0.3083	0.3138
	3	0.3515	0.3113
	4	0.4184	0.3592
	5	1.0804 ***	0.3685
	6	1.2131 **	0.5364
Involvement of father (Higher values indicate a higher involvement. Category 0 is used as reference.)	1	0.0088	0.3109
	2	0.4039	0.2941
	3	0.0923	0.3075
	4	0.7903 **	0.3267
	5	0.2012	0.3759
	6	0.4640	0.4297
Education of parents (Higher values indicate a higher education. Category 1 is used as reference.)	2	-0.2119	0.4694
	3	-0.2712	0.4634
	4	0.6308	0.5467
	5	1.2568 **	0.5639
	6	1.8346 ***	0.6614
Divorced parents		0.5874	0.4350
Foreign nationality		0.4730	0.5175
Financial Problems of the parents (Higher values indicate more problems. Category 0 is used as reference.)	1	0.3776	0.2716
	2	-0.0709	0.2297
	3	-0.1595	0.2890
	4	-0.5166 *	0.2793
	5	-1.0105 **	0.5200
	6	-1.2236 **	0.5649
Age Groups (Category 2 is used as reference)	<35 years	-0.2132	0.2123
	50 – 65 years	-0.1192 *	0.2272
	>= 66 years	-0.5702 **	0.2807
Gender (Female)		-0.0203	0.1684
Constant		-1.5575 ***	0.5422
Number of observations: 1,022 || Pseudo R²: 0.1323			

Source: See Table 6.

Table 42: Full logit regression results for Belgium, based on Equation 6 and the applicable EVS 2008 data

Belgium	Independent variable: Third level education attainment		
Variable	**Variable category**	**Coefficient**	**Standard Error**
Involvement of mother (Higher values indicate a higher involvement. Category 0 is used as reference.)	1	0.2096	0.2380
	2	0.0317	0.2310
	3	0.6291 ***	0.2159
	4	0.7830 **	0.3695
	5	-0.1037	0.5696
	6	0.7845	0.5150
Involvement of father (Higher values indicate a higher involvement. Category 0 is used as reference.)	1	0.3312	0.2321
	2	0.1922	0.2406
	3	0.4540 **	0.2191
	4	0.3668	0.3491
	5	1.4167 ***	0.4439
	6	0.7501 *	0.4026
Education of parents (Higher values indicate a higher education. Category 1 is used as reference.)	2	0.3539	0.3606
	3	1.1050 ***	0.3665
	4	1.7489 ***	0.3649
	5	2.8035 ***	0.3985
	6	(empty)	
Divorced parents		0.7391	0.4844
Foreign nationality		-0.3968	0.3575
Financial Problems of the parents (Higher values indicate more problems. Category 0 is used as reference.)	1	0.0695	0.2419
	2	-0.1447	0.2294
	3	-0.2297	0.2722
	4	-0.6973 ***	0.3002
	5	-0.2119	0.4986
	6	-1.0918 **	0.5297
Age Groups (Category 2 is used as reference)	<35 years	-0.7645 ***	0.2034
	50 – 65 years	-0.5076 ***	0.1919
	>= 66 years	-0.9468 ***	0.2564
Gender (Female)		0.2380	0.1508
Constant		-1.9231 ***	0.3808
Number of observations: 1,111 || Pseudo R²: 0.2342			

<u>*Source*</u>: See Table 6.

