Essays on Intrahousehold Relationships and Decision-Making

Alma Sobrevilla

Submitted in fulfilment of the requirements for
the Degree of Doctor of Philosophy
Adam Smith Business School
University of Glasgow

September 2018

Abstract

This thesis aims to study three specific research questions in child health, women's empowerment and children's education from an intrahousehold perspective, using panel data from the Mexican Family Life Survey.

The first essay (Chapter 2) aims to shed light into the problem of obesity in Mexico. The chapter studies the intergenerational transmission of obesity in children and adolescents offering quantitative measures of the parent-child link in terms of the Body Mass Index (BMI). Starting by following a simple Ordinary Least Squares approach, the analysis progresses to the use of fixed effect methodologies in order to isolate shared and non-shared genetic factors from the parent-child BMI relationship. Results suggest a strong link between the BMI of fathers and children, which is not only associated to genetic elements but also to time-variant factors that could be related to eating and exercising habits; this relationship is highly significant and stronger for children living in households with a high socioeconomic status. The mother-child link, on the other hand, seems to be slightly weaker and almost exclusively explained by time-invariant factors (such as genetics) however this relationship tends to be stronger for children whose mothers are in paid employment.

In the second essay (Chapter 3) this thesis explores the relationship between women's employment and education on their level of participation on seven different aspects of intrahousehold decision-making. Unlike previous research papers on the matter, this work considers three possible results for women's involvement in decision-making: i) exclusive decision-making, ii) shared decision-making with at least one other family member, or iii) non-participation. Results show that having one additional year of education will increase the likelihood of a woman sharing decision-making power with at least some other family member, but will reduce the probability of her being the exclusive decision-maker. On the other hand, being in paid employment tends to increase women's likelihood of both, sharing power and becoming exclusive decision-makers. The analysis then goes on to explore the role of social norms on women's behaviour and finds that having a higher level of education than the average in the community seems to decrease women's level of intrahousehold decision-making power,

supporting the notion that women seem to compensate their success outside the household with submissive attitudes at home.

Finally, the third essay (Chapter 4) studies the association between children's cognitive ability and their time allocation on school, work and housework. The relationship between children's endowment and the amount of resources parents allocate to them has been widely studied in the past; however, most of the previous research on this matter has only considered monetary resources as a measure of parental investments. Alternatively, this work considers time allocation as a more basic form of parental investment. Using fixed effects and instrumental variables methodologies, the chapter analyses the relationship between children's IQ z-scores and a set of six variables indicating children's participation or enrolment in work, housework and school, as well as the number of hours dedicated to each activity. Results suggest that cognitive ability does not seem to have a significant effect on children's participation or time allocated to work; nevertheless, it does have a strong link with school enrolment, number of hours spent at school and participation in housework, some of these effects being significantly different for boys and girls.

Contents

List of Tables

List of Figures

Acknowledgements

This thesis was written with the financial support of Mexico's National Council for Science and Technology (CONACyT).

I am grateful to my supervisors Dr. Luis Angeles and Dr. Celine Azemar, for their excellent guidance and advice on all three empirical chapters of this thesis. Their useful comments and suggestions have significantly improved the quality of this work.

To my fellow Mexican PhD students, Aldo Elizalde and Cristina Ibarra, who managed to take some time out of their busy agendas to help me get through administrative formalities, thank you so much for your advice and assistance.

I am also grateful to the lovely friends I met at the University of Glasgow, specially to my officemate and best friend during my PhD studies Seemanti Ghosh, and my dear friend Pooja Dewan, for all those discussions and feedback on my work, but also for the nonsense and the laughs we shared. All these years of hard work would have never been the same without you.

I am especially thankful to my family in Monterrey, Mexico, whose love and support kept me going from the very beginning of this journey. To my mum, Alma, who personally taught me how to read and write almost 25 years ago, this thesis is also the fruit and consequence of your hard work. And to my auntie Alicia, thank you for teaching me to be strong and encouraging me to pursue this dream. I would never have made it this far without you both.

And finally, to my dear husband Craig, whose love and support made it possible to complete the last couple of chapters of this thesis. Thank you for having had faith in me even when I didn't. You are the best gift this PhD journey has given me.

Alma Sobrevilla.

September 2018.

Declaration

I declare that, except where explicit reference is made to the contribution of others, this dissertation is the result of my own work and has not been submitted for any other degree at the University of Glasgow or any other institution.

Printed name: Alma Sobrevilla

Signature:

Chapter 1
Introduction

1.1 Motivation and Objectives

The need for intrahousehold analysis in policy-oriented empirical research has been recently stressed in the literature. Even when the major development objectives involve increasing the wellbeing of a community or a country as a whole, it is essential to understand the motivations, relationships, decision-making processes and distribution of resources that happen in lower units of planning. Knowing how resources are allocated and power relationships are like in the household, for instance, allows policy-makers to design effective development projects that are more likely to give the desired results (Rogers & Schlossman, 1990).

Therefore, it is essential to initiate a discussion on the intrahousehold sources and mechanisms behind common socioeconomic problems. A public health issue such as childhood obesity, for instance, can be traced back to shared and non-shared eating and exercising habits mainly developed in the household. Similarly, women's labour force participation can be seen as the aggregate result of many women making the decision of whether they should get a paid job outside the household or not, a process that is likely to involve not only their own wishes but also a complex negotiation process within the household. Likewise, children's enrolment in school or participation in paid work is a decision likely made by the parents based, among other factors, on a cost-benefit analysis. Therefore, research on these matters should not only focus on the final result (health, women's participation in the work force, children's enrolment in school) as an aggregate outcome, but also acknowledge the relevance of the intricate intrahousehold relationships and decision-making processes behind them. This thesis aims to study three specific research questions about obesity, women's empowerment and children's time allocation from an intrahousehold perspective, using panel data from the Mexican Family Life Survey (MxFLS).

The first issue that this thesis aims to analyse is obesity. Mexico currently has the second largest obesity rate among the OECD countries, with an obesity incidence of 32.4 per cent among adults, which is expected to rise significantly within the next decade (OECD, 2017). A separate research study based on micro-simulation seems to suggest a similar trend, concluding that by 2050 the proportion of men and women with normal weight will decrease, respectively, to 12 and 9 per cent, from reference figures of 32 and 26 per cent registered in 2010 (Rtveladze, et al., 2013). Similarly, Mexico has been recently ranked among the six countries with the highest rates of overweight and obesity among children and adolescents between 5 and 17 years old (OECD, 2014), with additional evidence suggesting the presence of an increasing trend in the incidence of childhood obesity in the last 13 years (Hernández-Cordero, et al., 2017). Considering that many of those overweight and obese children are likely to become overweight and obese adults (Dietz, 1998), the rise in the incidence of this problem becomes even more worrying. Furthermore, given the strong relationship between obesity and other chronic illnesses such as cardiovascular disease, diabetes and diabetes-related complications, the significant rise in the prevalence of obesity represents a major challenge not only in terms of social wellbeing, but also regarding the monetary costs associated with them, both direct (costs of treatment, hospitalisation) and indirect (mortality, disability, loss of productivity), which place a heavy burden in the Mexican social healthcare system. The direct cost of diabetes alone has registered an increase of more than US$717 million for outpatients and US$223 million for inpatients in the period 1994-2006, while indirect costs have raised US$ 177 million (Barquera, et al., 2013); both figures being expected to increase significantly in the future. In a different study considering 13 different obesity-related diseases, the authors predict an rise of the total obesity-related costs from US$ 806 million in 2010 to US$ 1.2 billion in 2030 and US$ 1.7 billion in 2050, whilst a decrease of 1 per cent in Body Mass Index (BMI) across the population would virtually result in health-care savings up to US$ 43 million in 2030 and $85 million in 2050 (Rtveladze, et al., 2013).

Even though there have been significant efforts by the government encouraging individuals to reduce their consumption of high-calorie foods and promoting an active life style[1], there is an important component that has not received enough attention: the intrahousehold dimension of the obesity issue. This means that obesity might not happen randomly in isolated occurrences, but it is likely to affect more than one person in the same home. In fact, there is already evidence in the literature finding that people sharing a household with overweight and obese individuals are also likely to be overweight and obese (Rodriguez Oreggia & Perez Lizaur, 2010), which suggests the presence of intrahousehold mechanisms facilitating the transmission of overweight and obesity among family members. More importantly, given that the high prevalence of overweight and obesity in Mexico has now spread across all age groups, including children and adolescents, there is a possibility that obesity might have become an intergenerational problem, likely to be transmitted from parents to children. Therefore, any attempt to design effective policy against this problem must invariably consider the intrahousehold relationships and parent-child transmission processes that contribute to intergenerational vicious cycles that might be aggravating the obesity epidemic in Mexico; however, previous research for the Mexican case has not studied this matter in depth. For this reason, the first essay in this thesis (Chapter 2), aims to offer quantitative measures of the father-child and mother-child links in BMI, using different methodologies that allow the analysis to control for certain non-variant factors both at the individual and household level. By contrasting the measures obtained under different methodologies it becomes easier to understand the components and sources of the transmission process, facilitating the design of appropriate policy.

As it will be shown in Chapter 2, one secondary result from the previous analysis is that mothers who are in paid employment tend to transmit more of their own anthropometric status to their children with respect to women who do not work outside the household, an outcome that triggered the formulation of the second research question studied in this thesis. The second essay (Chapter 3) explores the relationship between women's education and employment and their level of involvement in intrahousehold decision-making, especially regarding those decisions that directly involve their own lifestyle and wellbeing, as well as those of their children. The fact that working women tend to transmit more of their own anthropometric status to their children inevitably raises the question of whether paid employment may help women

[1] Please refer to Mexico's 'National Strategy to the Prevention and Control of Overweight, Obesity and Diabetes'(2013). Available at: https://www.gob.mx/cms/uploads/attachment/file/276108/estrategia_sobrepeso_diabetes_obesidad.pdf

get a higher level of influence, not only regarding food choices but also more transcendental decisions with long term effects in family life. The notion of women's empowerment in the domestic sphere is of particular interest for the Mexican case, due to the particular sociocultural environment and non-written norms that, independently from any external influences, condition people's behaviour and women's involvement in decision-making. In a highly gender-stratified society like Mexico, the spectrum of decision-making aspects in which women are actively involved is not wide, due to social norms that have implicitly assigned women to very specific areas of family life and segregated them from others (Casique, 2000). So, while food preparation and child care are seen as especially 'feminine' spheres of domestic life, other crucial aspects of decision-making such as large expenditures and important household investments, are typically managed by men. Likewise, men are traditionally expected to be breadwinners and go to work while women stay at home with the children. Therefore, even when women are legally allowed to study and work if they wish to, the reality is that, especially in small or highly traditional communities, women are still socially expected to be in charge of basic domestic affairs, which inevitably restrict the amount of time they can dedicate to paid work. In fact, only 44.9 per cent of Mexican women in working age are actually employed, this figure being the one of the lowest among the OECD countries, far below the average of 60.1 per cent (OECD, 2017). Although there are several external factors that might be discouraging women from participating in the labour market (such as the low levels of social protection, the lack of affordable child care and the gender pay gap), there still is a considerable proportion of women who do not even get to participate in the decision-making process regarding their own employment status, this matter being decided by other family members[2].

Even though there is already some work on the positive effects of education and employment on women's participation in decision-making, most of them consider general indexes to measure women's power across several aspects of decision-making. Also, women's involvement in decision-making is usually measured in dual variables with only two possible outcomes: participation and non-participation. However, a more comprehensive analysis of this matter should consider the possibility that employment and education might help women participate in some decision-making processes, but

[2] According to data from the Mexican Family Life Survey analysed in Chapter 3, almost 20 per cent of women reported themselves as 'non-participants' in the decision-making process regarding their own employment status.

not others. Also, it is important to take into account the fact that empowering factors such as employment end education may increase women's participation in intrahousehold decision-making but may not necessarily give them enough power to become exclusive decision-makers. Since the desirability of each particular level of power varies depending on the aspect of decision-making being studied, it is important to analyse the effects of employment and education separately for each decision. Therefore, the second empirical chapter of this thesis explores the relationship between women's employment and education on their level of participation on seven different aspects of family life, considering three different levels of decision-making power: non-participation, shared participation and exclusive decision-making. Just as in Chapter 2, the analysis includes fixed effects methodologies in order to control for time-invariant factors influencing women's power, employment status and level of education. Additionally, the study examines how social norms can undermine the positive effect of education and employment on women's intrahousehold decision-making power.

Finally, the third essay in this thesis (Chapter 4) focuses on one particular intrahousehold decision-making process: children's time allocation. Every family, consciously or not, makes choices regarding the way in which children spend their time. Even though there are many different alternative activities children can dedicate their time to, this study focuses on three of them: work, school and housework. Particularly, the analysis aims to examine the role that children's cognitive ability might be playing in the way their time is allocated among these three activities. The study of children's time allocation is especially relevant for the Mexican case, given the alarmingly high participation of children on the labour market. According to data from the National Institute of Statistics and Geography (INEGI, in Spanish) 3.2 million children and adolescents from 5 to 17 years old worked in 2017, representing a child labour rate of 11 per cent (INEGI, 2018). From this group, 7.1 per cent work in unpermitted activities that put at risk their health and development, and 4.7 per cent do unpaid domestic work in inadequate conditions.

The decision to send a child to school (instead of work) can be analysed as an investment, not so different than any other investment a household can make. For each child in any particular household, a decision needs to be made with regards to the use that will be made of their time. If a child goes to work, their time will translate into immediate income that will likely be destined to the household's present consumption. On the other hand, if the child goes to school the household will need to absorb direct and indirect costs associated with the child's school attendance, but this investment will most likely translate into a higher level of income in the future as the child grows to be an educated adult. An important factor to consider when making this decision has to do with the child's endowments, in particular those regarding the child's cognitive ability which will have an effect on their school performance and their future returns to education. If parents follow a reinforcement strategy that maximises the net present value of the household's income as a whole, children with a higher level of cognitive ability will be more likely to be sent to school, whilst children with a low level of cognitive ability will probably be sent to work. However, if parents choose to follow a compensation approach where the goal is to equalise the present value of their children's income, then less able children will be more likely to be sent to school in order to make up for their lack of ability, whilst more able children will be sent to work. Although some research has been already done on the relationship between ability and monetary investments such as school expenditures (Majid, 2012), little has been studied on the effect of ability in children's time allocation, which constitutes a more basic form in which parental willingness to invest can be understood, especially in poor households where the mere decision to send a child to school means a significant sacrifice in terms of present consumption therefore representing a major investment.

Understanding the factors influencing the decision-making process regarding children's time allocation and the particular role that children's cognitive ability plays in it could offer a better sight of the parental incentives behind the decision to send children to school or work and might contribute to the design of more effective policy against child labour. Hence, the third and last empirical chapter in this thesis aims to study this relationship in depth, considering data on children's time allocation, including not only their participation in work or school, but also the number or hours dedicated to each activity. Additionally, the analysis makes use of fixed effects and instrumental variables methodologies in order to control for time-invariant factors and solve possible endogeneity coming from reverse causality issues.

1.2 The Mexican Family Life Survey (MxFLS)

The quantitative analyses for all three essays in this thesis are performed using data from the Mexican Family Life Survey (MxFLS), a publicly available longitudinal survey designed by the Iberoamerican University (UIA, in Spanish) and the Centre for Economic Research and Teaching (CIDE, in Spanish), with the collaboration of the National Institute of Statistics and Geography (INEGI, in Spanish), the National Institute of Public Health (INSP, in Spanish), the University of California, Los Angeles (UCLA) and Duke University. The MxFLS compiles longitudinal information on a wide variety of aspects of family life at both the household and individual level, including socioeconomic and demographic characteristics, decision-making processes, time allocation, health status, anthropometrics and biomarkers as well as measures of cognitive ability. A large sample of households and individuals, which is representative of the Mexican population at the national, urban, rural and regional level, was studied over a 10-year period collecting information in three rounds: MxFLS-1 (2002), MxFLS-2 (2005-2006) and MxFLS-3 (2009-2012). The original sample selected for the first round consisted on a set of 35,000 individuals (8,400 households), 90 per cent of which were relocated and reinterviewed for subsequent rounds[3].

The MxFLS offers some advantages over other Mexican data sets. To begin with, it is the first Mexican survey that gathers two useful features: longitudinality and national representativeness. Given the nature of the research questions addressed in this thesis, having multiple observations per individual and household allows to deepen the analysis and control for time-invariant factors that could be playing a role in the relationships under study (as shown in Chapters 2 to 4). Similarly, working with a nationally representative data set makes the results easier to interpret, more suitable for international parallel analyses and more relevant for policy design.

Furthermore, the MxFLS compiles information on an extensive variety of topics, which makes it possible to extend the scope of the research questions under study and offers extra variables that can be used to strengthen the main analyses. For instance, having information on the anthropometric and socioeconomic status for the same sample

[3] More details on the sample design can be found at the official website of the Mexican Family Life Survey (MxFLS) : http://www.ennvih-mxfls.org/english/introduccion.html

makes it possible to study how the intergenerational transmission of the BMI might differ across different levels of family income (Chapter 2). Likewise, the simultaneous availability of both anthropometric measures and indicators of cognitive ability facilitates the process of finding an appropriate instrumental variable to solve potential endogeneity issues coming from reverse causality (Chapter 4).

Lastly, using the MxFLS has the essential advantage of incorporating data on very specific aspects of family life that are not generally available in other surveys. Information on intrahousehold decision-making, for example, is particularly detailed in this survey since it asks for the opinion of all family members, as opposed to just the head of the household. For each aspect of decision-making (from food choices to contraceptive use), every adult member of the household is asked the same question: 'Who make(s) the decisions?' This feature is particularly important for the purposes of the research question analysed in Chapter 3, since it allows the study to compare the results of using the opinion of different individuals, providing some robustness for those findings that converge into similar conclusions.

1.3 Organisation of contents

The empirical chapters of this thesis are organised in the following three sections (Chapters 2, 3 and 4), each chapter presenting a set of subsections containing a literature review, data description, methodology, discussion of results (including all figures and tables along with the main text) as well as a final subsection for conclusions. Finally, Chapter 5 presents the overall conclusions of this thesis.

1.4 References

Barquera, S., Campos-Nonato, I., Aguilar-Salinas, C., Lopez-Ridaura, R., Arredondo, A., & Rivera-Dommarco, J. (2013). Diabetes in Mexico: costs and management of diabetes and its complications and challenges for health policy. *Globalization and Health*, 2-9.

Casique, I. (2000). Mexican Married Women's Autonomy and Power within the Household. *XXII International Congress of the Latin American Studies Association, LASA.* Miami, Florida.

Dietz, W. H. (1998). Health Consequences of Obesity in Youth: Childhood Predictors of Adult Disease. *Pediatrics*, 518-525.

Hernández-Cordero, S., Cuevas-Nasu, L., Morales-Ruán, M., Méndez-Gómez Humarán, I., Ávila-Arcos, M., & Rivera-Dommarco, J. (2017). Overweight and obesity in Mexican children and adolescents during the last 25 years. *Nutrition & Diabetes*, 1-9.

INEGI. (2018). *3.2 MILLONES DE NIÑOS, NIÑAS Y ADOLESCENTES DE 5 A 17 AÑOS TRABAJAN.* Retrieved from http://www.beta.inegi.org.mx/contenidos/saladeprensa/boletines/2018/EstSociodemo/MdoTrabInf2018_06.pdf

Majid, H. (2012). Parental Decision-Making and Intra-Household Resource Allocation. PhD Dissertation. Ohio State University.

OECD. (2014). *Obesity Update 2014.* Secretary General of the OECD. Obtenido de http://www.oecd.org/els/health-systems/Obesity-Update-2014.pdf

OECD. (2017). *Obesity Update 2017.* Secretary General of the OECD.

OECD. (2017). *The Pursuit of Gender Equality: An Uphill Battle.* Paris: OECD Publishing.

Rodriguez Oreggia, E., & Perez Lizaur, A. B. (2010). Factores de dinámica social asociados al índice de masa corporal en adultos en México. *Estudios Económicos*, 337-362.

Rogers, B. L., & Schlossman, N. P. (1990). The internal dynamics of households: A critical factor n development policy. En *Intra-household resource allocation: Issues and methods for development policy and planning* (págs. 1-19). Tokyo, Japan.: United Nations University Press.

Rtveladze, K., Marsh, T., Barquera , S., Sanchez Romero, L., Levy, D., Melendez, G., . . . Brown, M. (2013). Obesity prevalence in Mexico: impact on health and economic burden. *Public Health Nutrition*, 233-239.

Chapter 2
Intergenerational Transmission of the Body Mass Index (BMI) in Children and Adolescents: A Panel Study.

Abstract

This chapter applies pooled OLS and fixed effects methodologies using panel data from the Mexican Family Life Survey (MxFLS) in order to quantify the intergenerational transmission of the Body Mass Index (BMI). Results suggest a strong correlation between the BMI of fathers and children, which seems to hold even after controlling for genetic predispositions and time-invariant habits, being particularly stronger for families with a high socioeconomic status and for households with a small number of members. On average, children of working mothers tend to experience a higher level of maternal transmission, with respect to children whose mothers do not work. Finally, results show that obese and overweight parents seem to be more prone to transmit their anthropometric status relative to normal weight parents, suggesting the presence of an intergenerational vicious cycle which might be contributing to the high prevalence of this problem.

2.1 Introduction

Parents have an important influence on their children's health. While some parents may transmit healthy genes to their children, others might be passing on defective genes that contain a predisposition for certain illnesses. Similarly, some parents might transmit health-enhancing behaviours whilst others (advisedly or not) may be teaching unhealthy habits to their children that could have repercussions on their health and wellbeing. Since children cannot control what kind of parents they get, having a high level of intergenerational transmission for health outcomes suggests that a child's potential to be healthy in the present and become a healthy adult in the future is not the same for all individuals, which may have adverse consequences in terms of economic equality and social mobility (Dolton & Xiao, 2014). That is, if the intergenerational transmission of health is sufficiently strong there may be a group of people that are condemned to have poor health across generations. Consequently, the analysis of the intergenerational transmission of health outcomes becomes essential in order to design better and more effective public policies that consider these potential disparities among individuals.

In Mexico, most of the problems in terms of child health have to do with nutritional deficiencies, usually associated with conditions such as overweight and obesity. Although some policies have been designed to fight these problems, most of them rely on the external influences that the child might be receiving from outside the household, such as the availability of junk food at school (via legal prohibitions and required standards for the food that is sold there). However, it is quite possible that a great part of a child's obesity problem could be explained by influences provided within the household, specifically by the parents. Although there are a few studies documenting the relationship between the anthropometric situation of parents and children in Mexico, none of them has considered the calculation of actual transmission coefficients for both parents considering the presence of genetic, socioeconomic and behavioural influences[4]. One of the most relevant studies in this matter is the one by Rodriguez Oreggia and Perez Lizaur (2010), in which the authors conclude that having obese individuals as family members makes people more likely to be obese as well. However, their estimation involves a mix of intrahousehold mechanisms and it's hard to tell how much of it is due to parental transmission and how much can be explained by the influence of other relatives. Dolton and Xiao (2014) calculate a mother-child elasticity of transmission using data from urban households in Mexico, however their sample is not representative of the whole population.

The main objective of this paper is to use representative data at national and regional level to quantify how much of a child's anthropometric condition can be explained by the one of each of the parents. Specifically, the study uses panel data from the Mexican Family Life Survey (MxFLS) in 2002, 2005 and 2009 to estimate coefficients of intergenerational transmission of the Body Mass Index (BMI) for children and adolescents between 0 and 19 years old, employing both cross-sectional and fixed effects approaches. Additionally, interaction variables are used in order to find out whether the strength of the parental transmission varies according to the child's age

[4] Socioeconomic influences might include factors such as income and parental education which can potentially determine the household's access to healthy meals and/or parental knowledge on what constitutes a healthy lifestyle. Behavioural influences refer mainly to eating and exercising habits of the parents that could be imitated by children.

and gender, the household socioeconomic status and the parents' anthropometric situation.

Next subsection presents a brief description of the nutritional status of children in Mexico and the importance of child obesity as a public health issue. Subsection 1.2 offers a literature review on the process of intergenerational transmission and their applications on health outcomes and subsection 1.3 explains the objectives of this paper as well as its contribution to the literature. Section 2 describes the data source (Mexican Family Life Survey) as well as some summary statistics for the main variables in the study. Section 3 explains some methodological details, the model used, as well as the estimation strategy. Results are discussed in section 4. Finally, conclusions are presented in section 5.

2.1.1 The Problem of Child Obesity in Mexico.

In 2010, 28 per cent of boys between 5 and 17 years old suffered from overweight or obesity[5], while this figure goes up to 29 per cent for girls (OECD, 2014). According to data from the National Health and Nutrition Survey in 2012 (ENSANUT 2012[6], for its acronym in Spanish) the proportion of children under 5 years old suffering from these problems increased from 7.8 per cent in 1988 to 9.7 per cent in 2012. In 2012, more than 1 in 5 adolescents between 12 and 19 years old had overweight and 1 in 10 suffered from obesity, the prevalence of these problems in adolescents having increased almost trice from 1988 to 2012. In fact, there is evidence suggesting the presence of a statistically significant positive trend on child and adolescent obesity in Mexico during, at least, the last 13 years (Hernández-Cordero, et al., 2017).

Considering that a significant proportion of overweight and obese children and adolescents are likely to become overweight and obese adults (Biro & Wien, 2010; Serdula, et al., 1993), the problem of child obesity is also a matter of concern for policymakers, who will need to ideate a system of social security with the capacity to

[5] The World Health Organization defines overweight and obesity as 'abnormal or excessive fat accumulation that presents a risk to health'. Having a Body Mass Index (BMI) of 30 or higher generally suggests the presence of obesity, while a BMI of 25 or higher indicates the presence of overweight. Please refer to: https://www.who.int/topics/obesity/en/

[6] Encuesta Nacional de Salud y Nutrición, 2012. Data publicly available at: https://ensanut.insp.mx/

support an upcoming group of young adults suffering from diseases that used to affect old people only. Actually, Mexican government has recently recognised the fact that the country is going through a transition process in which obesity and overweight have unusually increased, affecting all sectors of the population independently of their age, geographical location or whether they live in rural or urban zones. In response to this phenomenon, in 2013 the government implemented a national strategy against overweight, obesity and diabetes which seeks to fight these problems via the promotion of healthy habits and lifestyles, the generation of public spaces dedicated to physical activities and the capacitation of health personnel (Latnovic & Rodriguez Cabrera, 2013).

Given the importance of overweight and obesity in the Mexican public health's agenda, it is essential to study the key factors behind their prevalence. This chapter examines the phenomenon of parental transmission of anthropometric outcomes, which is likely to be contributing to the high persistence of these problems. Since the definitions of overweight and obesity are closely related to very specific measures such as weight and height, it is useful to analyze the behavior of an anthropometric outcome whose calculation involves the use of these variables, such as the Body Mass Index (BMI). This concept has been used in several medical and economic research and is now a generalized way to measure and classify the anthropometric status of an individual. The popularity of the BMI as anthropometric measure lies in its simplicity of calculation and the way it can be easily used to determine how much a person's body weight differs from what is desirable and healthy according to their height.

2.2 Literature Review: The Intergenerational Transmission of Anthropometric Outcomes.

A question that has been widely addressed in the literature is: what factors determine whether a child is underweight, overweight or obese? In general terms, the influences affecting a child's anthropometric outcomes can be classified in two categories: those that are purely external and have nothing to do with any parental influence (such as health issues caused by random accidents or the positive effects of a government program aiming to improve the child's level of health and welfare) and those influences attributed to a parent-child transmission (such as genetic factors and the behavioural and socioeconomic environment that the parents provide). Examples of the behavioural and environmental components of the parental transmission are easily found in the literature. Currie and Moretti (2007) use a data set based on California births from infants born between 1989 and 2001 to study the intergenerational transmission of birth weight and find that family income and other indicators of parental socioeconomic status such as educational level may influence the child's health by altering the use of prenatal care and modifying health-damaging behaviours like smoking. Another example has to do with the way parents allocate resources among household members, which might vary according to the cultural background and the nature of the economic incentives faced by the parents. Some households have a stronger preference for their sons over their daughters and may decide to give them a greater portion of food and economic resources. There might also be some level of preference for first-borns over the rest of the offspring (Sen, 1990; Dasgupta, 1993). These biases are a consequence of the parents' economic decisions and will inevitably affect children development. Genetics are also an important component of the transmission mechanism since children's genetic information inevitably comes from their parents and this inherited information might contain certain predispositions for a particular body size, health condition or even for a chronic disease. As a general rule, the estimated coefficients associated with the parental transmission of health outcomes are inevitably a mix of both genetic and behavioural or environmental factors since the transmission process takes place simultaneously in these three dimensions. As suggested by Martin (2008), the biological influences often interact with environmental factors in multiple and complicated ways, therefore trying to quantify separately the components of the parental transmission becomes a hard (if not impossible) task.