Table 43: Full logit regression results for Finland, based on Equation 6 and the applicable EVS 2008 data

Finland	Independent variable: Third level education attainment		
Variable	**Variable category**	**Coefficient**	**Standard Error**
Involvement of mother (Higher values indicate a higher involvement. Category 0 is used as reference.)	1	0.0930	0.3226
	2	-0.1324	0.3157
	3	0.1455	0.3127
	4	0.4498	0.4244
	5	0.7044	0.5808
	6	0.5778	0.8734
Involvement of father (Higher values indicate a higher involvement. Category 0 is used as reference.)	1	0.4048	0.3127
	2	0.5099 *	0.2938
	3	0.1530	0.2869
	4	0.1994	0.3594
	5	0.2120	0.4445
	6	0.5302	0.6024
Education of parents (Higher values indicate a higher education. Category 1 is used as reference.)	2	-0.4432	0.5337
	3	0.1561	0.2335
	4	0.9798 *	0.5209
	5	1.0096 ***	0.3102
	6	(empty)	
Divorced parents		0.1294	0.4527
Foreign nationality		(omitted, since only 1 observation)	
Financial Problems of the parents (Higher values indicate more problems. Category 0 is used as reference.)	1	0.0184	0.3027
	2	0.1360	0.2498
	3	0.0771	0.3335
	4	-0.3255	0.3003
	5	-0.1852	0.5306
	6	-0.3745	0.5735
Age Groups (Category 2 is used as reference)	<35 years	-0.0024	0.2839
	50 – 65 years	-0.0320	0.2255
	>= 66 years	-0.3472	0.3168
Gender (Female)		0.1748	0.1836
Constant		0.2526	0.3717
Number of observations: 636 || Pseudo R²: 0.0555			

<u>*Source*</u>: See Table 6.

Table 44: Full logit regression results for France, based on Equation 6 and the applicable EVS 2008 data

France	Independent variable: Third level education attainment		
Variable	**Variable category**	**Coefficient**	**Standard Error**
Involvement of mother (Higher values indicate a higher involvement. Category 0 is used as reference.)	1	0.2392	0.2579
	2	-0.0806	0.2544
	3	-0.0860	0.2531
	4	0.0640	0.3298
	5	0.2423	0.4821
	6	1.2916 *	0.7752
Involvement of father (Higher values indicate a higher involvement. Category 0 is used as reference.)	1	-0.0617	0.2785
	2	0.2562	0.2519
	3	0.2987	0.2556
	4	0.3518	0.3291
	5	0.8684 **	0.3986
	6	0.0161	0.4177
Education of parents (Higher values indicate a higher education. Category 1 is used as reference.)	2	0.7720 ***	0.2733
	3	1.4186 ***	0.3742
	4	1.7263 ***	0.2851
	5	2.2442 ***	0.3424
	6	2.9146 ***	0.7205
Divorced parents		0.3050	0.3845
Foreign nationality		0.1140	0.5576
Financial Problems of the parents (Higher values indicate more problems. Category 0 is used as reference.)	1	0.5398 **	0.2778
	2	0.0687	0.2390
	3	0.1665	0.2655
	4	-0.6094 **	0.2554
	5	-0.9910 **	0.3904
	6	-1.0713 **	0.4299
Age Groups (Category 2 is used as reference)	<35 years	0.4222 *	0.2295
	50 – 65 years	-0.4721 **	0.2055
	>= 66 years	-0.5327 **	0.2475
Gender (Female)		0.0571	0.1617
Constant		-1.8231 ***	0.3597
Number of observations: 954 || Pseudo R²: 0.2100			

<u>*Source*</u>: See Table 6.

Table 45: Full logit regression results for Great Britain, based on Equation 6 and the applicable EVS 2008 data

Great Britain	Independent variable: Third level education attainment		
Variable	**Variable category**	**Coefficient**	**Standard Error**
Involvement of mother (Higher values indicate a higher involvement. Category 0 is used as reference.)	1	-0.8194 **	0.3843
	2	-0.4869	0.3674
	3	-0.1558	0.2595
	4	0.3025	0.4080
	5	0.1436	0.4370
	6	0.6494	0.4071
Involvement of father (Higher values indicate a higher involvement. Category 0 is used as reference.)	1	0.6659 *	0.3558
	2	0.3866	0.3486
	3	0.5954 **	0.2740
	4	0.5803	0.3658
	5	0.1426	0.4399
	6	1.1074 ***	0.3532
Education of parents (Higher values indicate a higher education. Category 1 is used as reference.)	2	1.0941 *	0.6509
	3	1.4421 **	0.6327
	4	1.7602 ***	0.6776
	5	2.5909 ***	0.6707
	6	3.9084 ***	1.2618
Divorced parents		0.9458	0.6287
Foreign nationality		1.7637 ***	0.5052
Financial Problems of the parents (Higher values indicate more problems. Category 0 is used as reference.)	1	-0.2811	0.3993
	2	-0.3678	0.2889
	3	-0.0863	0.3195
	4	0.3514	0.3183
	5	-0.5855	0.4567
	6	-0.5422 *	0.3015
Age Groups (Category 2 is used as reference)	<35 years	-0.5260 *	0.2873
	50 – 65 years	0.0521	0.2531
	>= 66 years	-0.6342 **	0.2663
Gender (Female)		-0.5872 ***	0.1910
Constant		-1.9457 ***	0.6778
Number of observations: 698 || Pseudo R²: 0.1885			

<u>*Source*</u>*: See Table 6.*

Table 46: Full logit regression results for Hungary, based on Equation 6 and the applicable EVS 2008 data

Hungary	Independent variable: Third level education attainment		
Variable	**Variable category**	**Coefficient**	**Standard Error**
Involvement of mother (Higher values indicate a higher involvement. Category 0 is used as reference.)	1	0.4063	0.3792
	2	0.9325 ***	0.3625
	3	1.3191 ***	0.3274
	4	1.3172 ***	0.3921
	5	1.6823 ***	0.4441
	6	0.1617	0.6087
Involvement of father (Higher values indicate a higher involvement. Category 0 is used as reference.)	1	0.4065	0.3004
	2	0.1848	0.2837
	3	0.0122	0.2711
	4	0.2802	0.3351
	5	-0.0583	0.4324
	6	1.0366 **	0.4987
Education of parents (Higher values indicate a higher education. Category 1 is used as reference.)	2	-2.8773 ***	0.3958
	3	-2.8096 ***	0.3270
	4	-1.6823 ***	0.2581
	5	0.1087	0.4845
	6	(omitted, since no observation)	
Divorced parents		0.5101	0.5051
Foreign nationality		(omitted, since no observation)	
Financial Problems of the parents (Higher values indicate more problems. Category 0 is used as reference.)	1	0.1534	0.3772
	2	-0.1496	0.2533
	3	-0.4251	0.3104
	4	-0.4694 *	0.2500
	5	-0.6852	0.4469
	6	-0.4473	0.2801
Age Groups (Category 2 is used as reference)	<35 years	0.3647 *	0.2161
	50 – 65 years	0.9364 ***	0.2296
	>= 66 years	0.5560 *	0.3254
Gender (Female)		0.1337	0.1644
Constant		-0.6576	0.4306
Number of observations: 1,086 || Pseudo R²: 0.2273			

<u>*Source*</u>: *See Table 6.*

Table 47: Full logit regression results for Italy, based on Equation 6 and the applicable EVS 2008 data

Italy	Independent variable: Third level education attainment		
Variable	**Variable category**	**Coefficient**	**Standard Error**
Involvement of mother (Higher values indicate a higher involvement. Category 0 is used as reference.)	1	0.0497	0.3252
	2	0.2634	0.3575
	3	0.7469 ***	0.2669
	4	0.7193 *	0.3883
	5	0.4729	0.5266
	6	1.4457 ***	0.4798
Involvement of father (Higher values indicate a higher involvement. Category 0 is used as reference.)	1	0.9055 ***	0.3076
	2	0.6887 *	0.3613
	3	0.1670	0.3050
	4	0.8482 **	0.3787
	5	0.8642 **	0.4215
	6	0.6818 *	0.3962
Education of parents (Higher values indicate a higher education. Category 1 is used as reference.)	2	0.3930	0.3917
	3	0.9671 **	0.4074
	4	1.5349 ***	0.4219
	5	4.4898 ***	1.1816
	6	2.6326 ***	0.5421
Divorced parents	(omitted, since no observation)		
Foreign nationality	(omitted, since no observation)		
Financial Problems of the parents (Higher values indicate more problems. Category 0 is used as reference.)	1	-0.7964 **	0.3477
	2	-0.4991 *	0.2910
	3	-0.7581 *	0.4047
	4	-0.5084	0.3740
	5	-0.2872	0.5661
	6	-0.2236	0.3434
Age Groups (Category 2 is used as reference)	<35 years	0.0215	0.2455
	50 – 65 years	-0.1427	0.2578
	>= 66 years	-0.9338 **	0.3894
Gender (Female)		0.5212 ***	0.1943
Constant		-3.0417 ***	0.4573
Number of observations: 949 || Pseudo R²: 0.2030			