The process of intergenerational transmission of anthropometric status has been studied in the context of both developed and developing countries. Akbulut and Kugler (2007) used data from the National Longitudinal Survey of Youth in 1979 (NLSY79) on mothers and children to document the intergenerational transmission of a set of specific health outcomes that included weight, height, BMI, depression and asthma. Under the basic specification they find that 45 per cent of the variation in the child's BMI is explained by the variation in the mother's BMI, while this figure goes up to 58 per cent for children of immigrant mothers. Similarly, in a study for the 1958 British birth cohort, Li et al. (2009) use multilevel models to analyse the intergenerational transmission of obesity and according to their findings, a one standard deviation increase in maternal BMI is associated with an increase in the offspring BMI z score of 0.23. Likewise, Bhalotra and Rawlings (2011) investigated the intergenerational persistence of health from mothers to children in 38 developing countries during the period 1970-2000 and find that a one deviation decrease in maternal BMI is associated with an increase of 10.8 per cent in the risk of low birth weight. Analogous effects can be found in Thompson (2013), where the author uses samples of adopted and biological children from the U.S. National Health Interview Survey for the period 1998-2011 to analyse the intergenerational transmission of health variables such as: self-rated health level, obesity, asthma and diabetes. According to his findings the intergenerational link associated with these health variables is significantly robust, genetics explaining between 20 and 30 per cent of it. However, the process driving the transmission of health status from parents to children has to do not only with biological or genetic influences but also with behavioural and communicative factors. A useful illustration of this is given by Rimal (2003) who used structural equation models and data from the Stanford Five-City Project, which collected independent cross-sectional data waves in 1979, 1981, 1983, 1985, and 1989, to document the dependency of adult and child eating behaviours on self-efficacy (defined as an individual's ability to exert control over specific behaviours), knowledge and communication between adults and children. According to his results, adults' dietary behaviour along with the children's use of health information, knowledge and self-efficacy explain 48 per cent of the variance in children's dietary behaviour.

There is additional evidence suggesting that the strength of the parental transmission differs significantly across the distribution of income. Using data on individual birth records from California, U.S., Currie and Moretti (2007) found a strong maternal transmission of low birth weight, which seems to be stronger among poor households. Specifically, they find that children who were born in poverty are 0.040 percentage points more likely to have low birth weight if their mothers had low birth weight; whilst this estimate is 0.022 for non-poor households. Likewise, Bhalotra and Rawlings (2013) used a set of 38 developing countries to estimate the sensitivity of the intergenerational transmission of health to different socioeconomic variables.

According to their results, children who were conceived or born in places facing adverse socioeconomic conditions are more likely to suffer from maternal transmission of low height. Specifically, the authors find that a one standard deviation growth in the log of the GDP per capita is associated with a decrease in the intergenerational persistence of 29.6 per cent. This result is reasonable since richer countries usually have good public health services that can counteract the intergenerational effect for children of mothers with poor health.

The size of the intergenerational persistence of anthropometric outcomes also depends on the level of the anthropometric outcome itself. Using the U.S. National Longitudinal Survey of Youth 1979 (NLSY79) and the Children and Young Adults of the NLSY79, Classen (2010) has estimated an intergenerational correlation of the BMI (between women and their children) equal to 0.35 (namely, an intergenerational elasticity of 0.42)[7]. Nevertheless, this figure is not constant across the sample and the author uses quantile regression to document that this intergenerational persistence becomes higher at greater levels of the child´s BMI. For the full sample, for instance, the intergenerational elasticity is 0.27 for those children in the 10^{th} per centile of the BMI distribution, and this figure gradually grows for higher levels of the child´s BMI, reaching 0.58 for children in the 90th quantile.

Some researchers have raised the question of whether the mother's and the father's health outcomes are equally important in the determination of the children's situation. Whitaker, et al. (2010) used pooled data for English families between 2001 and 2006 to quantify the individual and joint effects of maternal and paternal overweight and obesity risk in children. The authors found that the mother-child associations for the BMI were significantly stronger than the father-child associations, independently of the child's gender (correlations of 0.27 for mothers and 0.23 for fathers, even after adjusting for undisclosed non-paternity[8]). Finally, in a study for intergenerational correlations of height using data from Vietnam in 1993, Venkataramani (2011) found that there are strong parental associations that are robust to the inclusion of household and parental characteristics (from the general specification the author finds

[7] The author explains that in this case the correlation is lower than the elasticity because the standard deviation of maternal BMI is lower than that of their children.

[8] The authors recognise that "undeclared non-paternity can result in an underestimate of the observed difference between maternal and paternal associations". Consequently, they use sensitivity analyses to take this possibility into account.

that one standard deviation increase in parental height is associated with between 0.18 and 0.20 standard deviation increase in child height z-scores). Also, the maternal relationship seems to be approximately 60 per cent higher for boys than for girls, the difference being significant at the 10 per cent level. Then, when the author uses the conditions faced by parents in early life as instruments for the parents' heights, he gets an even larger mother-child association, whilst the father-child link almost disappears. In contrast, Dolton and Xiao (2015) use data from the China Health and Nutrition Survey (CHNS) covering the period 1989-2009 and find that the size of the father-child association in BMI is slightly larger than in the case of the mothers for almost all OLS and fixed effects specifications.

2.2.1 The use of panel data in the study of the intergenerational transmission of BMI

Although most of the studies in the intergenerational transmission literature have used cross sectional data, having one single observation for parents and children in a specific point of time may arise some difficulties in the analysis of this relationship. First of all, even when a study accounts for an exhaustive set of controls, there is always a possibility that some unobserved factors might be influencing both the anthropometric measures of parents and children. This unobserved heterogeneity may be caused either by individual intrinsic factors (such as genetic conditions) or by household specific characteristics that are not usually observed (for example family habits or decision-making processes inside the household). Usually, when using cross sectional data the solution to the endogeneity problem is to use instrumental variables, however it is hard to find appropriate instruments that don't compromise the credibility of the analysis (Garcia & Quintana-Domeque, 2007).

In an attempt to overcome these problems, some studies have chosen to use data sets with a panel structure. Dolton and Xiao (2015) use the CHNS data base from 1989 to 2009 to document the intergenerational transmission of the BMI in China. In their study, the authors recognize the presence of unobservable heterogeneity at both individual and household level and follow a fixed effects methodology to deal with potential endogeneity coming from these unobserved factors. Under the OLS specification they find that one standard deviation increase in the father's BMI z-score is associated with an increase of 0.223 in the child's BMI *z*-score, whilst this figure is 0.208 for the case of the mother. When using individual fixed effects, these estimates go down to 0.151 and 0.160 respectively, whilst both converge to 0.152 when applying household fixed effects. Brown and Roberts (2012) use the British Household Panel Survey from 2004 to 2006 to carry out a decomposition analysis of the intergenerational correlation in the BMI of mothers and their adolescent children. However, instead of using a simple Ordinary Least Squares (OLS) approach they follow a Restricted Maximum Likelihood (REML) methodology that takes into account the individual and household fixed effects. Then, the intergenerational correlation is defined as "the fraction of the overall variance in BMI that stems from shared family background characteristics". In other words, the authors define the intergenerational correlation as the result of dividing the variance that is due to differences between families by the total variance in BMI. For this analysis the authors estimate an intergenerational correlation of 0.25. Once this figure is calculated, the authors monitor the change in this variable when socioeconomic variables are gradually added to the analysis in order to measure their contribution to the intergenerational correlation. In general, all the observable factors included in the decomposition analysis such as maternal characteristics and adolescent's behaviour account for 11.2 percent of the intergenerational correlation.

Using panel data can also help to clean the estimation from measurement errors. Classen (2010) for instance, uses longitudinal data for mothers and adolescents when they are both between 16 and 24 years old to analyse the intergenerational transmission elasticity of BMI, which is estimated to be 0.42 for the full sample. In this case, the author averages all the available observations for each individual across time and uses these averages to estimate his model. The author explains that this kind of approach helps him to mitigate possible bias from measurement error due to temporal variation in the anthropometric outcome. One disadvantage of this kind of approach is that by averaging observations a considerable portion of information is lost in terms of year-to-year variations that could help us to get better estimates of the intergenerational link.

Some other studies only have access to panel data for one of the generations. This is the case of the work by Castelnovo (2014) who calculates an estimate of the intergenerational elasticity of BMI using the British Cohort Study of 1970. Although the author has access to information on the children for three different years (when they are 10, 16 and 34 years old, taken from the 1980, 1986 and 2004 survey, respectively) he only has information in one point of the time for the parents of this specific cohort (1980 survey). Even though this amount of data might be good enough to calculate the persistence of the intergenerational transmission elasticity, the endogeneity problems caused by unobserved heterogeneity arise again, just as in the case of cross-sectional data. The author recognizes this difficulty and dedicates a whole separate section of his analysis to explore possible sources of endogeneity coming from the parental education variable. In this case, the author decides that the best way to overcome these issues is by applying instrumental variables. However, since he does not have access to appropriate instruments for parental education, he follows an alternative methodology known as "the Lewbel approach", a special variation of the traditional instrumental variables methodology. According to his results, the maternal intergenerational elasticity varies (depending on the specification) from 0.09 to 0.25 for male children and from 0.11 to 0.38 for females; whilst the paternal elasticity varies from 0.08 to 0.23 and from 0.13 to 0.35, respectively.

2.2.2 The Intergenerational Transmission of Health and Anthropometric Outcomes in Mexico.

The existence of a family transmission process for health and anthropometric outcomes has been also documented for the Mexican case, yet literature in this matter is not very abundant. Rodriguez Oreggia and Perez Lizaur (2010) used the 2002 and 2005 waves of the Mexican Family Life Survey to analyse the factors of social dynamics associated with the determination of BMI in adults. According to their results, those individuals living in households with a high incidence of overweight and obesity among their family members are more likely to be overweight and obese, relative to people living in households whose members have a normal weight. Specifically, having a higher obesity index within the household is associated with an increase in the male individuals' BMI of 3.94 to 6.79 per cent (depending on the model specification) and these figures are similar for the female individuals (around 3.5 to 6.5 per cent). The authors conclude that the family environment is an important determinant of the BMI outcomes, yet they recognise the fact that this relationship might also be influenced by genetic factors.

Some other studies have attempted to find a more direct relationship between parents and children. As part of a study of the intergenerational transmission of adiposity across six countries, Dolton and Xiao (2014) analyse the elasticity of transmission between Mexican mothers and their children using panel data from the Survey for the Evaluation of Urban Households (ENCELURB) for three years: 2002, 2004 and 2009. They estimate a mother-child BMI elasticity of 0.112, once the analysis controls for the child's age and gender, though these results might not be representative of the whole population since rural households are omitted from the estimation. Also, since the father's anthropometric information is not available in the survey, it is quite possible that the estimation of the mother-child elasticity is slightly biased due to the presence of assortative mating.

Another branch of literature has focused on the identification and analysis of risk factors that may enhance the presence of overweight and obesity on children, considering the presence of obesity in the parents as one of these factors. Shamah-Levy, et al. (n.d.) used a sample of 60 elementary public schools to analyse the relationship between Mexican school-age children obesity and the BMI of their parents. According to their results, there is a close relationship between the weight status of the parents and the anthropometric measures of child. Specifically, they find that more than 80 per cent of children with obesity or overweight problems had parents that were also obese or overweight. Similarly, Klünder- Klünder, et al. (2011) carried out a study of treatments and controls in 9 primary schools in Mexico City and calculated the risk for a child to have obesity problems using the nutritional situation of the parents as explanatory variable. They find that the odds ratio of a child being obese when the father is overweight is 3.9 whilst this figure goes up to 12.1 when the father is obese. For the mothers these estimates are 4.5 and 6.5, respectively. These results make them conclude that there is indeed a close relationship between the anthropometric outcomes of mothers and children.

This chapter will attempt to study the intergenerational transmission of BMI from parents to children using panel data from the Mexican Family Life Survey (MxFLS) in 2002, 2005 and 2009. The main objectives are to calculate an estimate of the parental transmission of BMI for both parents and their children and to investigate the sensitivity of the parent-child correlation to the child´s characteristics, the household socioeconomic level and the anthropometric status of the parents. The study of the intergenerational transmission of BMI presented in this document will contribute to the existing literature in the following ways. Unlike Rodriguez Oreggia and Perez Lizaur (2010), the main focus here is to measure the parent-child anthropometric relationship in a detailed way, rather than study the general effect of having adult family members suffering from obesity on the individual's BMI, an effect that could be due to a number of different relationships. In other words, when a correlation in BMI is observed among adult household members it is possible that this relationship could be driven by links between parents and children, within siblings, or between spouses, so it is hard to isolate and make inferences about the specific nature of the parental transmission. Also, this study analyses the parent-child relationship for children and adolescents between 0 and 19 years old, unlike Rodriguez Oreggia and Perez Lizaur who only take into account adult members of the household.

This study also differs from the analysis for the Mexican case carried out by Dolton and Xiao (2014) since it uses data from a representative sample at the national level, which includes both rural and urban households compiling anthropometric information for both parents.

Although the methodology used in the study of the Chinese case performed by Dolton and Xiao (2015) is followed here as reference, this analysis departs slightly from the one they did. Once they estimated the intergenerational correlation, they use quantile regression to estimate whether the strength of the transmission is different across the distribution of the child´s BMI. They find that the parental link tends to be higher for children with high BMI z-scores, from which they conclude that obese and overweight children are more likely to have inherited their condition from their parents. In this paper this outcome is studied from a different perspective. Since the causality naturally goes from parents to children, the question is whether the fact that a father or mother has a certain anthropometric status, such as obesity and overweight, makes him or her more prone to transmit his or her own condition. For this purpose, the analysis includes interaction terms indicating the anthropometric condition of each parent.

2.3 Sample

This study uses all three available waves from the Mexican Family Life Survey (MxFLS), a longitudinal database that covers a wide variety of topics on socioeconomic, demographic and health indicators and that is representative at the national, urban, rural and regional level. The original sample chosen for the first round consisted on a set of 35,000 individuals (8,400 households), 90 per cent of which were relocated and reinterviewed for subsequent rounds. It is important to keep in mind that, for the purposes of the Mexican Family Life Survey, a household consists of a group of individuals (related or unrelated) that share a living space and usually consume meals prepared on the same stove/oven, so it may contain both nuclear or extended families.

Table 2.0 (a): Number of children per household, by wave(year).

Number of children per household	Year						
	2002	**%**	**2005**	**%**	**2009**	**%**	**Total**
1	977	34.76	672	35.28	715	36.29	2,364
2	979	34.83	632	33.18	665	33.76	2,276
3	542	19.28	403	21.15	397	20.15	1,342
4	196	6.97	126	6.61	115	5.84	437
5	72	2.56	47	2.47	52	2.64	171
6	31	1.10	17	0.89	19	0.96	67
7	8	0.28	3	0.16	1	0.05	12
8	5	0.18	5	0.26	5	0.25	15
9	1	0.04	0	0.00	1	0.05	2
Total of households	2,811		1,905		1,970		**6686**
Total of children	5996		4047		4126		**14169**

Note: MxFLS 2002,2005-2006, and 2009-2012.

Table 2.0 (b): Number of nuclear families (number of mother-father pairs) per household, per wave(year)

Number of nuclear families per household	Year						
	2002	**%**	2005	**%**	2009	**%**	**Total**
1	2,782	98.97	1,883	98.85	1,917	97.31	6,582
2	29	1.03	19	1.00	48	2.44	96
3	0	0	3	0.16	3	0.15	6
4	0	0	0	0	2	0.10	2
Total of households	2,811		1,905		1,970		**6686**
Total of nuclear families	2,840		1,930		2,030		**6800**

Note: MxFLS 2002,2005-2006, and 2009-2012.

Table 2.0(c): Number of children per nuclear family, per wave(year).

Number of children per nuclear family	Year						
	2002	%	2005	%	2009	%	**Total**
1	1,019	35.88	701	36.32	786	38.72	2,506
2	977	34.40	641	33.21	672	33.10	2,290
3	533	18.77	394	20.41	388	19.11	1,315
4	195	6.87	123	6.37	114	5.62	432
5	73	2.57	47	2.44	50	2.46	170
6	29	1.02	17	0.88	17	0.84	63
7	8	0.28	3	0.16	0	0.00	11
8	5	0.18	4	0.21	3	0.15	12
9	1	0.04	0	0.00	0	0.00	1
Total of nuclear families	2,840		1,930		2,030		**6,800**
Total of children	5996		4047		4126		**14169**

Note: MxFLS 2002,2005-2006, and 2009-2012.

For the purposes of this research, the sample has been restricted to contain only children and adolescents between the ages of 0 and 19 that have complete anthropometric and biological information (i.e. weight, height, age and gender) so a BMI measure could be calculated for them. After cleaning the data set from biologically implausible outliers[9] and working under a pooled cross-section framework there is a total of 14,169 child-mother-father sets, across 6686 households. Table 2.0(a) shows that most of the households included in this sample only contain a small number of children, with almost 90 per cent of them having between one and three children. Also, as shown in Table 2.0 (b), most of the households in this sample consist of one nuclear family, with around 99 per cent of the households having only one mother-father pair (in this case, the 6686 households included in the sample represent a total of 6800 nuclear families). Consequently, the distribution of the number of children per household and the number of children per nuclear family is actually very similar (Table 2.0(c)). Finally, almost 70 per cent of the individuals appear at least twice in the panel, that is, they have anthropometric information for two years (See Tables A1 and A2 in Appendix A). Having repeated observations for a single individual is an important advantage since it provides additional information that might be useful to clean the

[9] According to the WHO, only BMI values whose z-scores are between -5 and 5 should be considered as biologically plausible, so these criteria are used for children and parents. Also, the sample has dropped those observations of children for whom gender is not registered to be constant over time and whose parents were reported to be outside reproductive age at the time of the child's birth.

analysis from unobserved heterogeneity that could be affecting the estimation of the parental transmission.

Instead of analysing children's BMI itself the study uses a z-score of the BMI, which considers how far or close is an individual's BMI from the mean in a reference population. Thus, a very high and positive z-score would indicate that a person's BMI is much higher than the mean in the reference population, suggesting that the person is very likely to be at high risk of overweight or obesity. As in Dolton and Xiao (2015), the analysis considers two sets of reference populations: the 2006 WHO Growth Standards for children aged between 0 and 5 years and the 2007 WHO Reference group for children and adolescents between the ages of 6 and 19. The 2006 WHO reference population uses data collected from Brazil, Ghana, India, Norway, Oman and the US; whilst the 2007 WHO standards are based in a sample of children from the state of Ohio in the United States. The conversion from BMI values to z-scores for children and adolescents aged 0 to 19 can be easily computed by running a simple software routine designed by the WHO[10]. Since the body size and complexion of an individual is not expected to change dramatically from late adolescence to maturity, using this conversion also for the parents becomes convenient and acceptable enough for the purposes of this study[11]. Table 2.1 shows the proportion of individuals in the sample that are classified as obese, overweight, normal weight or wasted according to the WHO standards[12]. As expected, the distributions of the BMI z-scores for parents and children are positively skewed, meaning that in general, people in this sample tend to be heavier than their reference populations. In fact, more than 30 per cent of children can be classified as having some degree of overweight, while this number goes up to almost 70 and 74 per cent for fathers and mothers, respectively.

[10] The Stata routines can be downloaded from http://www.who.int/childgrowth/software/en/ (for children aged 0 to 5 years) and http://www.who.int/growthref/tools/en/ (for children and adolescents between 5 and 19 years old).
[11] Also following the procedure carried out in Dolton and Xiao (2015), parents whose age is over 19 are treated as if they were exactly 19 years old, in order to calculate the z-scores.
[12] The document explaining this classification can be found at:
http://www.who.int/childgrowth/training/module_c_interpreting_indicators.pdf

Table 2.1: Anthropometric classification, z-scores.

		Mother		Father		Child	
WHO classification for z-scores	*z-score range*	**Obs.**	**%**	**Obs**	**%**	**Obs**	**%**
Obese	$z > 3$	1,227	8.66	584	4.12	332	2.34
Overweight	$3 \geq z > 2$	4,223	29.80	3,432	24.22	1,456	10.28
Possible risk of overweight	$2 \geq z > 1$	5,135	36.24	5,883	41.52	3,056	21.57
Normal weight	$1 \geq z \geq -2$	3,557	25.10	4,211	29.72	9,075	64.05
Wasted (malnourished)	$-2 > z \geq -3$	22	0.16	35	0.25	181	1.28
Severely wasted (malnourished)	$z < -3$	5	0.04	24	0.17	69	0.49

Note: MxFLS 2002,2005-2006, and 2009-2012.

2.4 Methodology

2.4.1 The Use of BMI *z*-scores in the Measurement of Parental Transmission.

The Body Mass Index (BMI) is a measure that has been traditionally used to determine whether a person's weight is healthy or normal, according to their height. This measure is calculated as follows:

$$BMI = \left[\frac{weight(kg)}{height^2(cm)}\right] * 10{,}000 \qquad (2.1)$$

The main objective of this paper is to quantify the parental transmission of the BMI in children and adolescents. However, simply regressing the BMI of the child on the parents' BMI is not likely to give us accurate estimations. First of all, since small children are still growing up, the BMI that is healthy or normal is not going to be the same for individuals of all ages. Similarly, as the growing process is different for boys and girls, it is not advisable to directly compare their BMI nor pool them all together in the analysis. Consequently, it is necessary to find a standardized measure that captures how low or high the child's BMI is, regardless of their age or gender. In this case, the analysis uses the *z*-score of the child's BMI with respect to a reference population of the same age and sex. The *z*-scores are calculated as indicated in equation (2.2):

$$z_i = \left[\frac{BMI_i - BMIR^*}{\sigma_{BMIR}}\right] \tag{2.2}$$

Where BMI_i represents the child's BMI while $BMIR^*$ and σ_{BMIR} are respectively the mean value and the standard deviation of the BMI in their correspondent reference population, which can be found in the 2006 or 2007 WHO sets of reference groups depending on the child's age.

2.4.2 Model and Estimation Strategy

The next step is to specify a model that formalizes the parent-child association of anthropometric outcomes, in this case the BMI. The baseline model is shown in equation (2.3)[13].

$$y_{ijt} = \beta_0 + \beta_1 m_{ijt} + \beta_2 f_{ijt} + \gamma c_{ijt} + \partial r_{ijt} + \varphi x_{ijt} + \theta w_{ijt} + u_{ijt} \tag{2.3}$$

Where y_{ijt} indicates the BMI z-score of the child "i" from household "j" in wave "t", m_{ijt} and f_{ijt} represent the BMI z-scores for the child's mother and father, respectively, also in wave t[14]. Therefore, β_1 and β_2 represent how much of the variation in the child's BMI z-score can be explained by the variation in the BMI z-score of the mother and father, respectively. The term c_{ijt} represents a vector of basic controls including the child's age and gender, an interaction term between the child's age and gender, the age of both parents as well as the squared age of the child, mother and father. The reader should keep in mind that the z-scores already consider the position of the child's anthropometric levels relative to a selected sample of children of the same age and

[13] Our baseline model keeps the essence from the one used in Dolton and Xiao (2015) for the Chinese case, though some small details have been modified.

gender, thus these measures do not have to be cleaned out to consider any gender or age effects. However, it is possible that the relative position of a child in the distribution of BMI of their reference group itself could be related to the child's age and gender. For example, there could be a parental preference for male children for cultural and traditional reasons, which could be affecting the amount and quality of food they get in comparison with female children. Or it could be the case that parents have a greater preference for babies and small children over adolescents. In order to consider this possibility, the model includes the child's age and its squared term, as well as their gender and its interaction term with age. Nonetheless, even after the estimation controls for age and gender, there could be an additional source of endogeneity coming from the fact that the z-scores are computed using two different sets of reference populations composed of samples extracted from different countries (United States for the 2007 WHO reference and a mix of developing and developed countries for the 2006 WHO standards), one should consider the possibility that children's overweight could be "accentuated" under one of the specifications. For example, it could be the case that all children whose z-scores were calculated under the WHO 2007 standards might tend to have greater measures of their z-scores just because the standard deviations of the reference samples are lower than the ones used to calculate the z-scores under the WHO 2006 standards, which is very likely as the latter uses a wide sample of children from six different countries. In order to make sure this possibility is accounted for, the estimation includes a dummy variable, r_{ijt}, to indicate whether the z-score of any particular child was calculated under the WHO 2007 standards, as opposed to the 2006 reference. Finally, the model should acknowledge the fact that the anthropometric condition of a child or teenager could also be a function of the availability of resources in the household and other family characteristics. For this reason, the estimation includes vector x_{ijt} which represents a set of variables describing the socioeconomic status and general characteristics of the child's family such as the level of household income, the number of bedrooms per capita in the house, the father's occupation, the mother's last level of education and the total size of the household. The last vector in the model w_{ijt} , represents a set of time and region dummy variables as well as their interaction terms, which are aimed to capture any trends in the children's anthropometric condition and any other transitory circumstances taking place in certain regions of the country that could have affected the anthropometric outcome of children living there.

What the transmission coefficients in equation (2.3) tell is the extent to which the BMI of the child is associated with the one of the parents. However, these estimates include a mix of genetic, behavioural and environmental factors that are transmitted or shared by the family and do not provide any information about the specific causality or mechanism that is driving this correlation (Dolton & Xiao, 2015). Fortunately, it is possible to partial out the time-invariant components of the parental transmission by using a household-specific intercept in equation (2.4), say β_j, which will capture all the behavioural and environmental factors that are common to all the members of the household "j" but remain constant over time, such as general food preferences, relative decision-making power of each member of the household, or special preference for certain child in the allocation of resources, as suggested by Dolton and Xiao (2015), following the ideas of Qian (2008) and Dasgupta (1993). This household fixed effects term also captures the social environment to which all family members are exposed and that could be affecting their weight status[15]. An example of this kind of influence is given by the "factors of social dynamics" studied by Rodriguez Oreggia and Perez Lizaur (2010) who argue that having a large number of obese people living in the household has an obesity-enhancing effect on the rest of the members via social interactions, independently of their kinship. Then, as long as the strength of these interactions is relatively stable over time their effect will be included in the β_j term.

$$y_{ijt} = \beta_j + \beta_1 m_{ijt} + \beta_2 f_{ijt} + \gamma c_{ijt} + \partial r_{ijt} + \varphi x_{ijt} + \theta w_{ijt} + u_{ijt} \tag{2.4}$$

Additionally, it is possible to isolate the genetic component of the parental transmission by performing a fixed effects regression at the individual level. By substituting β_j by β_i in equation (2.4) it is possible to estimate how much of the variation on the child's BMI can be explained by the variation on the parents' BMI, independently of the effect of

[15] The reader should keep in mind that a household one or more nuclear or extended families, but also unrelated families or unrelated individuals belonging to different families (house-sharing). In strict terms, the household fixed effects would control for all those factors that are common to all the individuals living in that particular household. Even when members of unrelated families might not share common eating or exercising habits, the household fixed effects would still control for factors such as location of the house, availability of fast food in the area, exercising facilities nearby, etc.

genetics and any other non-shared habits and behaviours that could be affecting the child's anthropometric condition. Finally, the baseline model described by equation (2.3) is used in order to measure how the size of the parental transmission differs across the distribution of to: i) the child's age and gender, ii) socioeconomic characteristics of the household and iii) the level of the parental BMI, the latter being particularly useful to identify the presence of intergenerational vicious cycles of unhealthy BMI outcomes.

2.5 Results

This section presents the results of estimating a measure for the parental transmission using equation (2.3) and (2.4). The first subsection discusses the results of estimating the parental correlation using Ordinary Least Squares (OLS) regressions which include all the genetic, environmental and behavioural factors involved in the transmission process. Next, subsection 2.5.2 presents the results of estimating a fixed effects model at the household and individual level, where all time-invariant factors which are intrinsic to each household and individual are held constant. Finally, subsection 2.5.3 discusses the results of adding interaction terms to the estimation in order to consider possible variations in the size of the transmission across the distribution of the child's age and gender, the household's socioeconomic characteristics and the level of BMI of the parents.

2.5.1 Pooled Ordinary Least Squares Estimation (OLS)

Table 2.2 shows the pooled Ordinary Least Squares (OLS) results of estimating equation (2.3). Departing from a very simplistic specification in which the child's BMI z-score is exclusively explained by the parents' BMI z-scores, the analysis estimates an intergenerational correlation of 0.231 for the mother and 0.211 for the father (column (3)), both being significant at 1 per cent. This means that one standard deviation increase in the mother's BMI is associated with an increase of 0.231 standard deviations in the child's BMI. Similarly, one standard deviation increase in the father's

BMI is associated with an increase of 0.211 standard deviations in the child's BMI[16]. Since both transmission coefficients increase when they are considered separately in the model (columns (1) and (2)), it is reasonable to assume that there is some level of correlation between the mother's and the father's BMI status, so the mother's influence on the child's BMI is somehow "absorbed" in the father's transmission coefficient when the mother is omitted from the equation, and vice versa. Consequently, a model that attempts to estimate a coefficient of parental transmission considering only one of the parents at a time is very likely to be biased upwards.