<u>*Source*</u>: See Table 6.

Table 48: Full logit regression results for the Netherlands, based on Equation 6 and the applicable EVS 2008 data

Netherlands	Independent variable: Third level education attainment		
Variable	**Variable category**	**Coefficient**	**Standard Error**
Involvement of mother (Higher values indicate a higher involvement. Category 0 is used as reference.)	1	0.4739 **	0.2395
	2	0.1471	0.2507
	3	0.2757	0.1817
	4	0.4998 *	0.2657
	5	0.3660	0.3206
	6	0.6582 **	0.3161
Involvement of father (Higher values indicate a higher involvement. Category 0 is used as reference.)	1	0.5217 **	0.2386
	2	0.5806 **	0.2463
	3	0.2140	0.1954
	4	0.8192 ***	0.2549
	5	0.8064 ***	0.2895
	6	0.9667 ***	0.2720
Education of parents (Higher values indicate a higher education. Category 1 is used as reference.)	2	0.6333	0.5194
	3	1.1671 **	0.5138
	4	1.6798 ***	0.5448
	5	1.9696 ***	0.6224
	6	2.4052 ***	0.5433
Divorced parents		0.1904	0.3982
Foreign nationality		1.0444	0.8483
Financial Problems of the parents (Higher values indicate more problems. Category 0 is used as reference.)	1	0.3023	0.2714
	2	-0.0827	0.2366
	3	-0.1071	0.2429
	4	0.2929	0.2336
	5	0.1655	0.3266
	6	-0.4333 *	0.2320
Age Groups (Category 2 is used as reference)	<35 years	-0.4535 **	0.2202
	50 – 65 years	-0.6177 ***	0.1730
	>= 66 years	-1.3155 ***	0.1992
Gender (Female)		-0.2089	0.1354
Constant		-1.4879 ***	0.5363
Number of observations: 1,201 || Pseudo R²: 0.1864			

Source: See Table 6.

Table 49: Full logit regression results for Norway, based on Equation 6 and the applicable EVS 2008 data

Norway	**Independent variable: Third level education attainment**		
Variable	**Variable category**	**Coefficient**	**Standard Error**
Involvement of mother (Higher values indicate a higher involvement. Category 0 is used as reference.)	1	0.8735 ***	0.3094
	2	0.2461	0.2837
	3	0.5239 **	0.2444
	4	0.3001	0.3063
	5	0.9595 **	0.3944
	6	0.6707 *	0.3742
Involvement of father (Higher values indicate a higher involvement. Category 0 is used as reference.)	1	0.2667	0.2970
	2	0.3590	0.3100
	3	0.1390	0.2689
	4	0.6366 **	0.3072
	5	0.7729 **	0.3718
	6	1.0444 ***	0.3494
Education of parents (Higher values indicate a higher education. Category 1 is used as reference.)	2	-0.3037	0.8276
	3	0.0842	0.8124
	4	0.5651	0.8438
	5	1.1620	0.8533
	6	0.5953	0.8371
Divorced parents		0.5173	0.3400
Foreign nationality		0.3444	0.4070
Financial Problems of the parents (Higher values indicate more problems. Category 0 is used as reference.)	1	-0.2048	0.3118
	2	-0.3431	0.2351
	3	-0.1230	0.2664
	4	-0.8010	0.2687
	5	-0.4871	0.3607
	6	-1.1500	0.4043
Age Groups (Category 2 is used as reference)	<35 years	-0.4702 **	0.2413
	50 – 65 years	-0.3345 *	0.2036
	>= 66 years	-0.8954 ***	0.2837
Gender (Female)		0.2370	0.1640
Constant		-0.4244	0.8495
Number of observations: 748 || Pseudo R²: 0.1232			