In columns (4) and (5) the estimations introduce the child's age and gender as additional explanatory variables. As mentioned before, even though the z-scores are free from any gender or age affect, it is important to include such variables in the estimation to recognise the fact that the relative position of a child's BMI in the distribution of the reference population could be correlated with the child's age or gender. Results show that children's BMI z-scores tend to decline with age, suggesting that, on average, obesity might be a graver problem for small children that it is for adolescents. Also, the coefficient associated with male children is positive and significant under any of the specifications, meaning that, on average, boys in this sample tend to be heavier than girls. However, the negative sign of the interaction term for age and gender introduced in column (5) suggests that the gender gap tends to shrink as the individuals grow up. Since the z-scores already account for the biological differences between boys and girls, this could mean that there might be a certain preference for boys over girls in terms of food allocation, which tends to disappear as children get more autonomy over the amount and kind of meals they eat.

From columns (6) to (10), an additional set of variables is included to control for the parents' age. This allows the estimation to account for any correlation between the child's anthropometric situation and the parents' age, which could be a problem if parents of certain age group also tend to have a BMI z-score that is higher or lower than the rest. Results suggest that, on average, children of older parents tend to be leaner, a result that is especially significant for the case of the father. The small size and lack of significance of the quadratic terms associated with parental age in most of

[16] This interpretation applies only in this particular context, since both variables (dependent and explanatory) are z-scores, and therefore have a standard deviation of 1.

the specifications suggest that the relationship between the parents' age and the child's BMI might be in fact linear. Before any other set of socioeconomic controls is introduced (column (6)), results show that including the parents' age and their quadratic terms has a boosting effect on both transmission elasticities, though this influence is slightly higher for the mother (whose estimated coefficient goes from 0.240 to 0.245).

Next, the estimation adds a set of controls attempting to capture the household's socioeconomic situation using specific characteristics such as: the classification of the household's level of income (measured as a dummy variable indicating the quantile classification), number of people living in the household, number of bedrooms per capita, as well as the classification of the father's occupation and the mother's educational level (column (7)). In column (8) the household's characteristics are kept in the estimation while also including a set of region-time interactions to consider possible events or external influences that happened in a specific region in certain year which could have had an effect on children's anthropometric measures.

Table 2.2 . Baseline model, pooled OLS estimation.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
BMI z-score mother	0.266***		0.231***	0.240***	0.240***	0.245***	0.252***	0.252***
	(0.014)		(0.014)	(0.014)	(0.014)	(0.014)	(0.015)	(0.015)
BMI z-score father		0.252***	0.211***	0.214***	0.214***	0.212***	0.212***	0.210***
		(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.016)	(0.016)
Child's gender: Male				0.055**	0.173***	0.175***	0.178***	0.179***
				(0.025)	(0.050)	(0.050)	(0.055)	(0.055)
Child´s age				-0.026***	-0.006	0.000	-0.003	-0.003
				(0.003)	(0.015)	(0.015)	(0.017)	(0.017)
Child's age squared					-0.001	-0.001	-0.001	-0.001
					(0.001)	(0.001)	(0.001)	(0.001)
Gender (Male)*age					-0.011***	-0.011***	-0.011**	-0.011**
					(0.004)	(0.004)	(0.005)	(0.005)
Mother´s age						-0.001	-0.001	-0.001
						(0.003)	(0.003)	(0.003)
Father´s age						-0.006**	-0.007**	-0.007**
						(0.003)	(0.003)	(0.003)
WHO 2007 Reference	0.106***	0.139***	0.071**	0.313***	0.271***	0.273***	0.325***	0.326***
	(0.028)	(0.028)	(0.028)	(0.037)	(0.053)	(0.053)	(0.059)	(0.058)
Constant	0.034	0.091***	-0.182***	-0.142***	-0.241***	-0.045	0.007	0.009
	(0.032)	(0.031)	(0.035)	(0.038)	(0.062)	(0.088)	(0.338)	(0.335)
Household socioeconomic level							Y	Y
Region*time interactions								Y
R-squared	0.057	0.048	0.087	0.092	0.093	0.095	0.108	0.110
N. of cases	14169	14169	14169	14169	14169	14166	11065	11065
Clusters (Households)	3928	3928	3928	3928	3928	3928	3284	3284

Note: MxFLS 2002,2005-2006, and 2009-2012. The stars in the estimated coefficients indicate their significance (*** p<0.01, ** p<0.05, * p<0.10), clustered standard errors by household in parenthesis. Household socioeconomic level includes the quantile of the household's income, size of the household, bedrooms per capita, father's occupation and mother's level of education.

Figure 2.1. Map of Regions in Mexico (following the classification used by the Bank of Mexico for its Quarterly Reports of Regional Economies).

Once the household's characteristics are included in column (7), results show that both parental correlations adjust slightly and remain almost unchanged as the rest of the controls are added. Finally, taking the complete specification represented in column (10) as reference, the regression analysis estimates a maternal and paternal transmission coefficient of 0.252 and 0.210, respectively. This result indicates that a mother's BMI outcome that is one standard deviation above her reference mean is associated with her child's BMI being 0.252 standard deviations above its reference mean, assuming the rest of the variables in the model are held constant. Analogously, a father's BMI measure that is one standard deviation higher than his reference mean is associated with a child whose BMI is 0.210 standard deviations higher than his or her reference mean, assuming that the rest of the controls remain constant.

2.5.2 Fixed Effects Estimates

The parental correlation estimated in the previous section comprises a mix of different transmission mechanisms including genetic factors, learned behaviour and shared environment. Given the longitudinal nature of the data it is possible to isolate some of these mechanisms by following a fixed effects approach. In this section, household and individual fixed effects methodologies are employed in order to partial out any time-invariant factors influencing the children's anthropometric condition.

Table 2.3. Intergenerational transmission of the BMI, fixed effects estimation.

	(a) Household Fixed Effects			(b) Individual Fixed Effects		
	(1)	(2)	(3)	(4)	(5)	(6)
BMI z-score mother	0.060**	0.046	0.045	0.049	0.042	0.035
	(0.029)	(0.039)	(0.040)	(0.033)	(0.041)	(0.041)
BMI z-score father	0.065**	0.072**	0.075**	0.092***	0.088**	0.099***
	(0.028)	(0.036)	(0.035)	(0.032)	(0.039)	(0.038)
Child's gender: Male	0.136**	0.110*	0.115*			
	(0.054)	(0.061)	(0.061)			
Child´s age	0.013	0.011	0.012	-0.021	-0.041	-0.104***
	(0.016)	(0.019)	(0.019)	(0.024)	(0.029)	(0.034)
Child's age squared	-0.001*	-0.001*	-0.001*	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Gender (Male)*age	-0.010**	-0.007	-0.008	0.001	0.004	0.004
	(0.004)	(0.005)	(0.005)	(0.006)	(0.007)	(0.007)
Mother´s age	0.019***	0.017**	-0.033	0.032**	0.032*	0.011
	(0.007)	(0.009)	(0.039)	(0.013)	(0.018)	(0.042)
Father´s age	-0.011*	-0.013	0.020	0.004	0.002	-0.021
	(0.006)	(0.008)	(0.032)	(0.009)	(0.011)	(0.037)
WHO 2007 reference	0.290***	0.334***	0.337***	0.357***	0.484***	0.485***
	(0.053)	(0.060)	(0.060)	(0.066)	(0.078)	(0.078)
Constant	-0.091	0.131	0.409	-0.907**	0.040	2.461**
	(0.134)	(0.317)	(0.558)	(0.414)	(0.595)	(0.994)
Household socioeconomic level		Y	Y		Y	Y
Region*time interactions			Y			Y
R-squared	0.016	0.019	0.023	0.039	0.051	0.061
N. of cases	14166	11065	11065	14166	11065	11065
N. of groups	3928	3284	3284	9124	7459	7459
Clusters (Households)	3928	3284	3284	3928	3284	3284

Note: MxFLS 2002,2005-2006, and 2009-2012. The stars in the estimated coefficients indicate their significance (*** p<0.01, ** p<0.05, * p<0.10), clustered standard errors by household in parenthesis. Household socioeconomic level includes the quantile of the household's income, size of the household, bedrooms per capita, father's occupation and mother's level of education.

Household Fixed Effects

In this subsection the main objective is to partial out any time-invariant factors that are common to all the individuals living in the same household. Examples of this kind of influences are sleeping and eating habits, traditions, cultural factors as well as any specific preferences regarding the allocation of resources within the household[17]. For this purpose, the estimation follows the model represented by equation (2.4).

Panel (a) in Table 2.3 shows the results from following this procedure. According to the estimates shown in column (1), once household fixed effects methodologies are applied, the mother-child and the father-child transmission coefficients are estimated to be 0.067 and 0.070, respectively. Since the estimation is controlling for time-invariant influences that are common to all members of the household, such as general preferences, cultural factors, strength of social interactions inside the home, and even shared genetic predispositions, it is still not surprising that the sizes of both parental transmission coefficients shrink with respect to the pooled OLS estimation. Although both estimates are still significant at 10 per cent, the fall in the size of the mother's

[17] Since a portion of genetics is shared among family members (parents and children, siblings and other relatives), using household fixed effects also takes out a small fraction of the genetic component, however it does not entirely isolate it as in the case of the individual fixed effects.

coefficient with respect to the pooled OLS is remarkably higher than the case of the father's, suggesting that shared genes, family habits and common preferences in the household might be playing a more important role in the maternal transmission than in the paternal one. As the household's socioeconomic characteristics are included in the estimation (column (2)), the maternal correlation shrinks in size and loses its significance, whilst the father's transmission coefficient marginally grows in size keeping its significance level. Once region and time dummies are included in column (3), the maternal link keeps weakening at the same time that the father's correlation seems to get even stronger. These results might be suggesting that even though the maternal transmission process appears to go beyond shared family habits and other characteristics, there must be at least one element from the set of variables called "Household's socioeconomic status" that is playing an important role in it, so when it was explicitly included in the estimation the maternal BMI *z*-score was not significant anymore. In other words, factors such as household income, household size or parental education could be driving the mother-child relationship. An interesting exercise is to compare columns (1) and (2) from panel (a) in Table 2.3, as both estimations include household fixed effects, the only difference between them being that the latter also controls for the influence of socioeconomic characteristics that might not be included in the household fixed effect. The reader can think of the father's occupation or the mother's education as examples of those factors. For instance, two cousins living in the same house may have different BMI *z*-scores because the decisions involving their nutrition and health are made by different mothers that could have different levels of education. Thus, the drop in the significance of the maternal coefficient from column (1) to (2), seems to suggest that the strength of the mother-child relationship could be driven by the mother's socioeconomic condition, measured by her education in this case. Conversely, the father's correlation seems to be resistant to the inclusion of both household fixed effects and the socioeconomic status of the family. Even though the reduction in the coefficient size from the pooled OLS estimation to the household fixed effects one indicates that at least some portion of the father-child relationship was driven by shared genetics, habits and other generally fixed characteristics of the family, the significance of the regression coefficients measuring this relationship across different specifications following both methodologies implies that the strength of the paternal link might also have to do with other factors. Using the complete specification of column (3) the analysis suggests that, once the estimation controls for household fixed effects, a mother whose BMI is one standard deviation above her reference mean is associated with children whose BMI are, on average, 0.045 standard deviations above their reference mean; whilst a father whose BMI is one standard deviation above his reference mean is associated with children whose BMI are, on average 0.075 standard deviations higher than their reference mean, the latter estimate being significant at 5 per cent.

Individual Fixed Effects

By substituting β_j for β_i in equation (2.4) the estimation captures all the individual-specific factors influencing the child's anthropometric condition in the β_i term, so the parental transmission estimates exclude any genetic components and account only for the mechanisms that involve non-fixed influences such as transitory environmental conditions and behaviours. Panel (b) in Table 2.3 presents the results of estimating such a model.

Just as in the case of the household fixed effects regression, once a fixed effects methodology is applied at the individual level there is a considerable reduction in the size of both parental transmission coefficients with respect to the OLS results, which is not surprising since the analysis is taking out the effect of genetics and habits that are fixed over time[18]. Interestingly, the mother-child link loses all its strength and significance this time, while the father's transmission coefficient grows in size (in comparison with the household fixed effects approach) and is now significant at 1 per cent. As the socioeconomic controls are included in the estimation, the father's coefficient keeps its size and significance whilst the maternal link keeps shrinking. Taking the complete specification shown in column (6), the estimation yields a transmission coefficient of 0.035 for the mother and 0.099 for the father, which means that once the effect of genetics has been taken out, a mother whose BMI is one standard deviation above her reference mean is associated with a child whose BMI is 0.035 standard deviations above his or her reference mean. Similarly, a paternal BMI that is one standard deviation above its reference mean is associated with a child's BMI that is 0.099 standard deviations greater than its reference mean, this correlation being significant at 1 per cent. These results suggest that, unlike the maternal transmission, the father-child relationship seems to be based in factors that go beyond a simple genetic correlation. This might be reflecting the greater bargaining and decision-making power of the father inside the household, which could be fuelled not

[18] As the effect of genetics is taken out, the estimation is also neutralizing the biasing effect of any existing correlations between genetics and other determinants of the child´s weight.

only by psychological and cultural factors but also economic influences. Since more than 90 per cent of the fathers in the sample are reported to be working, while only 30 per cent of the mothers are, the greater father-child association under the individual fixed effects specification could be reflecting the fact that children are more likely to consume food that is compatible with the breadwinner's time-variant preferences and choices[19].

At this point, it is convenient to compare the individual and the household fixed effects estimates and understand the different intuition behind them. As commented before, in the individual fixed effects approach the estimation of the parent-child link is taking out the effect of all those time-invariant factors that are intrinsic to each individual and that might be having an effect on their anthropometric condition, which in this case refers mostly to genetics and its role on the transmission of biologically predetermined trends. What remains in the individual fixed effects estimates is then a mix of environmental and behavioural influences that vary over time and have an effect on the children's BMI.

Inversely, when the estimation is based on a household fixed effects approach the model is cleaning the parental correlation from the influence of time-invariant factors common to all the individuals living in the same household and that have an effect on their BMI, such as cultural and environmental factors affecting the BMI of all the members of the family. In general, the paternal correlation seems to be stronger and more resistant to both fixed effects procedures than the maternal one. This suggests that the father-child link in BMI cannot be totally explained by either genetics (individual fixed effects) or time-invariant habits and cultural factors affecting all members of the household (household fixed effects).

2.5.3 Determinants of the size of the parental transmission

This section discusses how the size of the parental transmission changes across the distribution of a variety of factors. First, the analysis aims to investigate whether the degree of parental correlation varies according to the child's age and gender. Secondly, the study measures the size of the transmission across the distribution of different variables describing the household's socioeconomic status.

[19] Once the sample is restricted to only consider children whose both parents work, the significance of the father-child link disappears (see Tables A3 and A4 in Appendix A).

Child's age and gender

In this subsection a pooled OLS model is estimated while introducing a set of interaction terms in order to determine whether the size of the parental transmission is higher or lower for children of certain gender or age group. Table 2.4 shows the results of introducing interaction terms to account for the effect of the child's characteristics on the size of the parental correlation.

Results imply that, on average, boys tend to experience a greater BMI transmission from their fathers and a lower transmission from their mothers, in comparison with girls. Although the differences between both groups are not statistically significant, this outcome suggests the presence of a role modelling process in which children are more likely to imitate the behaviours and health attitudes of the parent of the same sex. In order to analyse the effect of age on the size of the parental transmission the analysis follows two different approaches. First, the child's age is measured in years and interaction terms are then used with the mother and father's BMI *z*-scores (columns (1) and (2)). This particular methodology allows the analysis to estimate the marginal effect of an extra year in the child's age on the strength of the mother-child and father-child correlations.

Regardless of whether the estimation allows or not for a quadratic effect of age on the child's BMI, growing up seems to increase the link between children and their parents, this effect being especially significant for the father-child relationship. Specifically, results suggest that each additional year in the child's age in associated with an increase of 0.005 and 0.008 points in the maternal and paternal correlation, respectively. This outcome might be reflecting the fact that older children tend to have meals that are more similar to the ones consumed by the parents, in comparison with babies and small children.

Nevertheless, the previous estimates are implicitly assuming that the marginal effect of age on the size of the parental transmission is the same across the distribution of the child's age, which is not necessarily true. As an alternative approach, children are classified into four age groups and interactions are then built with the parents' BMI *z*-scores (column (3)). The sign and size of the new interaction terms suggest that older children tend to experience a higher degree of parental transmission, with respect to babies and small kids between 0 and 5 years old. However, adolescents between 15 and 19 years old have smaller maternal correlations than children between 12 and 14, and between 6 and 11.

Table 2.4: Variation in the size of the transmission elasticity. Child's age and gender

	(1)	(2)	(3)
BMI z-score mother	0.217***	0.214***	0.195***
	(0.032)	(0.032)	(0.029)
BMI z-score father	0.118***	0.116***	0.112***
	(0.032)	(0.032)	(0.030)
Child´s age	-0.039***	-0.017	
	(0.007)	(0.018)	
Child's age squared		-0.001	
		(0.001)	
Child's gender: Male	0.192***	0.193***	0.130**
	(0.069)	(0.069)	(0.066)
Gender (Male)*Age	-0.011**	-0.011**	
	(0.005)	(0.005)	
Child's age group: 6-11 years old			0.133
			(0.082)
Child's age group: 12-14 years old			0.120
			(0.079)
Child's age group: 15-19 years old			0.000
			(.)
Gender (Male)*Child's age group: 6-11			-0.023
			(0.062)
Gender (Male)* Child's age group: 12-14			-0.033
			(0.069)
Gender (Male)*Child's age group: 15-19			-0.138**
			(0.067)
Interaction terms:			
Gender:			
BMI z-score mother* Child's gender (male)	-0.034	-0.034	-0.033
	(0.024)	(0.024)	(0.024)
BMI z-score father* Child's gender (male)	0.028	0.028	0.029
	(0.026)	(0.026)	(0.026)
Age as a continuous variable:			
BMI z-score mother * Child's age	0.005**	0.006**	
	(0.003)	(0.003)	
BMI z-score father * Child's age	0.008***	0.008***	
	(0.003)	(0.003)	
Age in categories (Base category: 0-5 years)			
BMI z-score mother * Child's age group: 6-11 years old			0.104***
			(0.032)
BMI z-score mother * Child's age group: 12-14 years old			0.114***
			(0.035)
BMI z-score mother * Child's age group: 15-19 years old			0.083**
			(0.038)
BMI z-score father * Child's age group: 6-11 years old			0.122***
			(0.034)
BMI z-score father * Child's age group: 12-14 years old			0.095**
			(0.037)
BMI z-score father * Child's age group: 15-19 years old			0.114***
			(0.036)
Mother's age and father's age	Y	Y	Y
Household socioeconomic level	Y	Y	Y
Region* time interaction dummies	Y	Y	Y
Constant and WHO 2007 reference dummy	Y	Y	Y
R-squared	0.112	0.112	0.115
N. of cases	11065	11065	11065
Clusters (Households)	3284	3284	3284

Note: MxFLS 2002,2005-2006, and 2009-2012. The stars in the estimated coefficients indicate their significance (*** p<0.01, ** p<0.05, * p<0.10), clustered standard errors by household in parenthesis. Household socioeconomic level includes the quantile of the household's income, size of the household, bedrooms per capita, father's occupation and mother's level of education.

Similarly, children between 12 and 14 years old tend to experience a lower paternal transmission with respect to children in the age groups of 6 to 11 and 15 to 19 years. Moreover, the ages in which the parental transmission coefficients reach their maximum is not the same for both parents. As the estimates show, the highest level of maternal transmission seems to be experienced by preadolescents between 12 and 14 years old, whilst the paternal link reaches its maximum strength among children between 6 and 11 years old.

Household socioeconomic characteristics

The next objective is to study the relative strength of the parental transmission according to the household's socioeconomic characteristics, including household income, the father's education and occupation, the mother's education and work status and the number of people living in the household. First, the analysis considers the quantile of household's income and includes its interactions with the parental BMI z-scores. Table 2.5 shows the results of following this procedure, taking the first quantile as reference category.

In the case of the mother-child correlation there seems to be a u-shaped pattern in which households in the second quantile of the income distribution tend to experience the lowest level of transmission; however, these differences are not statistically significant. In the case of the father, there is a clear positive relationship between the level of income and the size of the intergenerational correlation. As shown in column (2), the fact that the household belongs to the fourth quantile of the income distribution makes the paternal transmission coefficient grow 0.094 points with respect to the households in the first quantile, this estimate being significant at 5 per cent. The size and significance of this coefficient suggest that children living in relatively rich households tend to experience a higher father-child transmission than those in the lower tail of the income distribution. This effect might have to do with the level of economic freedom that the father has, which also conditions the extent to which he can, advisedly or not, transmit his own preferences in terms of food and health habits. A father with a higher economic status has a greater spectrum of choices in which he might be more able to provide his children with food that matches his own preferences.

Table 2.5: Variation in the size of the parental transmission. Quantile of Household Income

	(1)	(2)	(3)
BMI z-score mother	0.249***	0.252***	0.255***
	(0.031)	(0.015)	(0.030)
BMI z-score father	0.210***	0.171***	0.171***
	(0.016)	(0.032)	(0.032)
Quantile of Household Income			
2nd Quantile	0.028	-0.017	0.026
	(0.078)	(0.067)	(0.089)
3rd Quantile	-0.041	-0.077	-0.088
	(0.075)	(0.071)	(0.091)
4th Quantile	0.026	-0.080	-0.093
	(0.078)	(0.071)	(0.092)
Interaction terms:			

BMI z-score mother * 2nd Quantile	-0.029		-0.031
	(0.041)		(0.041)
BMI z-score mother * 3rd Quantile	0.014		0.008
	(0.037)		(0.037)
BMI z-score mother *4th Quantile	0.023		0.008
	(0.039)		(0.039)
BMI z-score father * 2nd Quantile		-0.004	0.001
		(0.041)	(0.041)
BMI z-score father * 3rd Quantile		0.041	0.039
		(0.040)	(0.040)
BMI z-score father *4th Quantile		0.094**	0.093**
		(0.039)	(0.040)
Child's age child's age squared, mother's age and father's age	Y	Y	Y
Household socioeconomic level	Y	Y	Y
Region*time interaction dummies	Y	Y	Y
Constant and WHO 2007 reference dummy	Y	Y	Y
R-squared	0.111	0.111	0.111
N. of cases	11065	11065	11065
Clusters (Households)	3284	3284	3284

Note: MxFLS 2002,2005-2006, and 2009-2012. The stars in the estimated coefficients indicate their significance (*** p<0.01, ** p<0.05, * p<0.10), clustered standard errors by household in parenthesis. Household socioeconomic level includes: size of the household, bedrooms per capita, father’s occupation and mother’s level of education.

Next, the size of the maternal transmission is analysed across the distribution of the mother’s level of education and work status (Table 2.6). Interestingly, the fact that a mother works has a significant effect on the child’s anthropometric status. As shown in column (3), children of working mothers are, on average, 0.082 standard deviations heavier in comparison with children of non-working mothers, and this effect is significant at 5 per cent. On average, having a working mother also has a boosting effect on the size of the maternal transmission, this effect being significant at 10 per cent (columns (4) and (5)). This result suggests that having a job might provide the mother with additional bargaining power that allows her to choose the children’s meals, which are likely to be compatible with her own preferences.

Finally, the study analyses the effect of the household’s size on the strength of the parental transmission (Table 2.7). In theory, a child living in a large household is subject to a number of different influences from the rest of the family members, so the share of the child’s BMI that is explained exclusively by the parental transmission might not be as high. In order to measure this effect, the estimation includes interaction terms between the parental BMI and the size of the household, as shown in Table 2.7. In the case of the mother-child relationship, although there is a small and positive correlation between the size of the household and the strength of the transmission, this effect is not statistically significant. However, the father-child link does seem to respond significantly to changes in the household size. As shown in columns (1) and (3), an increase of one person in the household size is associated with a reduction of 0.027 points in the size of the father-child transmission, this effect being significant at 1 per cent.

Table 2.6: Variation in the size of the parental transmission. Mother's education and work status

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
BMI z-score mother	0.252***	0.274***	0.241***	0.230***	0.230***	0.257***	0.256***
	(0.015)	(0.051)	(0.015)	(0.016)	(0.016)	(0.053)	(0.054)
BMI z-score father	0.212***	0.212***	0.201***	0.201***	0.201***	0.211***	0.253***
	(0.016)	(0.016)	(0.015)	(0.015)	(0.017)	(0.016)	(0.049)
Mother's education (Base category: High school):							
Less than high school	-0.149***	-0.109				-0.116	-0.054
	(0.056)	(0.100)				(0.100)	(0.119)
More than high school	-0.112	-0.073				-0.071	0.013
	(0.086)	(0.146)				(0.146)	(0.183)
Mother's work status:							
Mother works			0.082**	-0.005	-0.002	-0.021	-0.009
			(0.034)	(0.064)	(0.077)	(0.066)	(0.081)
Interaction terms : Mother's education							
BMI z-score mother * Less than high school		-0.025				-0.017	-0.013
		(0.053)				(0.053)	(0.055)
BMI z-score mother * More than high school		-0.025				-0.036	-0.034
		(0.079)				(0.079)	(0.082)
BMI z-score father * Less than high school							-0.041
							(0.050)
BMI z-score father * More than high school							-0.051
							(0.090)
Interaction terms : Mother's work status							
BMI z-score mother * Mother works				0.052*	0.052*	0.051	0.053
				(0.031)	(0.031)	(0.032)	(0.032)
BMI z-score father * Mother works					-0.002		-0.006
					(0.031)		(0.033)
Child's age and age squared, mother's age and father's age.	Y	Y	Y	Y	Y	Y	Y
Household socioeconomic level	Y	Y	Y	Y	Y	Y	Y
Region*time interaction dummies	Y	Y	Y	Y	Y	Y	Y
Constant and WHO 2007 reference dummy	Y	Y	Y	Y	Y	Y	Y
R-squared	0.109	0.109	0.107	0.108	0.108	0.11	0.111
N. of cases	11065	11065	12123	12123	12123	11063	11063
Clusters (Households)	3284	3284	3499	3499	3499	3282	3282

Note: MxFLS 2002,2005-2006, and 2009-2012. The stars in the estimated coefficients indicate their significance (*** p<0.01, ** p<0.05, * p<0.10), clustered standard errors by household in parenthesis. Household socioeconomic level includes the quantile of the household's income, size of the household, bedrooms per capita, father's occupation and mother's level of education.

Table 2.7: Variation in the size of the parental transmission. Size of the household

	(1)	(2)	(3)
BMI z-score mother	0.252***	0.253***	0.225***
	(0.045)	(0.015)	(0.043)
BMI z-score father	0.210***	0.361***	0.367***
	(0.016)	(0.048)	(0.048)
Size Household	-0.026*	0.012	0.006
	(0.014)	(0.013)	(0.016)
Interaction terms			
BMI z-score mother * Size household	0.000		0.005
	(0.007)		(0.007)
BMI z-score father * Size household		-0.026***	-0.027***
		(0.008)	(0.008)
Child's age and age squared, mother's age and father's age,	Y	Y	Y
Household socioeconomic level	Y	Y	Y
Region*time interaction dummies	Y	Y	Y
Constant and WHO 2007 reference dummy	Y	Y	Y
R-squared	0.11	0.111	0.111
N. of cases	11065	11065	11065
Clusters (Households)	3284	3284	3284

Note: MxFLS 2002,2005-2006, and 2009-2012. The stars in the estimated coefficients indicate their significance (*** p<0.01, ** p<0.05, * p<0.10), clustered standard errors by household in parenthesis. Household socioeconomic level includes the quantile of the household's income, bedrooms per capita, father's occupation and mother's level of education.

2.5.4 Robustness checks

In this section, I briefly discuss the results of performing a robustness check on the previous estimates. Specifically, I investigate whether results change significantly when: *a)* I separate the sample into two different groups according to the child's age (from 0 to 5 years old and from 6 to 19 years old), and *b)* I use the Mexican sample to calculate the reference values for the BMI z-scores (instead of using the reference values provided by the World Health Organisation). Section I in Appendix D shows the results of running separate regressions for different age groups (Part "a") and running the same regressions presented previously but using the Mexican sample as reference (Part "b").

Results show a small degree of heterogeneity between age groups in terms of the estimated values of the coefficients associated with parental transmission. For most of the specifications under the pooled OLS framework, for instance, children between 0 and 5 years old seem to have slightly lower coefficients of parental transmission in comparison with children and adolescents between 6 and 19 years old; however, the level of significance of the transmission coefficients in the final (baseline) pooled OLS specification is similar for both groups (1 per cent). Once fixed effects methodologies are applied, the divergence between these two groups gets larger, as the coefficients for parental transmission become statistically non-significant for children between 0 and 5 years old. Conversely, the positive and significant coefficient for the parental transmission generally holds for children between 6 and 19 years old. This pattern is similarly observed for the rest of the methodologies and specifications, in which the parent-child relationship seems to be stronger for older children. Overall, results seem to suggest that most of the effects captured in the analysis presented before are driven by older children and adolescents, rather than babies and small children. This result is not surprising, as older children might be more likely to resemble the eating and exercising habits of the parents, with respect to babies and smaller children who are likely to have separate diets and habits.

Part "b" in Section I (Appendix D) shows the results of redoing the whole analysis presented in previous sections using the sample from the Mexican Family Life Survey to construct the z-scores of the BMI for both: parents and children. In other words, instead of using the reference values provided by the World Health Organisation, I calculate the sample mean for BMI by age and gender and use it as reference to construct z-scores. As shown in the regression results, changing the reference point does not significantly alter the main results associated with the sign and significance of the parental transmission of the BMI. Even though the magnitude of the coefficients is slightly changed in some cases, most of the main results discussed in previous sections remain unchanged.

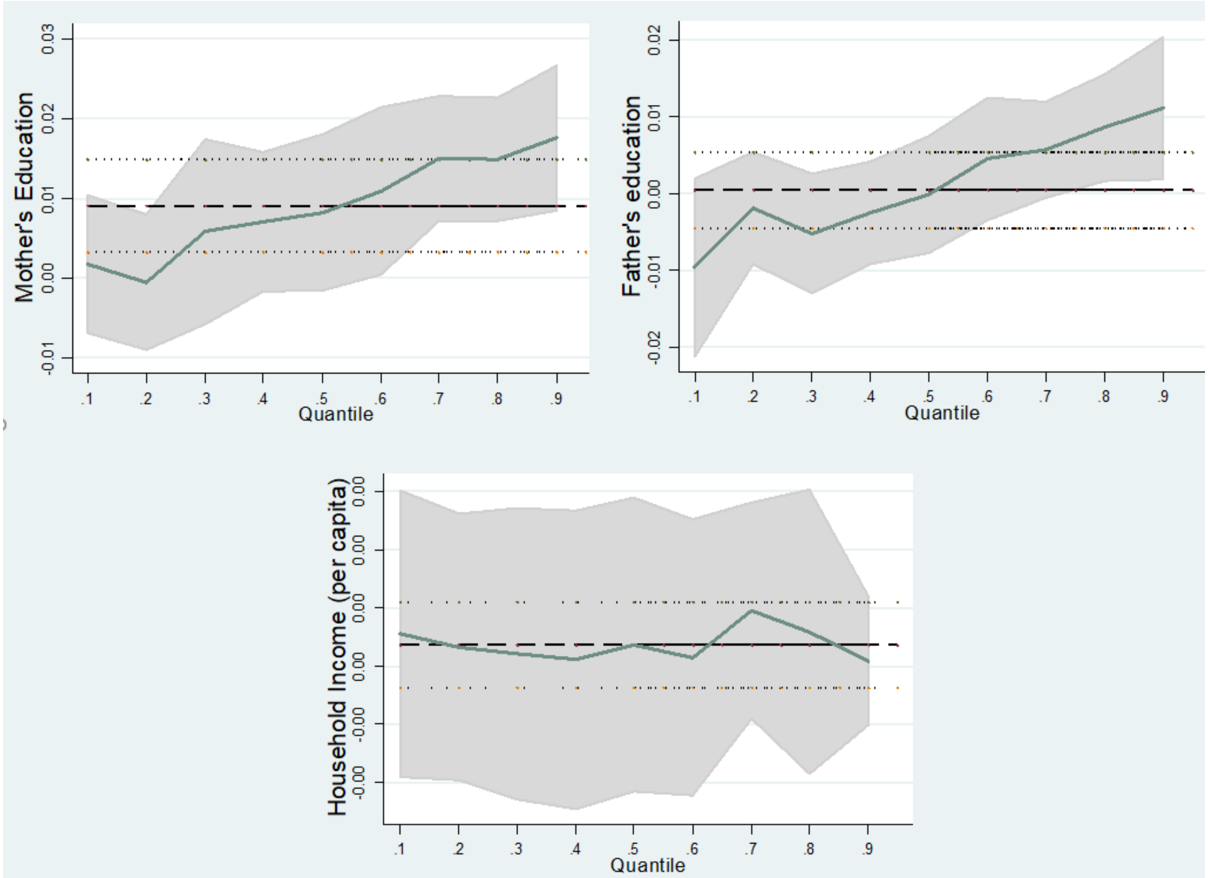
2.5.5 Quantile regression

The analysis presented before employed Ordinary Least Squares methodologies in which the estimations are calculated on the conditional mean of the dependent variable. In other words, it has been assumed that the association of the explanatory variables with the child's BMI z-score (dependent variable) is constant across the distribution of the child's BMI. However, it is possible that factors such as the parents' education or the household income could have regression coefficients that vary across different quantiles of the child's BMI. In order to consider this possibility, the analysis could benefit from the use of quantile regressions, a technique that has been used in many areas of economics and medicine to study the association between a set of explanatory variables and a dependent variable, across the distribution of the latter (Koenker & Hallock, 2001; Lê Cook & Manning, 2013; Huang, Zhang, Chen, & He, 2017).

In this section, I perform quantile regressions to analyse possible heterogeneity on the regression parameters across the distribution of the child's BMI z-score, paying special attention to the coefficients associated with household income and parental education, in order to provide additional insight into the parent-child relationship in BMI. Figure 2.2 shows the values of the regression coefficients associated with household income, mother's education and father's education across the distribution of the child's BMI[20].

[20] Table A5 in Appendix A shows the coefficient regressions and bootstrapped standard errors estimated for the mother's and father's BMI, household income per capita, mother's education and father's education.

Figure 2.2. Quantile regression, with respect to mother's education, father's education and household income per capita.



The first graph in Figure 2.2 shows the regression coefficients associated with the mother's level of education (in years), across the distribution of the child's BMI *z*-score. The positive slope of the line depicted in the graph indicates that the marginally positive relationship between the mother's education and the child's BMI is stronger for children in the upper tail of the BMI distribution. Actually, it is only for those children above the 0.60 quantile that the positive relationship is statistically different than zero (we can see this by looking at the grey area around the estimated line, which represents a confidence interval of 95%) This means that maternal education might play a more important role in children's eating and exercising habits for those children who are overweight and obese. A similar pattern can be found with respect to the father's education, where the sign of the relationship is actually different depending on the quantile of the child's BMI that is taken into consideration. For those children below the 0.50 quantile in BMI, the father's education is actually negatively correlated with the child's BMI, however this is not a significant coefficient at 5%. As the child's BMI increases, the relationship between the father's education and the child's BMI becomes positive and significant at 5%. Just as in the case of the mother, the influence of the father's education on the child's eating and exercising habits seems to be stronger for those children who are relatively heavier. Finally, the bottom graph in Figure 2.2 shows the quantile regression coefficients associated with household income. Conversely to the patterns found for parental education, this particular variable does not show any particular trend across the distribution of the child's BMI. The effect of household income on children's BMI seems to be fairly homogeneous across the distribution of the child's BMI, this association being very small and statistically non-significant for all quantiles.

2.7 Conclusions

This chapter studies the intergenerational transmission of the Body Mass Index (BMI) from parents to children using panel data from the Mexican Family Life Survey (MxFLS). Departing from a simple model specification using pooled ordinary least squares (OLS) and then applying fixed effects methodologies at the household and individual level, the analysis estimates a set of measures of the intergenerational transmission of the BMI between children and adolescents between 0 and 19 years old and their parents. Additionally, the study analyses the sensitivity of this estimate across the distribution of the child's age and gender, the household socioeconomic characteristics and the anthropometric status of both parents.

Results suggest that only the paternal link is resistant to the consideration of both household and individual fixed effects, implying that, unlike the mother-child relationship, the strength of the paternal link lies in factors that go beyond a simple genetic correlation or the presence of shared family habits and other time-invariant characteristics. Also, as children grow up their anthropometric statuses resemble the ones of their parents in a more noticeable way; however, this positive marginal effect is not constant across the distribution of the child's age.

Similarly, the family's socioeconomic status seems to have an important effect on the size of the parental transmission. Specifically, this study finds that the father-child link in BMI tends to be particularly stronger for those households in the higher tail of the income distribution and for children whose fathers work as patrons, employers or business owners. In general, having a higher socioeconomic status might make fathers more able to choose their children's food and habits, so these are more compatible with their own. An analogous rationale is valid in the case of the maternal link, as results suggest that, on average, children of working mothers tend to experience a higher degree of maternal transmission in comparison with children of mothers who do not work. Also, the strength of the father-child link seems to weaken as the household grows in size, suggesting that the marginal effect of the father´s influence on the child´s BMI decreases as the child has additional behavioural and environmental influences inside the household.

Finally, results from quantile regressions suggest that maternal education might play a more important role in children's eating and exercising habits for those children who are overweight and obese. A similar pattern can be found with respect to the father's education, where the sign of the relationship is actually different depending on the quantile of the child's BMI that is taken into consideration. Conversely, household income does not show any particular trend across the distribution of the child's BMI.

2.8. References

Akbulut, M., & Kugler, A. D. (2007). Intergenerational Transmission of Health Status in the U.S. among Natives and Immigrants. Mimeo.

Bhalotra, S., & Rawlings, S. (2013). Gradients of the Intergenerational Transmission of Health in Developing Countries. *Review of Economics and Statistics*, 660-672.

Bhalotra, S., & Rawlings, S. B. (2011). Intergenerational persistence in health in developing countries: The penalty of gender inequality. *Journal of Public Economics*, 286-299.

Biro, F. M., & Wien, M. (2010). Childhood obesity and adult morbidities. *The American Journal of Clinical Nutrition*, 1499S-1505S.

Brown, H., & Roberts, J. (2012). Born to Be Wide? Exploring Correlations in Mother and Adolescent Body Mass Index using Data from the British Household Panel Survey. Working Paper, Sheffield Economic Research Paper Series 201201, Department of Economics, University of Sheffield.

Castelnovo, P. (2014). Intergenerational Transmission of BMI and its Effects on Cognitive Skills. (Unpublished Doctoral Dissertation), Universita Degli Studi Di Milano Bicocca, Universita Cattolica del Sacro Cuore, Italy.

Classen, T. J. (2010). Measures of the intergenerational transmission of body mass index between mothers and their children in the United States, 1981-2004. *Economics and Human Biology*, 30-43.

Currie, J., & Moretti, E. (2007). Biology as Destiny? Short- and Long-Run Determinants of Intergenerational Transmission of Birth Weight. *Journal of Labor Economics*.

Dasgupta, P. (1993). *An Inquiry into Well-Being and Destitution.* New York: Oxford University Press Inc.

Dolton, P., & Xiao, M. (2014). The Intergenerational Transmission of Adiposity across Countries. Presented at the Royal Economic Society Conference, 7-9 April.

Dolton, P., & Xiao, M. (2015). The intergenerational transmission of BMI in China. *Economics and Human Biology*, 90-113.

Garcia, J., & Quintana-Domeque, C. (2007). Obesity Employment and Wages in Europe. *Advances in Health Economics and Health Services Research*, 187-217.

Hernández-Cordero, S., Cuevas-Nasu, L., Morales-Ruán, M., Méndez-Gómez Humarán, I., Ávila-Arcos, M., & Rivera-Dommarco, J. (2017). Overweight and obesity in Mexican children and adolescents during the last 25 years. *Nutrition & Diabetes*, 1-9.

Huang, Q., Zhang, H., Chen, J., & He, M. (2017). Quantile Regression Models and Their Applications: A Review. *Journal of Biometrics & Biostatistics* .

Klünder-Klünder, M., Cruz, M., Medina-Bravo, P., & Flores-Huerta, S. (2011). Padres con sobrepeso y obesidad y el riesgo de que sus hijos desarrollen obesidad y aumento en los valores de la presión arterial. *Boletín Médico del Hospital Infantil de México*, 438-446.

Koenker, R., & Hallock, K. F. (2001). Quantile Regression. *Journal of Economic Perspectives*.

Latnovic, L., & Rodriguez Cabrera, L. (2013). Public health strategy against overweight and obesity in Mexico's National Agreement for Nutritional Health. *International Journal of Obesity Supplements*, S12-S14.

Lê Cook, B., & Manning, W. G. (2013). Thinking beyond the mean: a practical guide for using quantile regression methods for health services research. *Shanghai Archives of Psychiatry*.

Li, L., Law, C., Lo Conte, R., & Power, C. (2009). Intergenerational influences on childhood body mass index: the effect of parental body mass index trajectories. *The American Journal of Clinical Nutrition*, 551-557.

Martin, M. A. (2008). The intergenerational correlation in weight: how genetic resemblance reveals the social role of families. *American Journal of Sociology*, S67-105.

OECD. (2014). *Obesity Update 2014.* Secretary General of the OECD. Retrieved from http://www.oecd.org/els/health-systems/Obesity-Update-2014.pdf

Qian, N. (2008). Missing Women and the Price of Tea in China: The Effect of Sex-Specific Earnings on Sex Imbalance. *The Quarterly Journal of Economics*, 1251-1285.

Rimal, R. N. (2003). Intergenerational Transmission of Health: The Role of Intrapersonal, Interpersonal and Communicative Factors. *Health Education & Behavior*, 10-28.

Rodriguez Oreggia, E., & Perez Lizaur, A. B. (2010). Factores de dinámica social asociados al índice de masa corporal en adultos en México. *Estudios Económicos*, 337-362.

Sen, A. (1990). More than 100 million women are missing. *The New York Review of Books.*

Serdula, M. K., Ivery, D., Coates, R. J., Freedman, D. S., Williamson, D. F., & Byers, T. (1993). Do Obese Children Become Obese Adults? A Review of the Literature. *Preventive Medicine*, 167-177.

Shamah-Levy, T., Escalante-Izeta, E., Morales-Ruan, C., Jimenez-Aguilar, A., Amaya-Castellanos, C., Salazar-Coronel, A., . . . Amaya-Castellanos, A. (n.d.). The

Relationship between Mexican School-Age Children Obesity and the BMI of their Parents: A Comprehensive Prevention Strategy. iConcept Press Ltd.

Thompson, O. (2013, August). The Intergenerational Transmission of Health Status: Estimates and Mechanisms. Working Paper, Department of Economics, University of Massachusetts.

Venkataramani, A. S. (2011). The intergenerational transmission of height: evidence from rural Vietnam. *Health Economics*, 1448-1467.

Whitaker, K. L., Jarvis, M. J., Beeken, R. J., Boniface, D., & Wardle, J. (2010). Comparing maternal and paternal intergenerational transmission of obesity risk in a large population-based sample. *The American Journal of Clinical Nutrition*, 1560-1567.

Chapter 3

Women's intrahousehold decision-making power and its relationship with education and employment: An Ordered Logit Approach.

Abstract

This paper studies women's intrahousehold decision-making power and its relationship with education and employment using an ordered logit model. Fixed effects estimations are also carried out to solve potential endogeneity coming from unobservable time-invariant factors. Finally, the paper analyses quadratic and community divergence effects of education on power. Results show heterogeneity in the correlation of women's power with education and employment across different levels of power and suggest the presence of a significant quadratic effect of education. Having more education than the community average is negatively associated with power, supporting the notion that women tend to compensate their success outside the household with submissive attitudes at home.

3.1 Introduction

The level of decision-making power inside the household constitutes an elementary dimension of empowerment and it often associated with other power-enhancing attitudes and behaviours outside the household that reinforce women's position at home, creating a virtuous circle. For example, a woman that is allowed to make decisions is more likely to go to school or work outside the home if she wishes so. Then, contributing to the household income makes women more able to participate in decision-making processes (Bernasek & Bajtelsmit, 2002; Malhotra & Mather, 1997). Evidence also suggests that changes in intrahousehold decision-making power favouring women are an important source of improvements in child welfare, showing that it is the bargaining power and not necessarily the economic contribution of the woman what drives this relationship (Minsoo, Jeungil, & Sora, 2011). In fact, women's decision-making power by itself has been widely used to explain children's welfare outcomes in a variety of contexts and has been proven to have a significant positive impact (Ahmed, 2006; Lépine & Strobl, 2013; Schmidt, 2012; Ueyama, 2006; Chakraborty & De, 2011; Reggio, 2011; Antman, 2010).

While some authors choose to study the determinants of women's power in certain aspects, others build indexes to try and capture more general effects. The common factor in most of these studies is the consideration of two separate possibilities: full power (the woman makes the decision) or involvement (either she makes the decision herself or jointly with other family member), without exploring the ordinal nature of these classifications. In this regard, one might be interested on knowing the factors that make women more likely to pass from not having any involvement to getting involved and from being involved to making decisions on their own. This question is especially relevant considering the fact that full power or shared involvement are not optimal choices for some decisions. However, it is important to take into account the impact of non-observable characteristics on women's ability to bargain, such as personality, cultural background, or social links. If any of these variables were to be correlated with women's employment or job income (as it is likely), running a simple Linear Probability Model would not suffice. This chapter uses data from Mexico to study women's intrahousehold decision-making power and its relationship with education and employment at three different levels: no power, shared power and exclusive power. Then, fixed effects methodologies are employed to address endogeneity problems due to time-invariant features. Finally, the study analyses the correlation between women's education and decision-making power allowing for quadratic and community divergence components in this relationship.

The next section presents a general literature review on the economic and sociodemographic determinants of women's decision-making power. Section 3.3 examines the nature of gender roles and social norms in Mexico and briefly outlines the most relevant work on the determinants of women's power for this country. Section 3.4 describes the data used in the study and offers a preliminary descriptive analysis. The methodology used to cover each of the objectives of the article is explained with detail in section 3.5. Results are discussed in section 3.6. Finally, section 3.7 presents the conclusions.

3.2 The Determinants of Women's Decision-Making Power.

This chapter studies how education and employment are associated with the level of intrahousehold decision-making power for women, allowing for heterogeneity in the magnitude and size of this relationship across different levels of power. However, it is important to keep in mind that the level of decision-making power is not a measure of wellbeing itself, since the desirability of each level of power might vary according to the nature of each decision. The level of women's decision-making power in this paper has been used as a proxy for a much broader and hardly measurable concept: the bargaining power.

3.2.1 A Bargaining Approach for Household Decision-Making

Bargaining models appeared as an alternative to the unitary approach introduced by Becker (1965; 1981) that proposes the household as the decision-making entity of interest, without allowing for any negotiation process among family members. The bargaining approach considers that each person living in the household has different preferences, and consequently any decision-making process in the household will inevitably involve two elements: cooperation and conflict (Agarwal, 1997). Although cooperation allows allocations that can generally make members better off, it also implies some level of loss for one or more of the participants, who might have to compromise their own preferences or wellbeing in order to comply with what was agreed during the negotiation process. In exchange, individuals may gain power in some other aspect of decision-making or potentially improve their social capital by complying with social norms. So, for example, a woman might be willing to compromise her decision-making power regarding large expenditures if this makes her comply with a social norm that recognises the husband as the main decision-maker of the household.

In theory, the level of an individual's bargaining power will depend on their "fallback position", also called "reservation wellbeing", which represents the maximum level of wellbeing a person can achieve if the negotiation fails (Agarwal, 1997; Dauphin, 2001). As stated by Chiappori and Donni (2009), the difference between each particular bargaining model found in the literature can be reduced to the choice of the threat point. In the particular context of married women this notion suggests that their bargaining power will be strongly related with any factors that improve their fallback position, i.e., her wellbeing in case she divorced her partner. McElroy (1990) calls these variables the "extra household environmental parameters (EEPs)" which include aspects such as parental wealth, nonwage income, legal institutions regarding marriage and divorce, unemployment faced by the person's demographic group, among others. If the way a woman is socially perceived is considered as an additional variable in her fallback position function, her bargaining power will be also determined by sociocultural factors such as gender norms and traditional values.

Nonetheless, there is another branch of the literature suggesting that divorce or partnership dissolution might not be an accurate representation of a realistic threat point since it might seem excessive. Lundberg and Pollack (1993), for instance, proposed a model where the threat point is given by the classification of household decisions into gender-specific "spheres", where each spouse becomes an exclusive decision-maker in their own masculine or feminine sphere. In this context, the separate spheres approach would suggest that if negotiation fails women would make decisions regarding traditionally "feminine" aspects (most likely those related with food and everyday housekeeping) while their husbands would make decisions regarding aspects that are perceived as "masculine (possibly large expenditures and other important decisions in the household).

3.2.2 Empirical Evidence

Most of the empirical research on the determinants of female intrahousehold decision-making power has focussed on the socioeconomic elements that provide women with bargaining power within the household. Ownership of financial and physical assets, earnings and income are positively associated with female power (Wiklander, 2010; Oduro, Boakye-Yiadom, & Baah-Boateng, 2012; Huber & Spitze, 1981). Some direct inteventions in the form of microfinance and other self-help group programmes targeted to enhance women's control of the household's resources have also been found to significantly increase their level of decision-making power (Brody, et al., 2017; Ashraf, Karlan, & Yin, 2010; Bali Swain & Yang Wallentin, 2009), however the effectiveness of such projects depends widely on the particular context being studied and women's social identity (Garikipati, Johnson, Guérin, & Szafarz, 2017; Duvendack & Palmer-Jones, 2017) .

Other factors, such as the woman's age, level of education, years of marriage and urban residence have also been found to have a positive correlation with decision-making power (Arooj, et al., 2013; Khan & Sajid, 2011). However, the relative impact of the woman's socioeconomic status on her bargaining power is not the same for all the decision-processes that occur in the household. There is evidence from Sri Lanka suggesting, for instance, that a woman's level of education and employment status are strongly associated with her decision-making power in financial matters, but not for social and organisational issues (Malhotra & Mather, 1997). On the other hand, there is also evidence supporting the relevance of some factors across all levels of decision-making. For the Nigerian case, the work by Oyediran and Odusola (2004) concludes that the determinants of female decision-making power are different depending on the nature of the decision, however economic influences such as women's education and employment status have a significant influence across all dimensions of intrahousehold decision-making, including those regarding reproductive, cultural, and economic issues.

Institutions in the form of traditional conventions and social norms also play an important role in the distribution of power inside the household, especially in highly gender-stratified communities where "autonomy continues to be shaped largely by traditional factors" (Jejeebhoy & Sathar, 2001). There are culture-specific aspects, such as religion, ethnicity, or even traditional values and beliefs that are strongly associated with gender norms which prevent women from participating in the household decision-making process (Banerjee & Roy, 2015; Kritz & Makinwa-Adebusoye, 1999). The sociocultural context can also help explain the apparently contradictory results found in the literature suggesting that some economic characteristics that were thought to enhance female autonomy, such as paid employment or age at marriage actually have a neutral or even negative effect (Hossain, 1998; Wiklander, 2010). According to Mabsout and Van Staveren (2009), gendered institutions in the form of social norms and practices play an important role in the intrahousehold distribution of bargaining power and might mediate the effect of other individual and household characteristics. The authors suggest that well-educated women with a high economic contribution to the household may perceive themselves as deviations from a social standard that has established the man as the breadwinner and try to compensate this fact by being submissive with their male partners at home, a behaviour that had been previously identified in the literature and conceptualised as "doing gender" (West & Zimmerman, 1987). In certain cultures, some of the apparently power-enhancing characteristics in women are associated with a negative social connotation, which harms the woman's self-esteem and impoverishes the image that the husband has of her. In some rural areas in India, for example, it is not socially acceptable for women to get married at an old age, and those who do might be subject of criticism. So, even though being older can give the woman more experience and ability to bargain, this effect can be reversed for social pressures that make her less capable of claiming power inside the household. In practice, social norms can be quantified in the form of community averages. Mason and Smith (2003), for instance, study the determinants of women's empowerment across different dimensions for five Asian countries and find that gender norms in the form of community's average values for age, age at marriage, age difference with husband, education and paid work have the potential to explain around two-thirds of the within-country variation in the level of women's intrahousehold decision-making power.

3.3 Gender, Social Norms and the Study of Female Decision-Making Power in Mexico.

Any society can be described in terms of two parameters: "tightness" and gender-stratification. The first concept is a notion found in the sociology literature referring to the extent to which the lives of the members of a society are shaped and influenced by non-written social norms and tradition (Gelfand, Nishii, & Raver, 2006). Therefore, a tight society will be one in which its members face a great pressure to comply with social norms and expectations. The second term refers to the degree of differentiation between the rights and opportunities between men and women, or as Adams (2007) describes it, "the differential ability of men and women to access society's resources and receive its privileges". Mexico can be classified as a "tight" society, since people experience a strong pressure to comply with accepted social norms, even when they are in conflict with their own personal interests (Hietanen & Pick, 2015). This means that, although individuals are legally free to make choices according to their own wishes and objectives, there are some psychological barriers that restrain their decision-making power. In the Mexican context social norms regulating people's conduct also tend to be highly gender-stratified, meaning that the behaviours and attitudes that are expected from men are very different from those expected from women, who are supposed to be obedient and submissive; consequently, any psychological restrictions preventing individuals from exercising autonomy and decision-making power are even stronger for women (Guendelman, Malin, Herr-Harthorn, & Vargas, 2001).

The concept of social norm is quite complex and may have different meanings depending on the context (Cialdini, Kallgren, & Reno, 1991). An injuctive social norm for instance, refers to a behaviour that most individuals identify as the right thing to do, and so depicts what is commonly approved in a society. On the other hand, a descriptive norm refers to what people typically do, or the average behaviour, which may or may not be in concordance with the injuctive norm. In this case, it might be the injuctive norm for men and women to have similar rights and equal access to education and employment, however what is typically observed is for married women to have less years of education with respect to their husbands, which are also appointed as the households' breadwinners. Due to the lack of information regarding injuctive norms in the data set, in this paper we'll use community averages in order to study how deviations from descriptive norms (in terms of years of education) can change the magnitude of the correlation between women's education and power.

The analysis of the determinants of women's decision-making power in the household is relatively new for the Mexican case, but there are a few articles that have addressed this question. In cross-sectional studies performed by Casique (2000; 2010) using the 1995 National Survey of Family Planning and the 2003 National Survey on the Dynamics of Intrahousehold Relationships, the author constructs global indexes for women's intrahousehold decision-making power and finds that factors such as years of education, labour force participation, age and having been in previous unions have a significant enhancing effect on power. Even though Casique's research has made an important contribution to the literature and constitutes a baseline to the understanding the determinants of female decision-making power in Mexican households, it has some limitations. For instance, in both studies the author decided to build global indexes that measure the level of women's decision-making power across a variety of aspects of family life, a methodology that does not allow us to compare the effect of different sociodemographic, economic and cultural factors on each dimension of decision-making. A second limitation, which is explicitly recognised in her work, has to do with the nature of the data sets she used. The information used in both studies is cross-sectional and therefore it is not possible to explore any individual life-time changes and their effect on bargaining power (Casique, 2010). Additionally, the surveys she worked with do not provide any information about men's perceptions of women's power. Having the couple's report instead of the woman's response only allows a more comprehensive understanding of intrahousehold dynamics and reduces the risk of getting biased results (Allendorf, 2007; Story & Burgard, 2012; Duvendack & Palmer-Jones, 2017).

Another relevant study for the Mexican case is the one done by Antman (2014), who uses the Mexican Family Life Survey to study the effect of employment status on intrahousehold decision-making power regarding large expenditures. The author uses fixed effects models to deal with potential endogeneity issues coming from the correlation between work status and any household-specific unobserved factors that could also have an influence on bargaining power. According to her results, the head of the household's spouse is more likely to be involved in decision-making processes regarding large expenditures when she has been employed in the last 12 months. An important contribution of this work is the use of panel data which is useful in the treatment of endogeneity. However, just as in Casique's work, the author considers the responses from one of the spouses only (in this case the head of the household), and the analysis does not allow the effect of women's employment to vary across different levels of decision-making power.

This work contributes to the literature in very specific aspects. To begin with, it represents the first attempt to use Mexican panel data in the measurement of the association of education and employment with women's intrahousehold decision-making power regarding a variety of domestic aspects, including food choices, children's wellbeing, economic matters and decisions regarding the woman's autonomy. Unlike previous work that has been done for the Mexican case (Casique, 2000; 2010), this study recognises the fact that each aspect of intrahousehold decision-making might represent a different process, so sticking to one single decision-making power index might not provide enough information (Malhotra & Mather, 1997). Secondly, the analysis also makes use of the answers provided by the woman's partner regarding who is the household decision-maker and compares results according to which response is used in the regressions, which addresses the problem of not having men's views in the analysis. Additionally, a partial proportional odds model is used to consider that factors such as education and employment might have different correlations with women's power across different levels of power, which is important to recognise since having exclusive power might not be ideal for some aspects of decision-making such as children's education and health. Finally, quadratic effects in the relationship between education and power are analysed and locality averages are used to measure the influence of deviating from social norms (in years of education) on the magnitude of the correlation between education and women's intrahousehold decision-making power.

3.4 Data and Descriptive Analysis

This paper uses panel data from the Mexican Family Life Survey (MxFLS), a publicly available dataset which contains a broad variety of socioeconomic and demographic information for a large sample of Mexican households and individuals in three rounds: 2002, 2005 and 2009[21]. The design for the first round was undertaken by the National Institute of Statistics and Geography (INEGI, in Spanish), and consists of a probabilistic, stratified, multi-staged and independent sample, which is representative of the Mexican population at the national, urban, rural and regional level.