<u>*Source*</u>: See Table 6.

Table 50: Full logit regression results for Poland, based on Equation 6 and the applicable EVS 2008 data

Poland	**Independent variable: Third level education attainment**		
Variable	**Variable category**	**Coefficient**	**Standard Error**
Involvement of mother (Higher values indicate a higher involvement. Category 0 is used as reference.)	1	0.7885 **	0.3902
	2	0.9175 **	0.3710
	3	1.3017 ***	0.3555
	4	1.2230 ***	0.4005
	5	1.1202 **	0.4786
	6	1.1682 **	0.5378
Involvement of father (Higher values indicate a higher involvement. Category 0 is used as reference.)	1	0.1374	0.3371
	2	0.0470	0.3085
	3	0.4761	0.3041
	4	0.5410	0.3451
	5	0.8964 **	0.4204
	6	0.7209 *	0.4418
Education of parents (Higher values indicate a higher education. Category 1 is used as reference.)	2	1.6098	1.0392
	3	1.9004	1.1596
	4	2.1809 **	1.0346
	5	4.1181 ***	1.1542
	6	3.7627 ***	1.0788
Divorced parents		0.2583	0.9152
Foreign nationality		(omitted, since no observation)	
Financial Problems of the parents (Higher values indicate more problems. Category 0 is used as reference.)	1	-0.6182 **	0.2852
	2	-0.1983	0.2352
	3	-0.6198 **	0.2775
	4	-0.6469 **	0.3108
	5	-0.6430	0.4764
	6	-0.5217	0.5840
Age Groups (Category 2 is used as reference)	<35 years	0.8053 ***	0.2111
	50 – 65 years	-0.3924	0.2451
	>= 66 years	-0.5143	0.3304
Gender (Female)		0.5779 ***	0.1767
Constant		-4.5165 ***	1.0726
Number of observations: 982 || Pseudo R²: 0.2480			

<u>*Source*</u>: See Table 6.

Table 51: Full logit regression results for Portugal, based on Equation 6 and the applicable EVS 2008 data

Portugal	Independent variable: Third level education attainment		
Variable	**Variable category**	**Coefficient**	**Standard Error**
Involvement of mother (Higher values indicate a higher involvement. Category 0 is used as reference.)	1	-0.0530	0.4012
	2	1.3116 ***	0.4124
	3	0.5815	0.4100
	4	0.6735	0.6999
	5	0.3769	1.0133
	6	1.7457 **	0.8208
Involvement of father (Higher values indicate a higher involvement. Category 0 is used as reference.)	1	1.3958 ***	0.3981
	2	-0.4947	0.5289
	3	0.9603 **	0.4432
	4	1.1717 **	0.5812
	5	0.7313	0.7057
	6	1.5419 **	0.7505
Education of parents (Higher values indicate a higher education. Category 1 is used as reference.)	2	1.4362 **	0.6651
	3	1.9666 **	0.7818
	4	1.7583 **	0.8315
	5	2.9994 ***	0.8581
	6	(empty)	
Divorced parents		2.5203	1.0201
Foreign nationality		-0.3811	0.7242
Financial Problems of the parents (Higher values indicate more problems. Category 0 is used as reference.)	1	0.3910	0.6002
	2	-0.7179 **	0.3695
	3	-0.4704	0.5039
	4	-0.6981 *	0.3632
	5	-1.4173	0.8670
	6	-0.9851 **	0.4254
Age Groups (Category 2 is used as reference)	<35 years	0.4666	0.2913
	50 – 65 years	-0.3770	0.3641
	>= 66 years	-1.1376 **	0.4438
Gender (Female)		0.5293 **	0.2546
Constant		-4.1347 ***	0.7169
Number of observations: 996 || Pseudo R²: 0.3094			

<u>*Source*</u>: See Table 6.