Since the survey aimed to collect data both at the household and individual level, the questionnaire includes a "Decision-Making" section where each adult family member is asked to identify the decision-maker(s) for several aspects of family life. This paper will focus on seven specific decisions: food, children's education, children's health care, large expenditures, cash transfers to relatives, the woman's work status, and contraceptive use. Even though the woman's perception of her own power will be the main variable of interest, the husband's responses are also considered in the analysis. The explanatory variables include a set of socioeconomic characteristics at the individual, couple, household and community level, though the analysis will mainly focus on the effect of women's years of education and employment status. Since the main variable of interest is the level of decision-making power for women living in a marriage or free union, the sample is restricted to all women who reported to have a husband or partner living in the same household, for whom there is also socioeconomic information available[22]. Due to the presence of extended families, in some cases this might include not only the wife/partner of the head of the household but also any other women living with a husband/partner in the same household. After excluding implausible values[23], the initial sample consists of 18,419 observations distributed across the three waves of the panel.

Fortunately, in the case of the Mexican Family Life Survey (MxFLS), attrition is not expected to be a significant problem since the survey aimed to follow individuals over

[21] The MxFLS currently contains information for a 10-year period, collected in three rounds: 2002, 2005-2006 and 2009-2012. For simplicity, the waves will be referred as: " 2002", "2005" and " 2009", to indicate the year the information collection process began for each round. The MxFLS data can be downloaded from: http://www.ennvih-mxfls.org/english/index.html

[22] The study only considers women living with a partner or spouse since the bargaining process for single women is likely to be driven by different forces, and therefore will require a separate analysis.

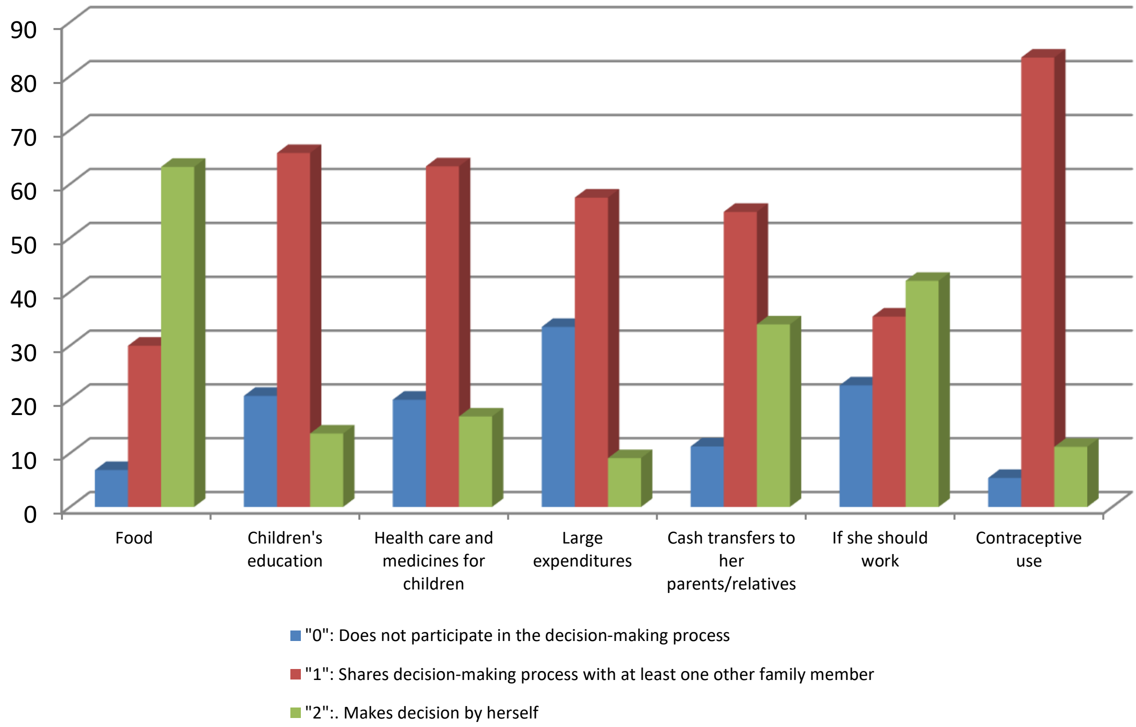
[23] For instance, women who reported to have more than one partner/spouse at a time or an implausible number of years of education were omitted from the analysis.

time, regardless of changes in residence or new household formations (for instance due to split-offs). So, even if some couples get divorced or separated over the duration of the three waves, both the man and the woman would still appear in the survey. In other words, separation does not imply attrition. So, for instance, if a woman gets divorced and then gets married again, she would still be included in my sample, regardless of the fact that she has now a different husband. The estimation actually controls for this matter using the variable "Previous Unions" in order to capture any effects that having a previous husband could have on the woman's power. However, if those divorced or separated women do not choose to marry again they would not be considered in my sample anymore, since this exclusively contains women who live with a husband or partner in the household. It is important to remember that the main objective of this paper is to measure the association between education and employment and decision-making power, specifically for women who live with a husband or partner, and not a general effect for all women. If we take this into account, the fact that my sample (not the survey) is dropping some women who get divorced or separated and do not get married again over the course of 10 years does not really represent a selection problem. What I'm measuring is the relationship between education and employment for women who are in a cohabitation relationship (even if they switch partners over time), while the estimation also controls for "previous unions", to take into account the fact that women who remarry might be different than those who have been only in one stable relationship. In any case, I don't expect attrition to be a problem, since most of the individuals (more than 80%) appear in my sample at least in 2 (out of 3) waves, as shown in Table 3.0.

Table 3.0 Number of individuals interviewed across the panel's waves.

Number of waves (times)	Number of individuals	Percentage
1	3144	17.07
2	4184	22.72
3	11091	60.21
	18419	100

Figure 3.1. Level of women's decision-making power by type of decision (frequencies in percentages)



Note: MxFLS 2002,2005-2006, and 2009-2012

Decision-making power in this context is seen as an ordinal measure rather than a simple binary variable. For each aspect of family life, the dependent variable "decision-making power" takes the value of 0 if the woman does not participate in the decision-making process at all, 1 if she shares the decision-making with at least one other person, and 2 if she makes the decision by herself. Figure 3.1 shows the distribution of decision-making power across different aspects of family life, according to the woman's perception of her own power[24].

Not surprisingly, the decision where women tend to have a higher share of power is food purchased for the household, an aspect of family life traditionally assigned to women. Decisions related to children's welfare such as education and health care, as well as the use of contraceptives are more likely to be made in association with some other family member, most likely the woman's husband or partner. Interestingly, sending cash transfers to her own family does not seem to depend entirely on the woman's choice, since more than 50 per cent of women reported they share this

[24] Please refer to Table B5 in Appendix B for the exact values of the percentages.

decision with at least some other family member. Likewise, almost 20 per cent reported that they do not have any say in their decision to work, suggesting that there is a considerable portion of women living in marriages or free unions who cannot go to work even if they want to, or that go to work against their own will. However, it is large expenditures the aspect in which women tend to report the highest level of non-participation, with more than 30 per cent of women reporting other family members as decision-makers. These facts are compatible with the traditional nature of social norms in Mexico, which identify men as the main decision-makers, and women as agents in charge of minor household affairs.

Table 3.1(a) shows the average level of power reported by women across seven aspects of decision-making, for each of the waves collected in the panel data set. Since the variable denoting power can take three values, namely: "0" for no power, "1" for shared power and "2" for exclusive power, an average response that is closer to 0 would indicate a relatively low level of decision-making power, whilst an average response closer to 2 would indicate a relatively high level of decision-making power. As shown in table 3.1 (a), even though women's participation in some decisions such as food purchases, large expenditures or contraceptive use has not changed much over time, their say in decision-making aspects such as cash transfers to her relatives and whether she should work has systematically increased. Interestingly, this rise seems to have been counteracted by a lower level of power regarding children-related decisions.

Table 3.1 (a): Mean of women's decision-making power by year and aspect.

	2002		2005		2009	
	Observations	Mean	Observations	Mean	Observations	Mean
Food	6026	1.554	5861	1.572	6121	1.564
Children's education	5451	0.957	5160	0.942	5284	0.890
Health care and medicines for children	5494	1.002	5218	0.970	5384	0.933
Large expenditures	6017	0.729	5826	0.782	6058	0.759
Cash transfers to her parents/relatives	4403	1.148	3875	1.256	3903	1.286
If she should work	6007	1.098	5804	1.208	6047	1.278
Contraceptive use	4331	1.055	4013	1.049	4260	1.069

Note: MxFLS 2002,2005-2006, and 2009-2012

Table 3.1 (b). Mean of the variation on women's decision-making power across waves.

	Period	Average variation in decision-making power	Standard error of the variation	Min	Max	t-statistic (Ho: Mean Differnce=0)
Food	2005-2002	0.0368	0.7756	-2	2	3.2057
	2009-2005	0.0273	0.7737	-2	2	2.2821
Children's education	2005-2002	-0.0474	0.6575	-2	2	-4.5143
	2009-2005	-0.1181	0.7082	-2	2	-9.8129
Health care and medicines for children	2005-2002	-0.0600	0.7057	-2	2	-5.3669
	2009-2005	-0.0872	0.7392	-2	2	-7.0012
Large expenditures	2005-2002	0.0741	0.7980	-2	2	6.2526
	2009-2005	-0.0073	0.8147	-2	2	-0.5750
Cash transfers to her parents/relatives	2005-2002	0.1367	0.8177	-2	2	8.1146
	2009-2005	0.0581	0.8365	-2	2	3.0077
If she should work	2005-2002	0.1481	1.0082	-2	2	9.8662
	2009-2005	0.1005	1.0251	-2	2	6.2540
Contraceptive use	2005-2002	-0.0004	0.5157	-2	2	-0.0390
	2009-2005	0.0201	0.5261	-2	2	1.7667

Note: MxFLS 2002,2005-2006, and 2009-2012

Since the analysis considers longitudinal data, it is important to corroborate that the level of women's decision-making power shows some degree of variation over time. Table 3.1 (b) shows the average difference in decision-making power across waves. For each woman in the sample, I calculated the change in their reported level of decision-making power from 2002 to 2005 and from 2005 to 2009, and then averaged these numbers across individuals for each aspect of decision-making. As the level of decision-making power itself can only go from 0 to 2, the average differences across time are not expected to exceed the unit, however they are far enough from zero for most aspects of decision-making. In fact, for 11 out of 14 differences being analysed, the absolute value of the t-statistic associated with the null hypothesis that the average difference is equal to zero is greater than the 5 per cent critical value of 1.96, suggesting that the levels of decision-making power do show variation across time.

3.5 Methodology

One of the key objectives of this paper is to recognise the presence of heterogeneity in the relationship between women's decision-making power and factors such as education and employment across the distribution of power itself. Consequently, the quantitative analysis must treat power as an ordinal measure, considering that decision-making power comes in at least three different levels: non-participation, shared participation and exclusive decision-making. However, this hierarchy refers only to the level of power itself and should not be associated with a measure of wellbeing where women are necessarily better off the more decision-making power they have[25].

3.5.1 Ordered Logit (Proportional Odds Model)

A basic ordered logit model is used as a baseline approach. The main variable of interest is the level of female decision-making power, for which it is only possible to observe three values in the sample: 0, for non-participation, 1, for shared participation and 2 for being the exclusive decision-maker. However, these values can be seen as classifications of a non-observable continuous variable measuring decision-making power.

$$y_{it}^{*} = x_{it}'\beta + \varepsilon_{it} \tag{3.1}$$

Where y_{it}^{*} is a latent variable representing women's decision making power and x_{it} is a vector of observable characteristics including the woman's level of education, work status, age, marital status, age at marriage, whether she has been in previous unions or marriages, whether she belongs to an indigenous ethnic group[26], number of children, age of the children, the proportion of male children, the couple's differences in age, education and power perception, household income as well as the size of the community where she lives in period t. Additionally, region and time fixed effects are included as control variables in order to account for regional heterogeneity and possible trends in the level of decision-making power. β is then the set of regression coefficients measuring the relationship between decision-making power and the woman's characteristics while ε_{i} represents a set of unobserved factors that also have an effect on the dependent variable. However, the model depicted in equation (3.1) cannot be directly estimated since there are only K=3 categories of response, which are related to the latent variable as follows:

$$\begin{aligned} y_i &= 0 \quad (no\ power) \quad if \ -\infty < y_i^{*} \leq \tau_1 \\ y_i &= 1 \quad (shared\ power) \quad if \ \tau_1 < y_i^{*} \leq \tau_2 \\ y_i &= 2 \quad (exclusive\ power) \quad if \ \tau_2 < y_i^{*} \leq \infty \end{aligned} \tag{3.2}$$

[25] The desirability of each level of power will depend on the nature of the decision. However, the discussion of the desirability of each outcome is beyond the scope of this paper.
[26] There are more than 60 indigenous groups in Mexico. This study considers the dummy variable 'Indigenous group' equal to 1 if the person belongs to any of them.

Where the probability of a woman being classified in the k category of decision-making power, given the level of her socioeconomic characteristics (x) can be expressed as:

$$\Pr(y_{it} = k|x_{it}) = \left(\frac{\exp(\tau_{k+1} - x_{it}'\beta)}{\exp(\tau_{k+1} - x_{it}'\beta) + 1}\right) - \left(\frac{\exp(\tau_k - x_{it}'\beta)}{\exp(\tau_k - x_{it}'\beta) + 1}\right) \qquad (3.3)$$

3.5.2 Generalised Ordered Logit (Partial Proportional Odds Model)

An implicit supposition represented in equation (3.3) is the parallel regression assumption, meaning that the parameters measuring the relationship between the explanatory variables and the level of decision-making power are constant across different levels of power, which might not be necessarily true for all parameters. If, for instance, the association between an additional year of education and power is particularly higher for women who have a low level of decision-making power, running a simple ordered logit model might not capture this relationship appropriately. Consequently, the analysis will make use of a generalised order logit model to allow the regression parameters to vary across different levels of decision-making power. In this case, the probability of an individual i having a level of power k, given her socioeconomic characteristics (x) is:

$$\Pr(y_{it} = k|x_{it}) = \left(\frac{\exp(\tau_{k+1} - x_{1it}'\beta_1 - x_{2it}'\beta_{2(k+1)})}{\exp(\tau_{k+1} - x_{1it}'\beta_1 - x_{2it}'\beta_{2(k+1)}) + 1}\right) - \left(\frac{\exp(\tau_k - x_{1it}'\beta_1 - x_{2it}'\beta_{2k})}{\exp(\tau_k - x_{1it}'\beta_1 - x_{2it}'\beta_{2k}) + 1}\right) \qquad (3.4)$$

Where β_1 is the vector of parameters associated with the variables for which the parallel regression assumption holds (subset x_1), and β_{2k} is the vector of parameters associated with the variables for which it does not (subset x_2).

3.5.3 Fixed Effects Ordered Logit Model ('Blow-Up and Cluster' estimator)

The previous approaches treat all observations as if they came from a cross-sectional data set, that is, they do not explicitly exploit the panel structure of the data. In this case, the analysis would benefit from the use of a fixed-effects methodology since there a considerable set of unobservable characteristics that could simultaneously affect women's decision-making power and some of their socioeconomic outcomes. One can think, for instance, on the role that a woman's personality or the way she was brought up play not only on her ability to bargain but also on her willingness to work and go to school. Additionally, applying an individual fixed-effects methodology will allow us to specifically measure how much does the women's decision-making power changes when she increases her education or modifies her work status. When the estimation considers the presence of individual-specific fixed-effects, the latent variable model in equation (3.1) becomes:

$$y_{it}^{*} = x_{it}'\beta + \alpha_i + \varepsilon_{it} \tag{3.5}$$

Where α_i represents a set of time-fixed unobservable characteristics associated with a woman's level of decision-making power (such as: personality, ability to bargain, cultural background). Then, if the model is written in a more general form considering individual-specific thresholds, the probability of any individual i being classified in category k in period t is (Ferrer-i-Carbonell & Frijters, 2004; Baetschmann, Staub, & Winkelmann, 2015):

$$\Pr(y_{it} = k | x_{it}, \alpha_i) = \left(\frac{\exp(\tau_{ik+1} - x_{it}'\beta - \alpha_i)}{\exp(\tau_{ik+1} - x_{it}'\beta - \alpha_i) + 1}\right) - \left(\frac{\exp(\tau_{ik} - x_{it}'\beta - \alpha_i)}{\exp(\tau_{ik} - x_{it}'\beta - \alpha_i) + 1}\right) \tag{3.6}$$

However, the maximum likelihood estimation of equation (3.6) presents a few challenges: firstly, only $\alpha_{ik} = \tau_k - \alpha_i$ can be identified (not α_i, as required); and secondly, under 'fixed-t' asymptotics, it is not possible to estimate α_{ik} consistently due to the incidental parameter problem (Baetschmann, Staub, & Winkelmann, 2015). A simple solution to these problems would be to collapse the dependent variable into a binary variable with only two categories and use the Chamberlain estimator for fixed effects for a logit model. In order to follow this approach, it is necessary to choose an appropriate cut-off point for the dependent variable, each choice giving place to a different estimator.

A few options have been proposed in the literature, the most relevant being: the Ferrer-i-Carbonell and Frijters estimator (Ferrer-i-Carbonell & Frijters, 2004), the Das and Van Soest two-step estimator (Das & Van Soest, 1999) and the Blow-Up and cluster estimator, developed by Baetschmann, Staub, & Winkelmann (2015). The Ferrer-i-Carbonell and Frijters methodology finds an optimal cutoff point for every individual by minimising the Hessian matrix at a preliminary estimate of the regression coefficient β. Conversely, the Das and Van Soest approach estimates the model for all the possible cutoffs and then combining the results in a second stage, in which different weights are assigned to each estimator according to their variance. Finally, the Blow-Up and Cluster estimator estimates all possible cutoffs jointly by replicating K-1 times every observation, and choosing a different cut-off point for each of them. Then, a Conditional Maximum Likelihood logit is applied using the whole sample.

In a recent simulation experiment by Baestschmann, Staub and Winkelmann it has been found that the Ferrer-i-Carbonell and Fijeters estimator is actually biased, while both the Das and Van Soest and the Blow-Up and Cluster estimators generally perform well (Baetschmann, Staub, & Winkelmann, 2015). However, the Das and Van Soest estimator could still show a few problems, especially in small samples. Specifically, there is a possibility that the variance matrix for the regression coefficients could contain very few non-zero components leading to an imprecise estimation, which could happen if there is only a minor overlap between the samples derived from different dichotomisations. In other words, there could be a problem if the number of observations in certain categories of the dependent variable is particularly small (Dickerson, Hole, & Munford, 2014).

For these reasons, the regression analysis in this chapter follows the Blow-Up and Cluster approach suggested by Baetschmann, Staub, & Winkelmann (2015), which is the only one that has been shown to yield consistent estimators even when the number of cases for some categories is small. In this case the Blow-Up and Cluster estimator is slightly more preferable than the Das and Van Soest one, due to the small number of women belonging to a few categories (for instance, not having a say in food-related decisions, or exclusive decision-making regarding large expenditures)[27]. In order to calculate the BUC estimators the author makes use of the Stata routine developed by Dickerson, Hole and Munford (2014)[28].

[27] However, the Das and Van Soest estimators are also provided as a robustness check in Appendix D, section II, Table DII-3.4.
[28] As the authors point out, the code originally presented by Baetschmann, Staub, & Winkelmann (2015) can inadvertently drop observations in some cases.

3.6 Results

Results are presented as follows. First, subsection 3.6.1 shows the results of estimating equation (3.3) using cross-sectional variation in the ordered logit model. Next, subsection 3.6.2 presents the results of relaxing the parallel regression assumption by running a generalised ordered logit regression (specifically, the partial proportional odds model). Third, the 'Blow-Up and Cluster' methodology is applied to get fixed effects estimates that exploit within-individual variation in the ordered logit model. Finally, the estimation allows for the presence of quadratic effects in the relationship between education and power, also studying the impact of diverging from community standards in education, in terms of locality averages.

3.6.1 Ordered Logit (OL).

The decision-making processes considered in this study are clustered into four categories: daily life, children's wellbeing, economic decisions, and autonomy[29]. For each aspect of decision-making, the study estimates the association between a set of characteristics at the individual, couple, household and community level, and the degree of decision-making power reported by the woman and her partner, as shown in Tables 3.2a and 3.2b, respectively. The coefficients in these tables represent the change in the log-odds given a change in a covariate, holding the rest of the variables constant. However, the reader should keep in mind that the coefficients shown in Tables 3.2a and 3.2b should not be interpreted in a strict causal manner, especially regarding those associated with "work" in the decisions about women's autonomy, which might face endogeneity problems due to the presence of reverse causality. For instance, women who work also reported to have a higher level of power regarding their decision to work, but it is not possible to know the direction of the causality. Similarly, if a woman has more power to decide on whether she uses contraceptives she might be less likely to get pregnant and more likely to work.

[29] Although fertility decisions affect the lives of both: wife and husband, contraceptive use can be seen as a measure of women's control over when to get pregnant, representing her level of autonomy over her own body.

Table 3.2a: Ordered Logit estimates, based on women's opinion.

	Daily Life	Children's wellbeing		Economic decisions		Autonomy	
	Food	Children's Education	Children's Health Care	Large Expenditures	Cash Transfers to Her Relatives	If She Should Work	Contraceptive Use
Individual Level							
Education (years)	-0.004	-0.004	0.013*	0.015**	0.040***	0.059***	0.048***
	(0.007)	(0.008)	(0.007)	(0.007)	(0.007)	(0.006)	(0.010)
Work	-0.193***	0.234***	0.204***	0.683***	0.325***	0.546***	0.185**
	(0.052)	(0.061)	(0.057)	(0.051)	(0.056)	(0.046)	(0.077)
Age	0.046***	-0.005	-0.001	0.010*	0.016**	0.026***	0.012
	(0.007)	(0.008)	(0.007)	(0.006)	(0.007)	(0.006)	(0.010)
Married	0.237***	-0.035	-0.016	0.029	-0.105	-0.118**	-0.041
	(0.060)	(0.068)	(0.066)	(0.061)	(0.070)	(0.058)	(0.096)
Age at marriage	-0.022***	0.002	0.001	0.002	-0.017**	0.001	-0.019*
	(0.006)	(0.009)	(0.007)	(0.006)	(0.007)	(0.006)	(0.010)
Previous unions	0.118	0.450***	0.436***	0.127	0.306***	0.180*	0.129
	(0.103)	(0.134)	(0.120)	(0.099)	(0.114)	(0.097)	(0.166)
Indigenous group	-0.251***	-0.064	-0.056	-0.002	0.040	-0.019	-0.429***
	(0.070)	(0.081)	(0.079)	(0.069)	(0.081)	(0.068)	(0.123)
Number of children	0.017	0.089***	0.076***	0.046***	-0.001	0.003	0.021
	(0.018)	(0.020)	(0.017)	(0.016)	(0.019)	(0.015)	(0.026)
Age of children (mean)	-0.009	-0.106***	-0.076***	-0.001	0.006	0.007	-0.017
	(0.007)	(0.010)	(0.009)	(0.007)	(0.008)	(0.006)	(0.011)
Proportion of male children	0.018	-0.063	-0.117*	-0.129**	-0.190***	-0.056	0.047
	(0.064)	(0.068)	(0.067)	(0.060)	(0.069)	(0.058)	(0.094)
Couple Level							
Difference in Age	-0.001	-0.001	0.005	0.001	-0.001	-0.005	-0.006
	(0.004)	(0.005)	(0.005)	(0.004)	(0.005)	(0.004)	(0.007)
Difference in Education	0.000	0.014**	0.017***	0.021***	0.004	-0.000	0.010*
	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)	(0.004)	(0.006)
Household Level: Quantile of Net Income							
2nd	-0.013	0.018	0.022	0.030	0.007	-0.007	0.123
	(0.064)	(0.070)	(0.067)	(0.064)	(0.071)	(0.059)	(0.100)
3rd	-0.002	-0.020	0.071	-0.042	0.142**	0.099*	0.079
	(0.063)	(0.070)	(0.068)	(0.063)	(0.071)	(0.059)	(0.097)
4th	0.052	-0.082	0.014	0.099	0.116	0.152**	0.112
	(0.069)	(0.078)	(0.076)	(0.067)	(0.077)	(0.063)	(0.104)
Community/Locality Level: Population (Base: Less than 2,500)							
Between 2,500 and 15,000	0.149*	0.069	0.097	-0.015	0.167**	0.097	0.150
	(0.079)	(0.081)	(0.078)	(0.071)	(0.082)	(0.066)	(0.106)
Between 15,000 and 100,000	0.057	-0.044	0.036	0.018	0.072	0.129*	0.108
	(0.077)	(0.086)	(0.081)	(0.075)	(0.082)	(0.071)	(0.104)
More than 100,000	0.062	-0.024	0.061	-0.030	0.227***	0.287***	0.143*
	(0.056)	(0.061)	(0.060)	(0.054)	(0.061)	(0.050)	(0.082)
Region (Base: North)							
Center-North	0.137	-0.192*	-0.142	-0.327***	0.068	-0.063	-0.064
	(0.098)	(0.104)	(0.100)	(0.096)	(0.099)	(0.085)	(0.152)
Center	0.218**	-0.197*	-0.301***	-0.388***	0.203*	0.037	-0.246
	(0.103)	(0.112)	(0.106)	(0.102)	(0.111)	(0.093)	(0.159)
South	-0.034	-0.249**	-0.432***	-0.216**	-0.190*	0.170*	-0.286*
	(0.107)	(0.113)	(0.111)	(0.102)	(0.107)	(0.092)	(0.160)
Year (Base: 2002)							
2005	-0.161	-0.265**	-0.525***	0.083	0.326***	0.221**	-0.352**
	(0.103)	(0.113)	(0.107)	(0.098)	(0.102)	(0.087)	(0.140)
2009	0.092	-0.128	-0.198	0.043	0.536***	0.513***	0.110
	(0.114)	(0.141)	(0.132)	(0.112)	(0.120)	(0.103)	(0.174)
τ1	-1.443***	-3.513***	-2.923***	-0.138	-1.261***	0.661***	-2.684***
	(0.177)	(0.195)	(0.183)	(0.166)	(0.183)	(0.158)	(0.284)
τ2	0.838***	0.749***	0.918***	3.191***	1.700***	2.438***	2.483***
	(0.172)	(0.189)	(0.179)	(0.171)	(0.182)	(0.160)	(0.279)
Pseudo R-squared	0.025	0.064	0.037	0.025	0.024	0.041	0.014
Wald Chi-Square	327.991	665.641	434.572	417.665	332.947	771.891	116.188
N. of cases	9476	9301	9355	9446	7116	9445	7726

Note: MxFLS 2002,2005-2006, and 2009-2012. Dependent variable: women's perception of their own power as an ordered measure ("0", "1" or "2"). The stars in the estimated coefficients indicate their significance (***p<0.01, ** p<0.05, * p<0.10), clustered standard errors by household in parenthesis (since women living in the same household face similar living conditions that might have an effect on their level of power, unobserved components in the outcome variable for women within one household are likely to be correlated). The estimation also includes interaction terms between region and year.

Table 3.2b: Ordered Logit estimates, based on the partner's opinion.

	Daily Life	Children's wellbeing		Economic decisions		Autonomy	
	Food	Children's Education	Children's Health Care	Large Expenditures	Cash Transfers to Her Relatives	If She Should Work	Contraceptive Use
Individual Level							
Education (years)	0.006	0.003	0.012	0.025***	0.030***	0.051***	0.041***
	(0.007)	(0.008)	(0.008)	(0.007)	(0.007)	(0.006)	(0.012)
Work	-0.173***	0.190***	0.116**	0.574***	0.184***	0.565***	0.144*
	(0.049)	(0.060)	(0.057)	(0.051)	(0.056)	(0.046)	(0.086)
Age	0.023***	-0.014*	-0.010	0.002	0.011*	0.018***	-0.004
	(0.006)	(0.008)	(0.007)	(0.006)	(0.007)	(0.005)	(0.011)
Married	0.188***	0.167**	0.089	0.009	-0.087	-0.095*	0.068
	(0.057)	(0.073)	(0.071)	(0.061)	(0.069)	(0.056)	(0.104)
Age at marriage	-0.016***	0.009	0.001	0.013**	-0.013*	0.008	0.007
	(0.006)	(0.009)	(0.008)	(0.006)	(0.007)	(0.006)	(0.011)
Previous unions	0.169*	0.295**	0.269**	0.088	0.284***	0.033	-0.247
	(0.095)	(0.140)	(0.125)	(0.099)	(0.106)	(0.094)	(0.156)
Indigenous group	-0.168**	0.103	0.113	0.164**	-0.057	-0.049	-0.019
	(0.065)	(0.084)	(0.079)	(0.069)	(0.079)	(0.064)	(0.125)
Number of children	0.030*	0.099***	0.081***	0.038**	-0.020	-0.003	-0.019
	(0.016)	(0.020)	(0.019)	(0.016)	(0.019)	(0.015)	(0.029)
Age of children (mean)	0.013*	-0.105***	-0.075***	0.006	0.007	0.013**	0.021*
	(0.007)	(0.009)	(0.008)	(0.007)	(0.008)	(0.006)	(0.012)
Proportion of male children	0.015	-0.087	-0.068	-0.046	-0.066	-0.039	-0.092
	(0.059)	(0.070)	(0.070)	(0.061)	(0.067)	(0.056)	(0.099)
Couple Level							
Difference in Age	0.005	0.003	0.005	-0.006	0.000	0.001	-0.005
	(0.004)	(0.005)	(0.005)	(0.004)	(0.005)	(0.004)	(0.008)
Difference in Education	-0.008	0.018***	0.017***	0.008*	-0.002	-0.015**	0.003
	(0.007)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.010)
Household Level: Quantile of Net Income							
2nd	0.022	0.179**	0.165**	-0.042	0.018	0.003	0.102
	(0.061)	(0.077)	(0.072)	(0.063)	(0.071)	(0.060)	(0.111)
3rd	-0.005	0.066	0.128*	-0.088	0.115*	0.061	0.160
	(0.060)	(0.074)	(0.072)	(0.063)	(0.069)	(0.059)	(0.106)
4th	-0.036	-0.066	0.057	-0.100	0.108	0.136**	0.200*
	(0.065)	(0.080)	(0.078)	(0.068)	(0.076)	(0.063)	(0.116)
Community/Locality Level: Population (Base: Less than 2,500)							
Between 2,500 and 15,000	0.082	0.109	0.039	-0.129*	0.183**	0.052	0.117
	(0.070)	(0.078)	(0.075)	(0.071)	(0.081)	(0.066)	(0.115)
Between 15,000 and 100,000	0.177**	-0.041	-0.023	-0.202***	0.215***	0.098	-0.096
	(0.076)	(0.087)	(0.086)	(0.074)	(0.080)	(0.070)	(0.116)
More than 100,000	0.174***	0.155**	0.056	-0.120**	0.173***	0.147***	-0.108
	(0.052)	(0.063)	(0.063)	(0.054)	(0.059)	(0.051)	(0.090)
Region (Base: North)							
Center-North	0.230**	-0.273**	-0.231**	-0.221**	0.147	0.107	0.100
	(0.090)	(0.110)	(0.109)	(0.100)	(0.095)	(0.082)	(0.168)
Center	-0.130	-0.492***	-0.179	-0.395***	0.306***	0.159*	-0.003
	(0.094)	(0.120)	(0.115)	(0.106)	(0.109)	(0.090)	(0.168)
South	0.075	-0.325***	-0.350***	-0.373***	0.105	0.378***	-0.206
	(0.098)	(0.122)	(0.122)	(0.107)	(0.104)	(0.095)	(0.175)
Year (Base: 2002)							
2005	0.113	-0.223**	-0.281**	0.015	0.406***	0.360***	-0.003
	(0.096)	(0.111)	(0.117)	(0.107)	(0.101)	(0.084)	(0.150)
2009	0.205*	-0.510***	-0.531***	-0.430***	0.567***	0.305***	-0.206
	(0.106)	(0.136)	(0.137)	(0.112)	(0.122)	(0.103)	(0.196)
τ1	-1.179***	-3.222***	-2.821***	-0.195	-1.243***	0.681***	-2.257***
	(0.162)	(0.203)	(0.194)	(0.169)	(0.185)	(0.153)	(0.287)
τ2	0.962***	1.287***	1.362***	3.442***	1.650***	2.273***	3.252***
	(0.160)	(0.198)	(0.190)	(0.179)	(0.185)	(0.155)	(0.291)
Pseudo R-squared	0.021	0.079	0.045	0.019	0.014	0.034	0.009
Wald Chi-Square	320.908	822.560	490.833	285.718	192.242	663.135	66.105
N. of cases	9432	9224	9289	9406	7267	9419	7784

Note: MxFLS 2002,2005-2006, and 2009-2012. Dependent variable: husband/partner's perception of women's power as an ordered measure ("0", "1" or "2"). The stars in the estimated coefficients indicate their significance (***p<0.01, ** p<0.05, * p<0.10), clustered standard errors by household in parenthesis. The estimation also includes interaction terms between region and year.

A quick comparison between Tables 3.2a and 3.2b show that most of the explanatory variables have a similar association with women's decision-making power, regardless of what answers are considered in the analysis: the woman's own or her partner's. As expected, an additional year of education is significantly associated with increased power in decisions regarding large expenditures, cash transfers to her relatives, her work status and contraceptive use. On the other hand, being employed has a strong positive correlation with power, on all aspects of decision-making[30], except food choices, for which the association is negative. This result should not be surprising since working women are more likely to share or even delegate household responsibilities (such as food purchases), as their opportunity cost of spending time at home or the supermarket is higher than for non-working women. At the couple level, the number of extra years of education a woman has in comparison with her partner, has a significant positive association with decision-making power regarding children's wellbeing and large expenditures. Regarding the variables at the household level, results in Tables 3.2a and 3.2b suggest that, in comparison with women in the poorest quarter of the sample, women living in the third and fourth quantiles of income tend to have more decision-making power regarding cash transfers to her relatives and her own work status, respectively. Intuitively, the positive relationship between family income and women's power can be explained by the traditional nature of Mexican society and the connection between income and the external influences the household is exposed to. For instance, individuals living in high-income households are more likely to have international exposure (through travels, education, social circles) and consequently be more aware of the existence of less traditional cultural environments where women tend to be more independent. In contrast, poor households' cultural framework is likely to revolve around local values and social norms, which in the Mexican case tend to be highly traditional and gender-stratified. Also, the characteristics of the community where the woman lives are likely to be correlated with the way the household makes decisions and the extent to which women are allowed to negotiate. In this case, the size of the community is considered as a proxy for conservativeness or traditionalism, which can have an important association with women's power. As expected, women living in big localities and cities with more than

[30] The results also suggest a positive relationship between working and participation in the decision of whether she should work. However, since this particular coefficient is likely to be biased due to reverse causality issues, one should limit the interpretation of its positive sign to a result of the fact that women who reported to be working also reported a relatively high level of decision-making power in that matter. A more detailed analysis of this particular relationship is beyond the scope of this study.

100,000 inhabitants are significantly more likely to have power regarding cash transfers and work status, in comparison with women living in small towns with less than 2,500 people. Lastly, the estimation includes region and time fixed effects to capture any general differences in women's power across the country and through time. Since most of the coefficients associated with the region dummies included in the analysis have negative signs and are highly significant, the analysis suggests that women living in the north of the country (base category) have higher levels of power than those living in other regions, these differences being especially significant for decisions regarding children's wellbeing and large expenditures. This result is consistent with well-known sociocultural differences between the north and the rest of the country[31]. With respect to 2002, women's decision-making power regarding children's health care significantly reduced in 2005. At the same time, women's power regarding cash transfers and work status in 2005 and 2009 significantly increased with respect to 2002.

The previous results seem to suggest that, at least in this particular case, taking the responses of women or the ones of their husbands/partners does not modify much the estimated correlations between women's socioeconomic characteristics and their level of decision-making power. For this reason, the quantitative analysis from this point will focus on women's responses and will consider women's perception of their own power as the main dependent variable of interest.

A note on the employment-power relationship and the woman's individual contribution to the couple's income.

So far, the study of the relationship between employment status and women's decision-making power has been focusing on the analysis of whether the woman is in employment or not. However, it is quite possible that at least part of this relationship is driven by the actual contribution that the woman provides to the couple's income, which will be greater than zero for working women. In other words, the 'employment effect' might have a lot to do with the 'individual income' effect. Table DII-3.2a in Appendix D, Section II shows the results from including an additional variable

[31] For historical reasons the centre and south of the country have a richer cultural heritage and are more 'traditional' than the north, a region that has a strong cultural influence from the United States.

"woman's individual contribution to the couple's income", in the couple-level set of variables.

For most aspects of decision-making the 'work status effect' seems to be largely driven by the level of the woman's individual contribution to the couple's income, which is positively and significantly correlated with power for most aspects of decision-making, expect food choices. However, the fact alone that the woman works, independently from her income contribution, does still seem to have a positive and significant relationship with her level of decision-making power regarding large expenditures, just as in the previous estimations.

However, since the objective of this chapter is to measure the general effect of employment status, rather the individual components of the employment-power relationship, the rest of the analysis will continue to study the association between a woman being employed and her level of intrahousehold decision-making power.

3.6.2 Generalised Ordered Logit (Partial Proportional Odds Model).

Previously, the analysis assumed that the correlation between decision-making power and the woman's characteristics at the individual, couple, household and community level is the same for all levels of power. In other words, it has been assumed that each regressor has the same coefficient when analysing women who pass from non-participation to having any level power (from power category '0' to either '1' or '2') as from having none or limited power to becoming exclusive decision-makers (from power categories '0' or '1' to '2'). In this subsection the analysis uses women's perception of their own power as the dependent variable while relaxing the 'parallel regression assumption' by applying a partial proportional odds model on the set of specifications previously presented in Table 3.2a. Table 3.3 shows the results of fitting such a model for each aspect of intrahousehold decision-making, allowing the regression coefficients to change across different levels of power when the parallel regression assumption has been violated[32]. For each decision, column (1) represents the association of each of the explanatory variables with the log odds of moving from category '0: no power' to categories '1: shared power' or '2: exclusive power', whilst column (2) shows the effect of each variable on the log odds of moving from categories '0: no power' or '1: shared

[32] The tests for the parallel regression assumption used in the Stata routine that fits the partial proportional odds models consider a significance level of 5 percent (see Table B4 in Appendix B).

power' to category '2: exclusive power'. For instance, a positive coefficient for a variable in column (1) means that variable has a positive correlation with the probability of acquiring some power (either sharing it or being exclusive decision-maker). Analogously, a positive coefficient associated with a variable in column (2) means that such variable has a positive relationship with the probability of having exclusive power.

Table 3.3: Generalised Ordered Logit estimates (Partial Proportional Odds)

	Daily Life		Children's Wellbeing				Economic Decisions				Autonomy			
	Food		Children's Education		Children's Health Care		Large Expenditures		Cash Transfers to Her Relatives		If She Should Work		Contraceptive Use	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Individual Level														
Education (years)	-0.004	-0.004	0.028**	-0.044***	0.053***	-0.018*	0.024***	-0.006	0.079***	0.031***	0.094***	0.046***	0.129***	0.016
	(0.007)	(0.007)	(0.011)	(0.011)	(0.011)	(0.009)	(0.007)	(0.011)	(0.012)	(0.008)	(0.008)	(0.007)	(0.017)	(0.011)
Work	-0.189***	-0.189***	0.175***	0.175***	0.162***	0.162***	0.801***	0.400***	0.599***	0.278***	0.950***	0.433***	0.197**	0.197**
	(0.052)	(0.052)	(0.061)	(0.061)	(0.056)	(0.056)	(0.061)	(0.087)	(0.112)	(0.061)	(0.075)	(0.052)	(0.077)	(0.077)
Age	0.079***	0.042***	-0.047***	0.002	-0.023***	0.000	0.007	0.022***	0.016**	0.016**	0.020***	0.032***	0.012	0.012
	(0.010)	(0.006)	(0.009)	(0.008)	(0.008)	(0.007)	(0.006)	(0.007)	(0.007)	(0.007)	(0.006)	(0.006)	(0.009)	(0.009)
Married	0.230***	0.230***	-0.074	-0.074	0.160	-0.132*	0.069	-0.171	0.128	-0.180**	-0.012	-0.182***	0.207	-0.189*
	(0.060)	(0.060)	(0.074)	(0.074)	(0.106)	(0.077)	(0.065)	(0.111)	(0.102)	(0.073)	(0.071)	(0.064)	(0.127)	(0.105)
Age at marriage	-0.022***	-0.022***	0.006	0.006	0.004	0.004	0.008	-0.017*	-0.016**	-0.016**	0.012*	-0.005	-0.016*	-0.016*
	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.010)	(0.007)	(0.007)	(0.007)	(0.006)	(0.010)	(0.010)
Previous unions	-0.241	0.153	-0.219	0.670***	-0.002	0.543***	0.019	0.413***	0.285**	0.285**	-0.045	0.281***	0.090	0.090
	(0.170)	(0.100)	(0.145)	(0.119)	(0.151)	(0.113)	(0.101)	(0.154)	(0.111)	(0.111)	(0.116)	(0.098)	(0.153)	(0.153)
Indigenous group	-0.244***	-0.244***	-0.053	-0.053	-0.044	-0.044	0.007	0.007	0.046	0.046	-0.003	-0.003	-0.737***	-0.083
	(0.070)	(0.070)	(0.084)	(0.084)	(0.081)	(0.081)	(0.069)	(0.069)	(0.081)	(0.081)	(0.066)	(0.066)	(0.142)	(0.135)
Number of children	0.017	0.017	0.096***	0.040*	0.094***	0.035*	0.044***	0.044***	0.001	0.001	0.005	0.005	0.077**	-0.010
	(0.018)	(0.018)	(0.023)	(0.022)	(0.022)	(0.019)	(0.016)	(0.016)	(0.019)	(0.019)	(0.015)	(0.015)	(0.035)	(0.030)
Age of children (mean)	-0.040***	-0.005	-0.132***	-0.042***	-0.107***	-0.024***	-0.001	-0.001	-0.009	0.010	0.006	0.006	-0.017	-0.017
	(0.012)	(0.007)	(0.009)	(0.009)	(0.008)	(0.007)	(0.007)	(0.007)	(0.009)	(0.008)	(0.006)	(0.006)	(0.011)	(0.011)
Proportion of male children	0.018	0.018	-0.069	-0.069	-0.124*	-0.124*	-0.134**	-0.134**	-0.189***	-0.189***	-0.062	-0.062	0.042	0.042
	(0.064)	(0.064)	(0.073)	(0.073)	(0.069)	(0.069)	(0.061)	(0.061)	(0.069)	(0.069)	(0.058)	(0.058)	(0.094)	(0.094)
Couple Level														
Difference in Age	-0.001	-0.001	-0.000	-0.000	0.005	0.005	0.001	0.001	-0.001	-0.001	-0.005	-0.005	0.016*	-0.020**
	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.004)	(0.004)	(0.005)	(0.005)	(0.004)	(0.004)	(0.009)	(0.008)
Difference in Education	0.000	0.000	-0.002	0.052***	0.010	0.033***	0.021***	0.021***	0.004	0.004	-0.001	-0.001	0.010*	0.010*
	(0.005)	(0.005)	(0.008)	(0.012)	(0.008)	(0.010)	(0.005)	(0.005)	(0.005)	(0.005)	(0.004)	(0.004)	(0.006)	(0.006)
Household Level: Quantile of Net Income														
2nd	-0.010	-0.010	-0.018	-0.018	-0.001	-0.001	0.032	0.032	0.016	0.016	-0.006	-0.006	0.127	0.127
	(0.064)	(0.064)	(0.073)	(0.073)	(0.070)	(0.070)	(0.063)	(0.063)	(0.071)	(0.071)	(0.058)	(0.058)	(0.098)	(0.098)
3rd	-0.004	-0.004	-0.017	-0.017	0.059	0.059	-0.040	-0.040	0.146**	0.146**	0.096*	0.096*	0.069	0.069
	(0.063)	(0.063)	(0.073)	(0.073)	(0.070)	(0.070)	(0.063)	(0.063)	(0.071)	(0.071)	(0.058)	(0.058)	(0.096)	(0.096)
4th	0.054	0.054	-0.052	-0.052	0.023	0.023	0.113*	0.113*	0.131*	0.131*	0.169***	0.169***	0.135	0.135
	(0.069)	(0.069)	(0.080)	(0.080)	(0.077)	(0.077)	(0.068)	(0.068)	(0.077)	(0.077)	(0.064)	(0.064)	(0.105)	(0.105)
Community/Locality Level: Population (Base: Less than 2,500)														
Between 2,500 and 15,000	-0.262**	0.187**	0.082	0.082	0.123	0.123	-0.018	-0.018	0.161*	0.161*	0.093	0.093	0.157	0.157
	(0.133)	(0.077)	(0.085)	(0.085)	(0.084)	(0.084)	(0.071)	(0.071)	(0.083)	(0.083)	(0.066)	(0.066)	(0.110)	(0.110)
Between 15,000 and 100,000	0.047	0.047	-0.045	-0.045	0.048	0.048	0.020	0.020	0.059	0.059	0.119	0.119	0.109	0.109
	(0.077)	(0.077)	(0.091)	(0.091)	(0.085)	(0.085)	(0.076)	(0.076)	(0.086)	(0.086)	(0.073)	(0.073)	(0.113)	(0.113)
More than 100,000	0.051	0.051	-0.007	-0.007	-0.150*	0.203***	-0.041	-0.041	-0.041	0.297***	0.281***	0.281***	-0.130	0.238***
	(0.056)	(0.056)	(0.063)	(0.063)	(0.081)	(0.069)	(0.054)	(0.054)	(0.092)	(0.064)	(0.050)	(0.050)	(0.127)	(0.091)
Constant	0.844***	-0.723***	5.226***	-1.285***	3.556***	-1.259***	-0.037	-2.866***	1.144***	-1.681***	-0.882***	-2.397***	1.627***	-2.170***
	(0.252)	(0.164)	(0.311)	(0.216)	(0.279)	(0.200)	(0.170)	(0.268)	(0.209)	(0.184)	(0.187)	(0.167)	(0.309)	(0.265)
Pseudo R-squared	0.027		0.122		0.077		0.030		0.031		0.054		0.031	
Wald Chi-Square	356.464		1860.333		1569.761		469.628		389.865		955.704		238.725	
N. of cases	9476		9301		9355		9446		7116		9445		7726	

Note: MxFLS 2002,2005-2006, and 2009-2012. Dependent variable: women's perception of their own power as an ordered measure ("0", "1" or "2"). The stars in the estimated coefficients indicate their significance (***p<0.01, ** p<0.05, * p<0.10), clustered standard errors by household in parenthesis. The estimation also includes time and region dummies as well as their interaction terms.

Results show that the relationship between women's education and decision-making power is rather heterogeneous across levels of power. In the case of decisions regarding children wellbeing, for instance, one additional year of education is only positively associated with power in column (1), meaning that having more years of education is associated with an increase in the likelihood of passing from no role in decisions about children to a shared role in these decisions. However, further education is not positively correlated with the likelihood of passing from shared power to exclusive decision-making. Arguably, educated women realise that exclusive decision-making in these areas is not optimal. Moreover, education could allow women to share power regarding large expenditures, cash transfers to her relatives, whether she should work and contraceptive use. In the case of cash transfers and her work status, education is positively associated with the likelihood of passing from no control to shared control, and from shared control to exclusive control, albeit the magnitude of the second correlation is half as large as the first one. Considering that exclusive decision-making power is the optimal outcome for the decision of whether she should work[33], it is clear that education is positively associated a result that is highly desirable. The correlation between the woman's working status and her level of power, on the other hand, seems to be fairly homogenous across different levels of power. However, the magnitude of the relationship is significantly different for some decisions. In the case of large expenditures, cash transfers for her relatives and her work status, the positive coefficient associated with having a job is higher in column (1). This result implies that even though working is positively associated with the probability of being exclusive decision-maker in these matters, this relationship is even stronger regarding women's likelihood to share power. Similarly, the couple's difference in education has a significant positive association with decision-making power regarding children's wellbeing, large expenditures and contraceptive use. In the specific case of children-related decisions, women who are more educated than their partners are significantly more likely to be exclusive decision-makers, as opposed to sharing power. Even though having both parents sharing power regarding children's decisions is theoretically the most desirable outcome, leaving these matters in the hands of the most educated parent could also be an optimal choice if education provides individuals with knowledge and ability that might help them make better decisions.

[33] Since cash transfers to her relatives do not necessarily involve changes to the woman's lifestyle as her work status does, and given the fact that this decision is likely to affect other members of the household in a direct way, the question of whether cash transfer to her relatives should also be a matter of exclusive power is subject to discussion.

3.6.3 Fixed Effects Ordered Logit Model ('Blow-Up and Cluster' estimation)

Table 3.4 shows the results of using the 'Blow-Up and Cluster' methodology developed by Baetschmann, Staub and Winkelmann (2015). Each coefficient presented in Table 3.4 measures how much the level of decision-making power of a woman changes when a given explanatory variable is modified by one unit, holding constant all other aspects of the individual that are fixed over time and might be having an effect on her decision-making power.

Table 3.4: Fixed Effects Ordered Logit estimates (BUC)

	Daily Life	Children's wellbeing		Economic decisions		Autonomy	
	Food	Children's Education	Children's Health Care	Large Expenditures	Cash Transfers to Her Relatives	If She Should Work	Contraceptive Use
Individual Level							
Education (years)	0.003	-0.015	-0.024	0.014	-0.034	-0.008	0.105*
	(0.028)	(0.031)	(0.028)	(0.025)	(0.030)	(0.025)	(0.058)
Work	-0.014	0.051	0.115	0.346***	0.170	0.349***	0.199
	(0.105)	(0.111)	(0.103)	(0.101)	(0.123)	(0.092)	(0.156)
Age	-0.062	-0.141**	-0.139**	0.023	-0.015	-0.005	-0.088
	(0.051)	(0.064)	(0.058)	(0.054)	(0.067)	(0.052)	(0.094)
Married	1.113	0.519	0.329	0.692	1.132	0.747	0.808
	(0.779)	(0.612)	(0.613)	(0.643)	(0.844)	(0.679)	(0.687)
Age at marriage	0.015	0.046	0.030	0.005	-0.076	-0.053	0.011
	(0.038)	(0.045)	(0.042)	(0.042)	(0.048)	(0.037)	(0.069)
Previous unions	2.069	14.468***	14.477***	-12.591***	-11.388***	0.411	13.834***
	(1.485)	(1.332)	(0.801)	(0.798)	(1.499)	(1.142)	(1.228)
Number of children	-0.257	0.397	0.334	-0.030	0.112	-0.039	-0.298
	(0.251)	(0.299)	(0.206)	(0.152)	(0.299)	(0.164)	(0.367)
Age of children (mean)	-0.018	-0.077**	-0.060**	0.006	0.005	0.038*	-0.035
	(0.019)	(0.032)	(0.026)	(0.020)	(0.027)	(0.021)	(0.032)
Proportion of male children	0.058	-0.560*	-0.483	-0.080	-0.071	-0.056	-0.706
	(0.283)	(0.340)	(0.310)	(0.279)	(0.349)	(0.270)	(0.444)
Couple Level							
Difference in Age	0.027	0.045	0.015	-0.033	0.020	0.023	-0.015
	(0.027)	(0.036)	(0.033)	(0.026)	(0.035)	(0.027)	(0.041)
Difference in Education	0.001	0.020	0.023**	0.009	0.024*	0.013	-0.060
	(0.012)	(0.013)	(0.011)	(0.010)	(0.013)	(0.010)	(0.042)
Household Level: Quantile of Net Income							
2nd	0.045	0.090	0.008	0.033	-0.038	-0.029	0.134
	(0.102)	(0.113)	(0.107)	(0.094)	(0.126)	(0.088)	(0.152)
3rd	0.103	-0.076	0.012	-0.071	0.150	0.018	-0.081
	(0.108)	(0.117)	(0.113)	(0.100)	(0.131)	(0.092)	(0.163)
4th	0.143	-0.059	0.057	0.091	0.155	-0.008	-0.105
	(0.121)	(0.130)	(0.126)	(0.111)	(0.147)	(0.105)	(0.193)
Community/Locality Level: Population (Base: Less than 2,500)							
Between 2,500 and 15,000	0.337	-0.333	-0.067	-0.266	-0.096	-0.013	0.374
	(0.260)	(0.303)	(0.291)	(0.232)	(0.323)	(0.238)	(0.347)
Between 15,000 and 100,000	0.096	-0.296	-0.335	0.259	-0.219	-0.161	0.458
	(0.321)	(0.392)	(0.349)	(0.296)	(0.389)	(0.287)	(0.445)
More than 100,000	-0.242	0.970***	0.785***	0.030	-0.015	-0.242	0.429
	(0.258)	(0.298)	(0.288)	(0.235)	(0.391)	(0.229)	(0.404)
Pseudo R-squared	0.017	0.057	0.032	0.018	0.052	0.058	0.021
Wald Chi-Square	970.134	1194.770	924.282	370.344	270.147	1167.467	621.583
N. of cases	4562	3694	4146	5157	3388	7194	1709
N. of groups/clusters	1528	1280	1427	1744	1214	2089	649

Note: MxFLS 2002,2005-2006, and 2009-2012. Dependent variable: women's perception of their own power as an ordered measure ("0", "1" or "2"). The stars in the estimated coefficients indicate their significance (***p<0.01, ** p<0.05, * p<0.10), clustered standard errors by household in parenthesis (since the analysis should recognise the fact that observations within one household are not independent and they might show similar variations over time). The estimation originally includes region, time and their interaction terms, however they were automatically omitted for some of the columns, due to lack of within-variation.

Since some of the woman's characteristics are not likely to change over time, it is not surprising that for most aspects of decision-making the significance of many explanatory variables reduces when the estimation considers only within-individual variations. On the other hand, there are some characteristics at the individual, couple, and community level that are still significant under a fixed effect specification. Education, for instance, seems to have a significant positive association with power regarding contraceptive use, meaning that when women increase their level of education they become more likely to have a say in this matter. Similarly, when a woman gets a job (i.e., her work status variable changes from '0' to '1'), her odds of participation in decision-making regarding large expenditures significantly increases by a factor of 1.4 ($e^{0.346} = 1.4$). Results also suggest that women who got a job in the period of analysis also reported an increase in her level of decision-making power regarding her work status. Also, acquiring an additional year of education in comparison with their partner makes women significantly more powerful on decisions regarding children's health care and cash transfers to her relatives.

Results do not change much when the alternative Das and Van Soest two-step estimator is used (see Appendix D, Section II, Table DII-3.4), however not all the regressions can be estimated (lack of convergence) in this case mostly due to the small degree of variation in some aspects of decision-making. Just as in the previous estimations, results suggest a positive relationship between marriage and women's decision-making power for food-related choices and cash transfers, these correlations being statistically significant this time. Also, the negative relationship between age at marriage and power found before now seems to become significant. Similarly, the negative association between having previous unions and power regarding large expenditures, cash transfers and whether she should work is still large in size and significant at 1 per cent, just as in the previous estimations.

3.6.4 Non-linear Effects of Education and the Impact of Diverging from the Community Average.

In the previous analyses, the relationship between the woman's characteristics and her level of power is assumed to be constant across the distributions of the explanatory variables. So, for example, results from Table 3.2a imply that education has always a positive correlation with women's power regarding large expenditures, independently of the specific level of education of the woman. However, there are at least two reasons why this statement might not be completely accurate. First of all, it is possible that the association between education and decision-making power is significantly smaller for highly-educated women. Secondly, the analysis should consider the effect of diverging from social standards, in the sense that having more education than the average in the community might actually be negatively associated with power. As suggested by Mabsout and Van Staveren (2009), highly-educated women might face social pressures that make them give up some of their power at home, since they may perceive themselves as deviations from social norms, some of which are likely to be community-specific. In this section, the estimation allows for quadratic effects on the relationship between education and power and studies the association between women's divergence from community averages and their level of power[34]. For each aspect of decision-making, the analysis considers three different forms of divergence: simple difference, difference by age (with respect to women of exactly the same age), and difference by age group (with respect of women in the same age group[35]). Table 3.5 shows the estimated coefficients for the quadratic and divergence terms on a partial proportional odds model. Section (I) shows the regression coefficients associated with the explanatory variables for those women transitioning from having no power at all (level "0") to at least sharing power (level "1" or "2"), whilst section (II) contains the regression coefficients associated with the transition from having none or limited power (level "0" or "1") to becoming an exclusive decision-maker (level "2").

Results for the quadratic term on education suggest that, for most aspects of decision making, the positive correlation that each additional year of education has with decision-making power decreases as the woman becomes more educated. However, for decisions regarding work status and large expenditures this relationship seems to have an explosive behaviour as more educated women tend to benefit more (in terms of additional power) from increases in education, a result that is particularly significant for women transitioning from having no decision-making power at all to sharing or having full power (section I).

[34] For each explanatory variable the divergence terms are calculated as: $x_i - \bar{x}$, where x_i is the woman's years of education and $\bar{x}$ is the community average for women's education in a given community/locality.

[35] The age groups were built in sets of 5 years, starting from 20 years old and until 80. The lower and upper tails of the age distribution were classified as '19 years or less' and '80 years or more', respectively.

Having a higher educational level than the average in the community is negatively associated with power on most aspects of decision-making. For food-related decisions, every additional year of education that the woman has above the community average is associated with a lower probability of being exclusive decision-maker (section II) and at least sharing power (section I), though the effect is slightly stronger for the latter. A similar effect is observed for decisions regarding children's health, for which diverging from the community's average for women in the same age group is negatively associated with all levels of power. In the case of large expenditures, the divergence effect is only significant in the transition from having no power at all to at least sharing power with other family members, meaning that having more education than the community average is negatively associated with the probability of sharing power and positively associated with the likelihood of having no power at all. Having a higher level of education than the community average is also negatively associated with power regarding cash transfers to her relatives, for all levels of power, and a decreased likelihood of participating in decisions regarding contraceptive use. These results suggest that even though education is generally positively correlated with decision-making power, this relationship is significantly stronger for women who live in communities where the average level of education is similar to their own.