Table 52: Full logit regression results for Sweden, based on Equation 6 and the applicable EVS 2008 data

Sweden	Independent variable: Third level education attainment		
Variable	**Variable category**	**Coefficient**	**Standard Error**
Involvement of mother (Higher values indicate a higher involvement. Category 0 is used as reference.)	1	-0.2299	0.3193
	2	-0.6709 **	0.3134
	3	-0.1648	0.3011
	4	0.1313	0.3548
	5	0.4714	0.4231
	6	0.5975	0.5102
Involvement of father (Higher values indicate a higher involvement. Category 0 is used as reference.)	1	0.5122 *	0.2941
	2	0.5885 **	0.2938
	3	0.2504	0.2838
	4	1.0606 ***	0.3416
	5	1.2301 **	0.4817
	6	0.6848	0.4267
Education of parents (Higher values indicate a higher education. Category 1 is used as reference.)	2	0.2483	0.4444
	3	0.4111	0.4828
	4	0.2671	0.5279
	5	1.7049 ***	0.5632
	6	0.9499 **	0.5422
Divorced parents		-0.7334 **	0.3501
Foreign nationality		0.4122	0.4958
Financial Problems of the parents (Higher values indicate more problems. Category 0 is used as reference.)	1	0.0907	0.2632
	2	0.3941	0.2654
	3	0.3754	0.3467
	4	-0.3248	0.3042
	5	-0.0791	0.4969
	6	0.0241	0.5740
Age Groups (Category 2 is used as reference)	<35 years	-0.5652 **	0.2854
	50 – 65 years	-0.3590	0.2220
	>= 66 years	-0.6713 **	0.2889
Gender (Female)		0.51188 ***	0.17828
Constant		-0.43767	0.52889
Number of observations: 664 || Pseudo R²: 0.1244			

<u>*Source*</u>*: See Table 6.*

Variance Inflation Factor (VIF): Mean and Max

Table 53: VIF (Mean & Max) value of different regression models based on Equation 6, with or without parental involvement/education

Country	Equation 6 – Final Regression		Regression only with involvement		Regression only with education	
	Mean VIF	Max VIF	Mean VIF	Max VIF	Mean VIF	Max VIF
All Countries	1.22	1.49	1.16	1.45	1.11	1.30
Austria	1.23	1.62	1.18	1.58	1.09	1.24
Belgium	1.24	1.70	1.13	1.31	1.16	1.48
Finland	1.15	1.32	1.10	1.27	1.08	1.21
France	1.22	1.57	1.14	1.27	1.15	1.36
Germany	1.25	1.68	1.21	1.63	1.11	1.28
Great Britain	1.22	1.55	1.14	1.35	1.16	1.43
Hungary	1.36	1.78	1.25	1.74	1.17	1.46
Italy	1.25	1.62	1.15	1.29	1.17	1.41
Netherland	1.21	1.50	1.13	1.24	1.14	1.34
Norway	1.16	1.35	1.10	1.23	1.10	1.23
Poland	1.38	1.84	1.28	1.77	1.19	1.45
Portugal	1.36	1.97	1.29	1.88	1.15	1.38
Sweden	1.20	1.48	1.13	1.40	1.10	1.28

Max VIF: This indicates the highest measured VIF in any variable. This is listed, to show, that not only the mean does not represent a problem (if over five), but also that there is no single value over five.

Source: Own calculations, based on same regressions as in Table 14. Also, results of different VIF calculations are combined by me.