Table 3.5: Quadratic and divergence effects of education: Partial Proportional Odds Model (controlling for the husband's divergence from his community average)

			(I)					(II)							
			Educ	Educ2	Simple Difference	Diff. by Age	Diff. by Age Group	Educ	Educ2	Simple Difference	Diff. by Age	Diff. by Age Group	Pseudo R-squared	Wald Chi-Square	N. of cases
Daily Life	Food	(1)	0.116***	-0.006***				0.035**	-0.002**				0.028	381.415	9476
		(2)	0.134***	-0.006***	0.016			0.053**	-0.002**	0.016			0.029	384.209	9476
		(3)	0.083***	-0.003***		-0.087***		0.046***	-0.003***		-0.021*		0.029	392.022	9476
		(4)	0.152***	-0.006***			-0.057**	0.052***	-0.002**			-0.013	0.029	396.478	9476
Children's Wellbeing	Children's Education	(1)	0.063***	-0.002*				-0.009	-0.002*				0.122	1857.544	9301
		(2)	0.049*	-0.002*	-0.020			-0.022	-0.002*	-0.020			0.122	1863.545	9301
		(3)	0.068***	-0.002*		-0.004		-0.004	-0.002*		-0.004		0.122	1862.833	9301
		(4)	0.067***	-0.002*			-0.020	-0.004	-0.002*			-0.020	0.122	1868.217	9301
	Children's Health	(1)	0.080***	-0.002*				0.011	-0.002*				0.077	1562.871	9355
		(2)	0.077***	-0.002*	-0.043			0.018	-0.002*	-0.043			0.076	1549.398	9355
		(3)	0.083***	-0.002*		-0.007		0.014	-0.002*		-0.007		0.077	1569.139	9355
		(4)	0.090***	-0.002*			-0.028**	0.021	-0.002*			-0.028**	0.077	1572.349	9355
Economic Decisions	Large Expenditures	(1)	-0.023	0.003***				-0.023	0.001				0.031	472.477	9446
		(2)	0.034*	0.003***	-0.087***			-0.055*	0.003***	-0.020			0.032	488.304	9446
		(3)	-0.020	0.003***		-0.010		-0.020	0.001		-0.010		0.031	473.861	9446
		(4)	-0.017	0.003***			-0.020*	-0.017	-0.000			-0.020*	0.032	484.037	9446
	Cash Transfers	(1)	0.077***	0.000				0.029	0.000				0.031	389.671	7116
		(2)	0.111***	0.000	-0.091***			0.063***	0.000	-0.091***			0.031	395.239	7116
		(3)	0.078***	0.000		-0.009		0.030	0.000		-0.009		0.031	390.295	7116
		(4)	0.084***	0.000			-0.022*	0.036*	0.000			-0.022*	0.031	393.945	7116
Autonomy	Work	(1)	0.024	0.005***				0.024	0.001				0.055	929.317	9445
		(2)	0.036*	0.005***	0.007			0.036*	0.001	0.007			0.055	933.488	9445
		(3)	0.024	0.005***		0.003		0.024	0.001		0.003		0.055	929.218	9445
		(4)	0.032*	0.005***			-0.015	0.032*	0.001*			-0.015	0.055	930.707	9445
	Contraceptive use	(1)	0.154***	-0.002				0.048*	-0.002				0.031	246.223	7726
		(2)	0.183***	-0.002	-0.086**			0.077**	-0.002	-0.086**			0.032	251.546	7726
		(3)	0.176***	-0.002		-0.067**		0.046*	-0.002		0.006		0.032	259.382	7726
		(4)	0.211***	-0.002			-0.092***	0.059*	-0.002			-0.020	0.033	262.956	7726

Note: MxFLS 2002,2005-2006, and 2009-2012. The stars in the estimated coefficients indicate their significance (***p<0.01, ** p<0.05, * p<0.10), clustered standard errors in parenthesis. All estimations include the baseline set of control variables shown in Tables 2a and 2b. The estimations have also controlled for the husband's differences from his own community averages, however the coefficients associated with such variables were generally not statistically significant.

3.7. A brief note on power perception misalignment

Even though the main objective of this paper is to analyse women's decision-making power and its relationship with their level of education and employment status, an interesting question is to ask what factors make women and men report different values for the same variable: women's decision-making power. Table 3.6 shows the results of using an ordered logit model to study the couple's misalignment in power perception. The dependent variable in this case is the absolute value of the difference between women's self-reported level of power and her partner's report on her level of power for the 7 aspects of decision-making studied before. Since each individuals' report of the woman's power can take the values from "0" to "2", the absolute value of the difference in power perception between a woman and her partner can rank between "0" (if both the woman and the partner reported the same level of power for the woman), "1" or "2", depending on how different are their answers in terms of level of power.

The estimated coefficients in Table 3.6 show a significant level of heterogeneity in the association between the woman's education and employment status and the misalignment in the couple's perception of power. Women's education seems to be negatively correlated with misalignment in power perception regarding decision's on children's wellbeing, large expenditures and contraceptive use, which seems to suggest that households where women are more educated tend to have a more homogenous perception of power between women and their partners regarding those aspects of decision-making. However, women's education is also positively correlated with the couple's misalignment in power perception on decisions about cash transfers and whether she can work. Similarly, couples in which the woman is employed tend to have a higher level of disagreement regarding her level of power on food choices and her decision to work; however, women's employment is negatively correlated with the couple's misalignment on power perception regarding large expenditures.

Interestingly, married couples (as opposed to couples who live in free union) do seem to have a significantly lower level of disagreement in the woman's level of power regarding most aspects of decision-making. Marriage might be a proxy for a couple's stability, which in turn might influence their level of alignment in power perception. Finally, couples in which the woman has at least one previous union tend to have a higher level of disagreement in their perception of the woman's power.

The difference in the couple's age and level of education also seem to have a significant association with their misalignment in their perceptions of the woman's power in some aspects of family life. Couples in which the woman is older than the man tend to have a lower level of disagreement in their answers regarding children's education, cash transfers and contraceptive use. Conversely, couples in which the woman has a higher level of education than her partner tend to have a higher level of misalignment in their answers regarding children's education.

Table 3.6 . Misalignment in power perception between women and their partners in absolute values (ordered logit estimates).

	Daily Life	Children's wellbeing		Economic decisions		Autonomy	
	Food	Children's Education	Children's Health Care	Large Expenditures	Cash Transfers to Her Relatives	If She Should Work	Contraceptive Use
Individual Level							
Education (years)	-0.011	-0.034***	-0.022***	-0.019***	0.019**	0.038***	-0.041***
	(0.007)	(0.008)	(0.008)	(0.007)	(0.008)	(0.006)	(0.011)
Work	0.132***	0.009	-0.081	-0.242***	0.025	0.293***	0.037
	(0.051)	(0.060)	(0.057)	(0.053)	(0.060)	(0.047)	(0.075)
Age	-0.004	-0.001	-0.002	0.005	0.012*	0.019***	-0.017*
	(0.006)	(0.007)	(0.007)	(0.006)	(0.007)	(0.005)	(0.009)
Married	-0.102*	-0.141**	-0.167**	-0.048	-0.226***	-0.097*	-0.313***
	(0.061)	(0.070)	(0.065)	(0.061)	(0.071)	(0.056)	(0.082)
Age at marriage	0.002	0.005	-0.001	-0.020***	-0.009	-0.004	0.013
	(0.006)	(0.007)	(0.007)	(0.006)	(0.007)	(0.006)	(0.009)
Previous unions	0.008	0.253**	0.126	0.188**	0.184	0.221**	0.000
	(0.096)	(0.112)	(0.107)	(0.096)	(0.124)	(0.090)	(0.136)
Indigenous group	0.026	-0.031	0.120	-0.086	-0.040	-0.044	0.161
	(0.071)	(0.081)	(0.075)	(0.070)	(0.087)	(0.067)	(0.098)
Number of children	-0.016	-0.008	-0.004	-0.003	0.014	-0.012	0.022
	(0.016)	(0.018)	(0.017)	(0.015)	(0.020)	(0.015)	(0.024)
Age of children (mean)	-0.007	0.042***	0.030***	0.000	0.000	0.010	0.014
	(0.007)	(0.008)	(0.007)	(0.007)	(0.008)	(0.006)	(0.010)
Proportion of male children	-0.114*	-0.081	-0.107	-0.107*	-0.111	-0.060	-0.116
	(0.062)	(0.072)	(0.067)	(0.061)	(0.072)	(0.057)	(0.086)
Couple Level							
Difference in Age	-0.002	-0.012**	-0.001	-0.001	-0.009*	-0.003	-0.011*
	(0.004)	(0.005)	(0.005)	(0.004)	(0.005)	(0.004)	(0.006)
Difference in Education	0.008	0.029***	0.009	0.004	-0.002	-0.003	0.008
	(0.006)	(0.008)	(0.006)	(0.005)	(0.005)	(0.004)	(0.010)
Household Level: Quantile of Net Income							
2nd	-0.017	0.069	-0.028	-0.059	-0.005	0.039	-0.109
	(0.064)	(0.072)	(0.069)	(0.063)	(0.074)	(0.059)	(0.090)
3rd	-0.094	-0.010	-0.005	-0.040	0.184**	0.136**	-0.079
	(0.064)	(0.073)	(0.069)	(0.063)	(0.073)	(0.060)	(0.088)
4th	-0.033	0.057	-0.013	-0.014	0.242***	0.202***	-0.034
	(0.068)	(0.078)	(0.074)	(0.068)	(0.078)	(0.064)	(0.097)
Community/Locality Level: Population (Base: Less than 2,500)							
Between 2,500 and 15,000	-0.033	0.020	0.084	0.182***	0.261***	0.081	0.033
	(0.070)	(0.081)	(0.078)	(0.069)	(0.084)	(0.063)	(0.102)
Between 15,000 and 100,000	-0.099	0.025	0.089	0.032	0.145*	0.079	-0.010
	(0.077)	(0.092)	(0.081)	(0.077)	(0.088)	(0.070)	(0.111)
More than 100,000	-0.147***	0.009	0.163***	0.087	0.217***	0.255***	0.185**
	(0.055)	(0.062)	(0.058)	(0.055)	(0.062)	(0.049)	(0.076)
Region (Base: North)							
Center-North	0.016	0.040	0.023	0.062	0.404***	0.147*	0.075
	(0.094)	(0.109)	(0.102)	(0.098)	(0.103)	(0.086)	(0.128)
Center	0.130	0.192*	-0.147	0.197*	0.570***	0.293***	-0.016
	(0.099)	(0.114)	(0.110)	(0.104)	(0.113)	(0.091)	(0.135)
South	-0.089	-0.066	-0.222*	0.028	0.194	0.338***	-0.293*
	(0.106)	(0.124)	(0.117)	(0.108)	(0.120)	(0.094)	(0.154)
Year (Base: 2002)							
2005	-0.360***	-0.353***	-0.321***	-0.250**	0.312**	0.136	-1.001***
	(0.113)	(0.125)	(0.117)	(0.108)	(0.125)	(0.097)	(0.180)
2009	-0.042	0.130	0.146	0.251**	0.878***	0.779***	0.174
	(0.108)	(0.123)	(0.115)	(0.112)	(0.132)	(0.099)	(0.149)
τ1	-0.059	1.156***	0.655***	0.023	0.823***	0.826***	0.534**
	(0.166)	(0.201)	(0.185)	(0.173)	(0.192)	(0.155)	(0.248)
τ2	1.931***	3.853***	3.208***	2.559***	2.444***	2.324***	3.395***
	(0.169)	(0.209)	(0.189)	(0.179)	(0.195)	(0.156)	(0.267)
Pseudo R-squared	0.008	0.026	0.015	0.009	0.016	0.028	0.027
Wald Chi-Square	124.637	289.023	192.481	136.327	186.798	535.764	184.236
N. of cases	9339	9047	9144	9287	5946	9279	6979

Note: MxFLS 2002,2005-2006, and 2009-2012. Dependent variable: Misalignment in power percetion measured as the absolute value of the difference between woman's perception of her own power and her partner's perception of her power. The stars in the estimated coefficients indicate their significance (***p<0.01, ** p<0.05, * p<0.10), clustered standard errors by household in parenthesis. The estimation also includes interaction terms between region and year.

Even when the analysis above does provide some interesting insights, it does not seem to suggest a general effect in terms of the association between the woman's education and employment and the level of divergence in the couple's responses, as the correlations in question differ greatly across aspects of decision-making. However, factors such as marriage, previous unions and age difference do seem to have associations that are fairly homogenous across decisions.

3.8. Conclusions

This chapter studies women's intrahousehold decision-making power and its relationship with education and employment, using an ordered logit approach that considers the existence of three different levels of power regarding seven different aspects of decision-making. Generalised ordered logit models are used in order to allow the regression coefficients to vary across different levels of power. Also, the analysis makes use of fixed effects estimations to partial out the effect of unobservable time-invariant factors which could be affecting women's power as well as her socioeconomic characteristics. Finally, the study allows for the presence of quadratic effects in the relationship between education and power and analyses the association between women's divergence from community averages in years of education and their level of power.

Results suggest a significant level of heterogeneity on the nature of the relationship between women's power and factors such as their education and employment status across different levels of power. Regarding decisions on children's wellbeing and large expenditures, for instance, education seems to be positively correlated with the probability of passing from non-participation to shared decision-making, though it negatively associated with the likelihood of exclusive decision-making. Although the correlation between power and employment seems to be more homogeneously positive across levels of power, its magnitude varies significantly. Once all time-invariant individual-specific factors are taken out from the analysis using a fixed effects model, the study finds that life events such as getting a job and acquiring a higher level of education than the partner have significant positive effects on women's power. Finally, results suggest the presence of a significant negative quadratic effect on the relationship between education and power, for most aspects of decision-making. Also, having a higher level of education than the average woman in the community is generally associated with a lower level of power, this effect being particularly strong at increasing women's likelihood of not participating in the decision-making process.

An important implication of this study is that each dimension of women's power in the domestic sphere should be studied separately. Since each aspect of household decision-making might be influenced by the woman's characteristics in a different way, pooling all decisions into one single index is not likely to provide enough information on the nature of the bargaining process taking place for each of them. Secondly, since the association between women's power and factors such as education and employment is not homogenous across different levels of power and given that not all of them are equally desirable for every aspect of decision-making, carrying out a simple ordered logit analysis might lead to inaccurate conclusions.

Finally, it is also important to recognise the restricting impact of social norms, which can undermine the typically positive association between women's decision-making power and factors such as education. In this context, highly-educated women might benefit the most from the positive effect of education when living in localities where other women are also highly-educated, so they do not perceive themselves as deviations from a social standard.

3.9. References

Adams, M. (2007, November 15). Inequality/Stratification, Gender. In G. (. Ritzer, *The Blackwell Encylopedia of Sociology* (pp. 2307-2310). Blackwell Publishing. Retrieved from Blackwell Reference Online. : http://www.blackwellreference.com/subscriber/tocnode.html?id=g9781405124331_chunk_g978140512433115_ss1-39

Adato, M., de la Brière, B., Mindek, D., & Quisumbing, A. (2000). *The impact of Progresa on women's status and intrahousehold relations.* Washington, D.C. : International Food Policy Research Institute.

Agarwal, B. (1997). "Bargaining" and Gender Relations: Within and Beyond the Household. *Feminist Economics*, 1-51.

Ahmed, M. (2006). Intra-household Bargaining and Investment in Child Health. Northfield, Minnesota: Department of Economics, Carleton College.

Allendorf, K. (2007). Couple's Reports of Women's Autonomy and Health-care Use in Nepal. *Studies in Family Planning*, 35-46.

Antman, F. M. (2010). International Migration, Spousal Control, and Gender Discrimination in the Allocation of Household Resources. Department of Economics, University of Colorado at Boulder.

Antman, F. M. (2014). Spousal Employment and Intra-Household Bargaining Power. IZA Discussion Paper No. 8231.

Arooj, S., Hussain, W., Arooj, A., Iqbal, A., Hameed, S., & Abbasi, A. (2013). Paid Work & Decision Making Power of Married Women Cross Sectional Survey of Muzaffarabad Azad State of Jammu & Kashmir. *Advances in Applied Sociology*, 165-171.

Ashraf, N., Karlan, D., & Yin, W. (2010). Female Empowerment: Impact of a Commitment Savings Product in the Philippines. *World Development*, 333-344.

Baetschmann, G., Staub, K. E., & Winkelmann, R. (2015). Consistent Estimation of the Fixed Effects Ordered Logit Model. *Journal of the Royal Statistical Society, Series A*, 685-703.

Bali Swain, R., & Yang Wallentin, F. (2009). Does microfinance empower women? Evidence from self-help groups in India. *International Review of Applied Economics*, 541-556.

Banerjee, S., & Roy, A. (2015). Determinants of Female Autonomy across Indian States. *Journal of Economics, Business and Management*, 1037-1040.

Becker, G. S. (1965). A Theory of the Allocation of Time. *Economic Journal*, 493-517.

Becker, G. S. (1981). *A Treatise on the Family.* Cambridge, MA: Harvard University Press.

Bernasek, A., & Bajtelsmit, V. L. (2002). Predictors Of Women's Involvement In Household Financial Decision-Making. *The Journal of the Association for Financial Counseling and Planning Education*, 39-47.

Brody, C., de Hoop, T., Vojtkova, M., Warnock, R., Dunbar, M., Murthy, P., & Dworkin, S. L. (2017). Can self-help group programs improve women's empowerment? A systematic review. *Journal of Development Effectiveness*, 15-40.

Casique, I. (2000). Mexican Married Women's Autonomy and Power within the Household. *XXII International Congress of the Latin American Studies Association, LASA.* Miami, Florida.

Casique, I. (2010). Factores de empoderamiento y protección de las mujeres contra la violencia. *Revista Mexicana de Sociología*, 37-71.

Chakraborty, T., & De, P. K. (2011). Mother's Autonomy and Child Welfare: A New Measure and Some New Evidence. IZA Discussion Paper No. 5438.

Chiappori, P.-A., & Donni, O. (2009). Non-unitary Models of Household Behavior: A Survey of the Literature. *IZA Discussion Paper No. 4603.*

Cialdini, R. B., Kallgren, C. A., & Reno, R. R. (1991). A focus theory of normative conduct: A theoretical refinement and reevaluation of the role of norms in human behavior. *Advances in Experimental Social Psychology*.

Das, M., & Van Soest, A. (1999). A panel data model for subjective information on household income gowth. *Journal of Economic Behavior & Organization*, 409-426.

Dauphin, A. (2001). *Intrahousehold Decision-Making: A Review of Theories and Implications on the Modelling of Aggregate Behaviour.* Quebec, Canada: Canadian Centre for International Studies and Cooperation.

Dickerson, A., Hole, A. R., & Munford, L. (2014). The Relationship Between Well-Being and Commuting Re-Visited: Does the Choice of Methodology Matter? *Regional Science and Urban Economics*, 321-329.

Duvendack, M., & Palmer-Jones, R. (2017). Micro-Finance, Women's Empowerment and Fertility Decline in Bangladesh: How Important Was Women's Agency? *The Journal of Development Studies*, 664-683.

Ferrer-i-Carbonell, A., & Frijters, P. (2004). How important is methodology for the estimates of the determinants of happiness. *Economic Journal*, 641-659.

Garikipati, S., Johnson, S., Guérin, I., & Szafarz, A. (2017). Microfinance and Gender: Issues, Challenges and The Road Ahead. *The Journal of Development Studies*, 641-648.

Gelfand, M. J., Nishii, L. H., & Raver, J. L. (2006). On the nature and importance of cultural tightness-looseness. *Journal of Applied Psychology*, 1225-1244.

Guendelman, S., Malin, C., Herr-Harthorn, B., & Vargas, P. N. (2001). Orientations to motherhood and male partner support among women in Mexico and Mexican-origin women in the United States. *Social Science and Medicine*, 1805-1813.

Hietanen, A.-E., & Pick, S. (2015). Gender Stereotypes, Sexuality, and Culture in Mexico. In *Psychology of Gender Through the Lens of Culture* (pp. 285-305). Springer International Publishing .

Hossain, S. Z. (1998). Decision making, use of contraception and fertility in Bangladesh: a path analysis. *International Journal of Sociology and Social Policy*, 27-55.

Huber, J., & Spitze, G. (1981). Wives' Employment, Household Behaviors, and Sex-Role Attitudes. *Social Forces*, 150-169.

Jejeebhoy, S. J., & Sathar, Z. A. (2001). Women's Autonomy in India and Pakistan: The Influence of Religion and Region. *Population and Development Review*, 687-712.

Khan, S., & Sajid, M. R. (2011). Effects of Women's Education and Marriage Period on Their Decision Making Power at Household Level in Gujrat-Pakistan. *Middle-East Journal of Scientific Research*, 407-415.

Kritz, M. M., & Makinwa-Adebusoye, P. (1999). Determinants of Women's Decision-Making Authority in Nigeria: The Ethnic Dimension. *Sociological Forum*, 399-424.

Lépine, A., & Strobl, E. (2013). The Effect of Women's Bargaining Power on Child Nutrition in Rural Senegal. *World Development*, 17-30.

Lundberg, S., & Pollack, R. A. (1993). Separate Spheres Bargaining and the Marriage Market. *Journal of Political Economy*, 988-1010.

Mabsout, R., & Van Staveren, I. (2009). Disentangling Bargaining Power from Individual and Household Level to Institutions: Evidence on Women's Position in Ethiopia. *World Development*, 783-796.

Malhotra, A., & Mather, M. (1997). Do Schooling and Work Empower Women in Developing Countries? Gender and Domestic Decisions in Sri Lanka. *Sociological Forum*, 599-630.

Mason, K. O., & Smith, H. L. (2003). Women's Empowerment and Social Context: Results from Five Asian Countries. Washington, D.C.: Gender and Development Group, World Bank.

McElroy, M. B. (1990). The Empirical Content of Nash-Bargained Household Behavior. *The Journal of Human Resources*, 559-583.

Minsoo, P., Jeungil, O., & Sora, L. (2011). Women's Bargaining Power and Educational Expenditures: Implications for Subsidy Policy. *The Korean Journal of Policy Studies*, 37-51.

Oduro, A. D., Boakye-Yiadom, L., & Baah-Boateng, W. (2012). Asset Ownership and Egalitarian Decision-Making among Couples: Some Evidence from Ghana. The Gender Asset Gap Project, Working Paper Series No. 14.

Oyediran, K. A., & Odusola, A. F. (2004). Poverty and the Dynamics of Women's Participation in Household Decision-Making in Nigeria. *African Population Studies Supplement* , 115-139.

Reggio, I. (2011). The influence of the mother's power on her child labor in Mexico. *Journal of Development Economics*, 95-105.

Schmidt, E. M. (2012). The Effect of Women's Intrahousehold Bargaining Power on Child Health Outcomes in Bangladesh. *Undergraduate Economic Review.*

Story, W. T., & Burgard, S. A. (2012). Couples' reports of household decision-making and the utilization of maternal health services in Bangladesh. *Social Science & Medicine*, 2403-2411.

Ueyama, M. (2006). Effects of Women's Agriculture on Child Health in Rural Malawi: "Food Security Effect" and "Bargaining Effect". Japan Society for the Promotion of Science, Hitotsubashi University.

West, C., & Zimmerman, D. H. (1987). Doing gender. *Gender and Society*, 125-151.

Wiklander, J. (2010). Determinants of Women's Empowerment in Rural India. An Intra-Household Study. Unpublished Master's Thesis. Department of Economics, Lunds Universitet.

Chapter 4

The Role of Cognitive Ability on Children's Participation and Time Allocation between Work, Schooling and Housework.

Abstract

This paper analyses panel data from the Mexican Family Life Survey using fixed effects and instrumental variables methodologies in order to study the relationship between children's cognitive ability and time allocation among three activities: work, school and housework. Overall, results suggest that cognitive ability does not have a significant correlation with children's participation or time allocated to work; however, it does seem to have a strong relationship with school enrolment, number of hours spent at school and participation in housework.

4.1 Introduction

The way children spend their time has important implications for their wellbeing in both the short and long run. Time spent on educational activities is associated with the development of cognitive skills (Fiorini & Keane, 2014), whilst leisure time and recreational activities have beneficial effects on psychological wellbeing, social behaviour, physical health and intellectual achievement (Hertting & Kostenius, 2012; Whitebread, Basilio, Kuvalja, & Verma, 2012; McKay, 2012). Conversely, time spent in paid labour and housework has been shown to have negative effects on academic performance and other schooling outcomes (Ligeve & Poipoi, 2012; Buonomo Zabaleta, 2011; Assaad, Levison, & Zibani, 2010), which in turn has adverse consequences in terms of future income and employment.

The study of children's time allocation on child labour, school attendance and housework has mainly focused on the socioeconomic determinants that make children more likely to perform any of these activities. Factors such as poverty and less educated parents are positively associated with child labour and tend to reduce school attendance. However, little attention has been given to the intrahousehold decision-making process regarding the amount of time that each child dedicates to each activity, given their cognitive or health endowments. The question of parental selection has been mostly studied from a socioeconomic perspective, measuring how parents assign different amount of school expenditures and other monetary investments to children based on their endowments. In some households, especially the very poor, the mere decision of sending children to work or to school might be a good indicator of parental willingness to invest in their children's future income potential.

This chapter analyses panel data from the Mexican Family Life Survey using fixed effects and instrumental variables methodologies in order to study the relationship between children's cognitive ability and time allocation among three activities: work, school and housework, where work is understood as any activity inside or outside the household for which the child gets a payment that contributes to household expenditures, and housework refers to domestic chores and other unpaid activities done in the house (such as washing clothes or doing the dishes). Overall, results suggest that cognitive ability does not seem to have a significant correlation with children's participation or time allocated to work; however, it does seem to have a strong relationship with school enrolment, number of hours spent at school and participation in housework, some of these effects being significantly different for boys and girls.

The next section presents a general literature review on the economic and sociodemographic determinants of children's time allocation between school and work. Then, section 4.3 discusses the role of cognition on children's time allocation patterns. Section 4.4 describes the data used in the study, methodology is briefly explained in section 4.5, and results are discussed in section 4.6. Finally, section 4.7 presents the conclusions.

4.2 Parental Allocation of Children's Time: School vs Work

The amount of time children dedicate to different activities such as work, school or domestic chores is determined by the child's characteristics at the individual, household and even community level. The decision of whether to send a child to school or to work usually involves a cost-benefit analysis that compares the extent to which school contributes to the child's present value of future income with the costs of schooling in the present, which can be either direct such as fees and uniforms, or indirect such as the salary the family loses when they decide not to send the child to work (Webbink, Smits, & de Jong, 2012). As pointed out by Orazem and Gunnarsson (2003), most of the variables determining whether a child goes to school or to work can be summed up in the following categories: the characteristics and strength of the child labour market, past accumulations of human capital, school quality, and the household's socioeconomic status, size and composition. Each of these factors can be decomposed into specific variables at the individual, household, and community level.

A major factor in the parental decision to send children to work is the market wage for child labour. Given that information on wages for this particular market is not always available researchers usually pay attention to factors determining the earning potential of children, such as age and gender. Most studies on children's time allocation find strong and significant relationships between the child's age and gender and their participation in work. For instance, as children reach adolescence they become more employable and their potential wage rises, making them more likely to work, in comparison with small children (Guarcello, Manacorda, Lyon, & Rosati, 2010). Similarly, girls have been found to be more likely to be involved in housework relative to boys (Ilahi, 2001; Bonke, 2010), a result that is likely to be driven by the gendered division of labour in adulthood and the difference in expected future labour income between boys and girls (Raley & Bianchi, 2006). The child's current human capital accumulation might also be an important factor determining whether a child goes to school or works (Orazem & Gunnarsson, 2003). When a child has already been in school for some time, their potential future earnings derived from education are higher with respect to children who do not have such human capital accumulations, making them more likely to stay in school and less likely to be involved in labour or housework. In other words, when the parents have already invested in their children's education, keeping them at school seems a more profitable strategy. Other factors such as birth order and number of brothers and sisters in the household also affect the way parents allocate children's time. For instance, younger children tend to have better opportunities than firstborns and older siblings in terms of the division of work, since they grow up when most tasks and responsibilities have already been assigned to other family members (Edmonds, 2005). On the other hand, girls with brothers are more likely to participate in housework and have poorer educational attainment (Morduch, 2000; Conley, 2000). This result is compatible with the notion that families with male children tend to be more traditional towards gender roles and consequently have a greater degree of gender specialisation in the allocation of children's time (Raley & Bianchi, 2006). However, the effect of the total number of siblings is not clear since it can be either positive or negative in terms of the workload assigned to children (Webbink, Smits, & de Jong, 2012). On the one hand, having more brothers and sisters living in the household means more work to be done and a greater competition for resources which might make each child less likely to go to school and more likely to work. However, the presence of more family members could also enable an efficient division of labour that lowers the workload of each individual.

The household's socioeconomic characteristics have also been found to affect the way children's time is allocated. Income, for instance, increases the productivity of school (Orazem & Gunnarsson, 2003), making every investment in child's education more profitable. In theory, an increase in parental income should also reduce child labour, since there is less pressure for resources in the household so children do not need to work. However, child work also brings home additional resources, hence the correlation between child labour and income might not be monotonic. Parental education also affects the decision to send children to work or school, since educated parents are more likely to have experienced and appreciate the benefits of investments in education, and consequently more likely to more likely to send children to school instead of work (Webbink, Smits, & de Jong, 2012; Rammohan, 2014).

At the community level, an important determinant of children's time allocation is the quality of schools. Higher school quality usually means a higher potential future income for every hour spent at school, making the choice of sending children to school more profitable (Orazem & Gunnarsson, 2003; Rosati & Rossi, Impact of School Quality on Child Labor and School Attendance: The Case of the CONAFE Compensatory Education Program in Mexico, 2007). Similarly, proximity to school is likely to have a positive effect on school attendance, though it does not necessarily reduces child labour (Kondylis & Manacorda, 2012).

4.2.1 Methodological Approaches to the Study of Children's Time Allocation

One of the first works on children's time allocation is the study by Bianchi and Robinson (1997), who use time-diary data from California to examine the amount of time children spend reading (or being read to), watching TV, studying and doing housework. The authors use a series of unrelated Tobit equations to measure the effect of factors such as the child's characteristics, parental education, family income, family composition, maternal labour force status, number of children and birth order. A similar methodological approach can be found in Hofferth and Sandberg (2001), where the authors consider additional activities such as day care, play, going to church, doing sports, among others.

A different branch of the literature has focused on the specific decision regarding sending children to work or to school. A simple approach would consist of using single equations to separately analyse the factors that make children more likely to work or to study, however one should be aware that these decisions are usually made jointly. For this reason, some authors have chosen to use bivariate probit models that jointly analyse the decision about child labour and school attendance. While some studies limit their analysis to this particular question (Kamga, 2010), others go further and also investigate the determinants of the amount of time children dedicate to work and school, using a multivariate Tobit model (Koissy-Kpein, 2013). Rosati and Rossi (2001) analyse the joint decision of working and studying using a simultaneous equations that combine a Tobit and a probit model considering four different scenarios: working hours greater than zero and enrolled, working hours equal to zero and enrolled, working hours greater than zero and not enrolled, and working hours equal to zero and not enrolled. Similarly, Burki and Fasih (1998) use multinomial logit equations to model the probability for four possible scenarios for children's time allocation in Pakistan: being full-time student, part-time work and school, full-time work and neither work or school. Other studies make a distinction between labour and housework, such as Bonsang and Faye (2005) where a multinomial logit model is employed to study children's time allocation regarding school attendance, work, and housework. An additional question addressed in the literature has to do with selection issues that may arise in the study of children's time allocation. Ahmed (2011), for instance, uses a Heckman two-step sample selection model to account for the fact that children who spend a positive amount of hours at work might have unobserved characteristics that make them different than children who do not participate at all.

A common characteristic for most of previous work on children's time allocation is the use of cross-sectional data, which presents a number of limitations. First, taking into account potential endogeneity coming from the effect of unobservable characteristics at the household or individual level becomes more challenging, and often requires the use of instrumental variables to introduce a source of exogenous variation. Second, working with panel data allows us to focus on intrahousehold variations, which in turn makes it easier to study the effect of sibling differences on the way parents allocate children's time. For instance, parents may pay attention on the child's characteristics with respect to the rest of the children, in order to make a decision of whether that particular child should go to work or to school. Pörtner (2016) recognises these facts and utilises panel data from the Philippines to measure the effect of parental absence on the amount of time children allocate to work, school and housework. The author compares results from simple-equation and jointly estimated models for time spent on work and school using both OLS and fixed effects frameworks, emphasising the sensitivity of results to the use of different methodologies and suggesting the unsuitability of simple OLS models[36].

This chapter employs fixed effects and instrumental variables methodologies in order to measure the relationship between children's cognitive ability and their time allocation patterns, including both their participation and number of hours spent on three activities: work, school and housework. Since the main objective is not to study children's time allocation among all possible activities, but to disentangle the specific causality between ability and time allocation on work, school and housework, the variables associated with children's participation and number of hours spent on each activity are treated as a separate dependent variable in order to focus on solving the problem of reverse causality, which, unlike the issue of interdependence between the activities, is likely to cause bias in the results.

[36] Since all children in the sample used by Pörtner were involved in at least one of the three activities considered in the analysis, the usage of Tobit equations is not needed.

4.3 The Role of Children's Ability on Parental Choices

Most of the literature on the effect of children's ability endowments on parental choices has mainly focused on the allocation of resources in terms of investments on human capital, usually measured by expenditures on education. The idea of parents making human capital investments in children with different levels of ability was first introduced by Becker and Tomes (1976), who develop a model that helps to determine whether parents compensate or reinforce ability differences on children. The model predicts that if the cost of the investment is negatively correlated with the child's endowment less able children will receive a smaller investment, resulting in the parents reinforcing initial differentials in children's ability. However, this approach does not consider the role of parental preferences on the allocation of resources among children. According to Behrman, Pollack and Taubman (1982), parental aversion to inequality in their children's future earnings play an important role in the allocation of resources and can even reverse the predictions of the investment model presented by Becker and Tomes.

Empirical evidence supports the notion of parents selectively making investments on their children according to their endowments. In a study for rural Ethiopia, Ayalew (2005) shows that parents follow a compensating approach regarding their children's health endowments, but a reinforcement strategy regarding educational investments. Similarly, for the case of Burkina Faso, Akresh et al. (2012) find that children with high ability test scores are more likely to be enrolled in school, a result that is robust to the consideration of reverse causality issues and household fixed effects. Using data from the 1979 National Longitudinal Survey of Youth (NLSY-C), Frijters et al. (2013) also find a positive relationship between cognitive ability and parental investment. Likewise, Majid (2012) analyses parental decisions for the Mexican case using family fixed effects models and finds ability reinforcing patterns in terms of schooling expenditures, especially for boys.

Most of the literature available on this topic has measured parental investment in terms of schooling expenditures or indexes that intend to capture the effort parents make in providing children with cognitive stimulation, mainly measured by physical resources, parental time investments and procurement of additional tutelage (Frijters, Johnston, Shah, & Shields, 2013). However, this approach does not allow us to explore more basic dimensions of parental investment, such as the way children's time is allocated. In very poor households where income constrains make education a relatively expensive investment, a good measure of how much parents are willing to invest in their children is not how much money they spend or whether they provide them with private lessons, but the mere fact of sending them to school. For a family with limited resources, each hour that each child spends at school (instead of work) represents a major cost and can be perceived as a measure of parental investment. Moreover, analysing time allocation instead of monetary measures of investment allows us to study the role of children's cognitive ability on the parental choice regarding child work.

The relationship between cognitive ability and the way parents allocate children's time has not been studied in depth. The closest effort to exploring this question is the study by Sequeira (2013), where the author uses data from the project Young Lives to study the association between child work and cognitive ability for the Peruvian case. Her results show a negative relationship between ability and child labour, though its significance quickly disappears when poverty is added as an additional explanatory variable, suggesting that such a relationship is mainly driven by the negative association between poverty and ability. However, this study works mainly with cross-sectional variations and does not explore the possibility that parents decide on a particular child based not only on the ability of that child but also the one of the rest of the siblings. Moreover, it does not consider the possible presence of reverse causality between children's ability and time allocation, which is likely due to the effects of school attendance and work on their still-developing cognitive capacity.

The basic assumption behind the parental selection approach relies in the fact that parents observe their children's ability and make decisions based on this information. Becker and Tomes' model, for instance, suggests that if the parents follow a reinforcement strategy, more able children will be allocated a higher amount of time at school rather than doing housework or working. Even though the parents might be aware of children's ability relative to other children of the same age, this might not necessarily be the only information they take into account when deciding which child should go to school and which one to work. If children of the same family are perceived as assets on a single portfolio, which is taken as given, parents will allocate resources (in this case time) in an efficient manner considering the differences between the siblings' endowments. This study seeks to measure the relationship between child's time allocation and cognitive ability for any given household, studying intra-family variations in ability and how these affect parents' decisions. In addition, the analysis considers the possible presence of reverse causality between children's ability and time allocation, since the time children spend at school or work might be having a significant effect on their cognitive development, which in turn makes them more or less likely to attend school or work. In this case, the use of regular OLS methodologies might result in the production of biased estimates for the relationship between ability and time allocation, which could lead to erroneous conclusions.

4.4 Data

The quantitative analysis uses data from the Mexican Family Life Survey, a publicly available longitudinal dataset which contains a broad variety of socioeconomic and demographic information for a large sample of Mexican households and individuals. Among other variables, the survey contains information on the labour status, schooling, time allocation and cognitive ability for all family members younger than 15 years old. Schooling in the form of basic education is compulsory for children aged 15 or younger (studying primary and middle school, equivalent to grades 1st to 9th), and although compulsory attendance laws are unclear, most children who receive education actually attend school. Even though there is no clear regulation against home schooling, this is not a common practice[37].

In order to study children's participation in work, school and housework, the analysis considers the survey's information regarding the following questions: a) Has the child worked in the last 12 months? b) Is the child attending school in the current academic year[38], and c) Did the child participate on housework in the last seven days? The answers to each of these questions are then converted into dummy variables that take the value of '1' if the child participated in the activity and '0' otherwise. In order to study the amount of time children dedicate to each activity, the study will focus on the following questions: a) Hours a week spent at school, b) Hours a week spent at work and c) Hours a week spent doing housework.

[37] According to the Home School Legal Defense Association (HSLDA), in 2016 only 5000 families were registered for home schooling in Mexico. Please visit: https://hslda.org/content/hs/international/Mexico/default.asp

[38] This question refers to the child's enrolment in that particular academic year, not necessarily to the child's attendance.

The main explanatory variable of interest is the child's cognitive ability, which is measured by the results of a Raven test consisting of 18 progressive matrices. The scores from this test were measured in a scale from 0 to 100, then standardised by age. The z-scores were calculated by subtracting the value of the IQ test result minus the average score obtained by children of the same age, divided by the standard deviation of the IQ scores in that subsample[39]. Working with a z-score rather than the level of the test result allows us to analyse how much the probability of participation (or the time spent) on each activity is associated with differences in cognition with respect to other children of the same age. The analysis also considers other demographic and socioeconomic variables at the individual and household level, including the child's age and gender, birth order, household income and size, parental education, mother's work status and proportion of male children. Region and time fixed effects were also included in the estimations.

Figure 4.1: Participation in work, school and housework, percentage.

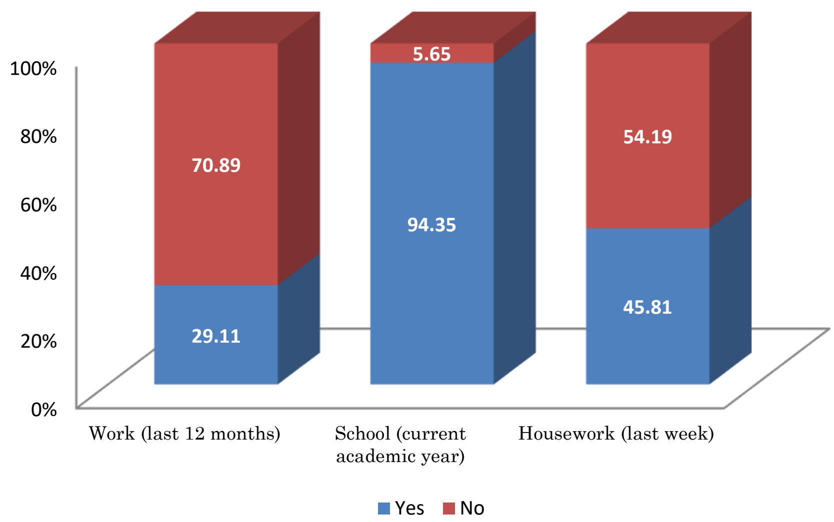
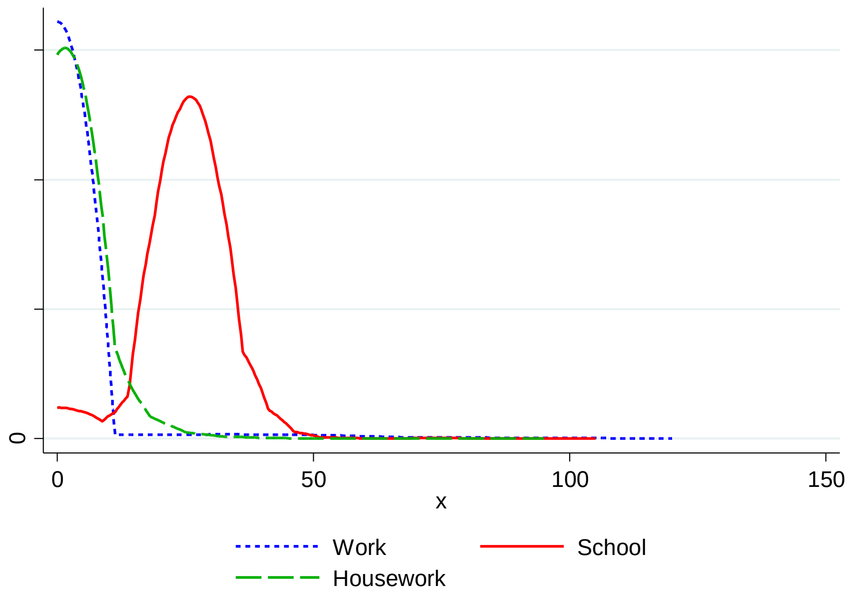


Figure 4.2: Number of hours spent at work, school and doing housework, Kernel density.

[39] Ideally, an external reference population should be considered in order to calculate the IQ z-scores, so the analysis is able to capture variations in children's cognitive ability that do not alter their position in the sample distribution. Unfortunately, there is not any information available on reference populations for non-anthropometric measures.



Figures 4.1 and 4.2 show the distribution of children's participation and the number of hours spent on each activity: work, school and housework. Not surprisingly[40], most children in the sample have been enrolled in school[41] and it's only a small percentage of them that is involved in work outside the home or housework. The number of hours allocated to school seems to be distributed normally, while the number of hours spent at work and doing housework concentrate mainly around zero with only a very small proportion of positive observations.

4.5 Methodology

This chapter focuses on two separate questions: how parents decide whether children participate or not on work, school, and housework, and what factors are correlated with the amount of time they dedicate to each activity. In order to answer the first question, logit regressions are estimated to account for the fact that all predicted values should be on the unit interval. In general terms, the logit model can be expressed as follows:

[40] Basic education in Mexico is mandatory for children aged between 5 and 15.
[41] The small proportion of children out of school should not be a major cause for concern since my sample is large (more than 20,000 observations) and that 5.65% actually represents around 1229 children, providing a considerable number of cases to work with. A very good explanation of the harmlessness of this situation can be found in a blog entry by Paul Allison in the blog "Statistical Horizons", which is available here:
https://statisticalhorizons.com/logistic-regression-for-rare-events

$$\log\left(\frac{P(Y_K=1|X)}{1-P(Y_K=1|X)}\right) = X'\beta \qquad (4.1)$$

Where $P(Y_k = 1|X_K)$ denotes the probability of a child participating in activity K (work, study or housework), given their characteristics at the individual and household level X, whilst β represents the association between these factors and the probability of participation.

Regarding the second question the estimation uses Tobit equations in order to consider the fact that the minimum length of time a child can dedicate to each activity is zero. Specifically, the estimation recognises the presence of a latent variable Y^* which cannot be captured directly but through the observed variable Y, which has a lower censoring bound at zero. In general terms, for each activity K:

$$Y_K = \begin{cases} Y_K^* & if \ \ Y_K^* > 0 \\ 0 & if \ \ Y_K^* \leq 0 \end{cases} \qquad (4.2)$$

Where the latent variable Y_K^* can be expressed as a function of a set of the child's characteristics at the individual and household level, X.

$$Y_K^* = X'\beta + u \qquad (4.3)$$

4.6 Results

Results are presented as follows. Subsection 4.6.1 analyses the relationship between children's participation and time allocation and their cognitive ability using pooled OLS models, subsection 4.6.2 focuses entirely on intrahousehold variations, applying household fixed effects at each particular point in time. Finally, subsection 4.6.3 explores the issue of reverse causality between ability and time allocation, using instrumental variables. For each methodology the analysis begins with the results from logit regressions regarding children's participation in each activity and then presents the outcomes from Tobit estimations regarding the amount of time children allocate to each activity[42].

[42] Regular fixed effects regressions (not Tobit) have been used to analyse intrahousehold variation in time allocation. Also, IV probit (instead of logit) are used in order to study the reverse causality issue regarding participation.

4.6.1 Pooled sample analysis

Table 4.1 shows the results from running logit and Tobit regressions to study the relationship between cognitive ability and children's participation and time allocated to work, school and housework, using different set of controls. For each specification, results show the regression coefficient associated with children's IQ-for-age *z* score and its interaction with gender, general estimation diagnostics as well as the sample size considered in the analysis.

Even though the IQ-for-age *z*-score seems to be negatively associated with children's participation in paid work across all specifications, this relationship becomes statistically insignificant once the child's characteristics at the individual level (such as gender, age, birth order and health status) are considered. In contrast, school enrolment seems to present a stronger case for the ability-participation link, as the regression coefficients are consistently positive and significant after controlling for the child's characteristics and family income. Not surprisingly, the relationship between cognitive ability and participation in housework seems to be different for boys and girls. Specifically, results suggest a significant negative association between girls' cognitive ability and their participation in housework, while this relationship is positive and not as strong for the case of boys. In other words, more able girls tend to participate less in housework while more able boys tend to participate more, yet the ability link is considerably smaller for the latter. Interestingly, for both boys and girls, once the analysis controls for parental education and maternal work status none of the associations seem to hold their level of significance, though the signs of the regression coefficients remain unchanged. The loss of significance in this case can be explained by the association between parental education and children's ability, both of these variables having parental ability as a common cause. Thus, including parental education in the estimation is likely to be capturing part of the ability effect.

Just as in the case of participation, the number of hours spent at work also seems to be negatively correlated with children's IQ-for-age *z*-score; however, this association does not appear to be statistically significant under any of the specifications. Inversely, ability shows to be positively associated with the number of hours children spend at school, a relationship that is strongly significant even when all sets of controls are considered in the estimation, suggesting that more able children also tend to spend more time at school, independently of the child's individual characteristics, family income, parental education and work status, as well as household size and composition[43]. On the other hand, having a higher level of cognitive ability appears to be negatively associated with the number of hours children spend doing housework, this relationship being significant even after controlling for the child's characteristics and family income.

In general terms, results suggest the presence of a selection process in which less able children tend to be assigned more paid work and housework, and more able children are more likely to attend school. Additionally, the relationship between ability and time allocation does not seem to be significantly different between boys and girls, except for the case of participation in housework, where more able girls tend to be significantly less likely to participate, while the effect is nearly zero for boys. This result might be reflecting the important effect of gender roles on the intrahousehold division of work, where participation on domestic chores might be somewhat negotiable for girls according to their ability, while boys are simply not traditionally expected to participate at all[44]. Although the previous results provide a first glance at the study of the relationship between children's ability and time allocation, one should keep in mind that the pooled sample framework used in the production of these estimates considers the whole variation in the sample coming from all children across different families, a methodology that might be ignoring the presence of family-specific factors that could be affecting both children's ability and time allocation. In other words, the previous results are built under the assumption that parents react to their kids' absolute level of cognitive ability. However, this assumption might not be as realistic as parents might actually take into account each child's relative position with respect to other children in the same household when making decisions regarding their time allocation.

[43] Most primary schools in Mexico run from 8:00 to 12:30, while private schools tend to extend the children's stay for a couple of extra hours, so there is a possibility that a great part of the variation in the amount of hours spent at school could be simply driven by the fact that some children attend private schools. In this case, it is possible that more able children might be more likely to be sent to private schools, on average.

[44] As shown in Table A3 in the Appendix, even though the regression coefficients associated with boys (male=1) are generally positive, the interaction coefficient between age and male is negative and highly significant, suggesting a decrease in boys' participation in housework as they grow up.

Table 4.1: Pooled sample analysis for children's participation and number of hours spent on each activity; using logit and Tobit regressions, respectively.

			Controls				
				(I)	(II)	(III)	(IV)
			None	Child's characteristics	(I) + Family Income	(II) + Parental education/work status	(III) + Other controls
Participation	Work	IQ z-score	-0.088*	-0.171	-0.164	-0.140	-0.145
		IQ z-score*Male(=1)		0.172	0.184	0.090	0.086
		Pseudo R-squared	0.001	0.095	0.112	0.107	0.129
		Wald Chi-Square	3.661	129.812	154.998	75.037	99.279
		N. of cases	16540	5795	5794	2308	2308
	School	IQ z-score	0.325***	0.286**	0.245*	0.316	0.411
		IQ z-score*Male(=1)		0.133	0.140	0.163	0.239
		Pseudo R-squared	0.012	0.177	0.194	0.375	0.419
		Wald Chi-Square	57.125	257.891	272.488	158.155	183.169
		N. of cases	16433	5764	5763	2286	2286
	Housework	IQ z-score	-0.007	-0.084**	-0.095**	-0.088	-0.079
		IQ z-score*Male(=1)		0.105*	0.108*	0.052	0.034
		Pseudo R-squared	0.000	0.106	0.108	0.104	0.121
		Wald Chi-Square	0.178	704.290	709.586	273.233	292.462
		N. of cases	16511	5794	5793	2308	2308
Number of Hours	Work	IQ z-score	-2.645	-4.725	-4.774	-3.052	-3.070
		IQ z-score*Male(=1)		4.296	4.984	1.828	1.233
		Pseudo R-squared	0.000	0.048	0.058	0.048	0.059
		F statistic	1.920	.	.	4.272	3.913
		N. of cases	16471	5777	5776	2300	2300
	School	IQ z-score	0.684***	0.554***	0.522***	0.476**	0.434**
		IQ z-score*Male(=1)		-0.088	-0.087	0.111	0.123
		Pseudo R-squared	0.001	0.029	0.029	0.039	0.042
		F statistic	86.988	27.531	23.047	11.117	8.268
		N. of cases	13580	4811	4811	1921	1921
	Housework	IQ z-score	-0.155*	-0.324*	-0.355**	-0.277	-0.215
		IQ z-score*Male(=1)		0.294	0.292	0.323	0.293
		Pseudo R-squared	0.000	0.045	0.046	0.038	0.074
		F statistic	2.842	.	.	13.125	.
		N. of cases	14145	4877	4876	2004	2004

Note: MxFLS 2002,2005-2006, and 2009-2012. The stars in the estimated coefficients indicate their significance (***p<0.01, ** p<0.05, * p<0.10), using clustered standard errors by household. Child's characteristics in column (I) include: age, gender, birth order and health and disability status. Other controls in column (IV) include household size, proportion of male children, as well as region and time fixed effects.

4.6.2 Intrahousehold Variation

In the previous subsection the analysis considers variations coming from comparing each child to the rest of the children in the sample. However, it is likely that parents only have access to information on the cognitive ability of their own children, so it is the relative position of a child's cognition with respect to their own siblings what plays a role in the selection process. In other words, parents might take into account how able is a child with respect to the rest of the children in the household in order to choose who goes to work and who goes to school. In order to study this possibility this subsection analyses the results of using household fixed effects regressions for both participation and time allocation.

The main assumption behind the use of this methodology is that parents observe differences in ability between their children at one particular point in time and simultaneously decide on their time allocation based on this information. Therefore, running simple household fixed effects in this case would not capture the ability-selection effect appropriately since any results derived from following this methodology would inevitably mix two sources of variation: differences between siblings at each point of time and general changes in ability over time. Since the main objective of the estimation is to capture the former, the estimation will need to use a more specific form of fixed effects where the unit of reference is each household at each particular point in time[45].

Table 4.2 shows the results from running logit and regular fixed effects regressions at the household level. As expected, the strength of the ability coefficient is lower in significance for most of the specifications. Interestingly, the signs of the ability-participation and ability-time allocation association change drastically under a fixed effects framework. For instance, once household fixed effects are considered the relationship between cognitive ability and the child's likelihood to participate in paid work becomes positive indicating that children who are more able with respect to other children in the family tend to be more prone to work, though this relationship is not statistically significant. Also, once the child's characteristics are controlled for in the school enrolment estimation results seem to suggest significantly opposite effects of

[45] For instance, "Household 1 at year 1", "Household 1 at year 2" and "Household 1 at year 3" would be three different fixed effects.

Table 4.2: Intrahousehold analysis for children's participation and number of hours spent on each activity; using logit and least squares fixed effects regressions, respectively.

			Controls				
				(I)	(II)	(III)	(IV)
			None	Child's characteristics	(I) + Family Income	(II) + Parental education/work status	(III) + Other controls
Participation	Work	IQ z-score	0.070	0.145	0.145	.	.
		IQ z-score'*Male(=1)		0.441	0.441	.	.
		Pseudo R-squared	0.001	0.722	0.722	.	.
		Wald Chi-Square	0.307	87.398	87.398	.	.
		N. of cases	496	170	170	.	.
		N. of groups	191	66	66	.	.
	School	IQ z-score	-0.073	-1.102	-1.102	.	.
		IQ z-score'*Male(=1)		2.687**	2.687**	.	.
		Pseudo R-squared	0.000	0.405	0.405	.	.
		Wald Chi-Square	0.058	359.342	359.342	.	.
		N. of cases	842	215	215	.	.
		N. of groups	304	82	82	.	.
	Housework	IQ z-score	-0.011	0.168	0.168	.	.
		IQ z-score'*Male(=1)		-0.096	-0.096	.	.
		Pseudo R-squared	0.000	0.403	0.403	.	.
		Wald Chi-Square	0.058	335.927	335.927	.	.
		N. of cases	3475	1162	1162	.	.
		N. of groups	1352	469	469	.	.
Number of Hours	Work	IQ z-score	0.024	0.274	0.274	0.366	0.366
		IQ z-score'*Male(=1)		-0.167	-0.167	-0.347	-0.347
		R-squared	0.000	0.040	0.040	0.051	0.051
		F statistic	0.042	3.079	3.079	.	.
		N. of cases	16471	5777	5776	2300	2300
		N. of groups	11941	4218	4217	1571	1571
	School	IQ z-score	0.042	-0.129	-0.129	0.247	0.247
		IQ z-score'*Male(=1)		0.208	0.208	-0.117	-0.117
		R-squared	0.000	0.288	0.288	0.390	0.390
		F statistic	0.056	18.864	18.864	10.376	10.376
		N. of cases	13580	4811	4811	1921	1921
		N. of groups	10321	3731	3731	1424	1424
	Housework	IQ z-score	-0.042	-0.010	-0.010	0.105	0.105
		IQ z-score'*Male(=1)		0.233	0.233	0.367	0.367
		R-squared	0.000	0.163	0.163	0.177	0.177
		F statistic	0.215	22.852	22.852	.	.
		N. of cases	14145	4877	4876	2004	2004
		N. of groups	9595	3308	3307	1272	1272

Note: MxFLS 2002,2005-2006, and 2009-2012. The stars in the estimated coefficients indicate their significance (***p<0.01, ** p<0.05, * p<0.10), using clustered standard errors by household. Child's characteristics in column (I) include: age, gender, birth order and health and disability status. Other controls in column (IV) include household size, proportion of male children, as well as region and time fixed effects. The fixed effects estimation controls for each household at each particular year, allowing a direct sibling-level comparison at each point of time.

ability for boys and girls. Namely, boys who are more able than other children in the household are more likely to be enrolled in school whilst more able girls are actually less likely to do so[46], though this last result is not significant.

Regarding the number of hours spent on each activity, ability seems to have no significant effect under any of the specifications considered. The IQ-for-age regression coefficients for children's time spent on work are all positive; indicating that, on average, more able girls tend to work more hours, this effect getting generally stronger in size as more controls are included in the estimation. As regards the number of hours spent at school and number of hours spent doing housework the effect of ability is not clear, as the IQ-for-age coefficient switches sign across different specifications.

Overall, results from the intrahousehold analysis differ greatly from the ones obtained using a pooled sample framework. Once household fixed effects are considered in the estimation, there seems to be a different effect of ability on school enrolment for boys and girls. Also, results show that having a higher level of ability with respect to other children in the household does not seem to have a significant effect on the number of hours they dedicate to any of the activities.

4.6.3 The Issue of Reverse Causality

One of the main concerns that the previous methodologies arise is the potential presence of reverse causality between cognitive ability and children's time allocation. Until now, the analysis has been assuming that children's cognitive ability is rather fixed, mainly determined by genetic factors that do not change over time. Nevertheless, empirical evidence in psychology and psychiatry suggests that even though there is a strong genetic component in the determination of children's ability, this can also be affected by other environmental factors, which include the activities in which children involve in (Makharia, et al., 2016; Sharkey & Elwert, 2011; Broberg, Wessels, Lamb, & Hwang, 1997). If the effect of children's time allocation on cognitive ability is strong enough the regression coefficients obtained before could be biased and should not be interpreted in a strictly causal manner.

[46] The odd result for girls in this case is not surprising, given the small number of observations used in the estimation.

In order to address the issue of reverse causality the author uses children's height-for-age z score as an instrument for IQ-for-age z score, making use of the close genetic relationship that exists between height and cognitive ability. The next subsections explain this in more detail.

Instrumental variables using 'height-for-age z score'

Alternatively, it is possible to solve the reverse causality issue by introducing a source of exogenous variation in cognitive ability through the use of an instrumental variable (IV). Ideally, the instrument should fulfil two conditions in order to be valid. First, it should be relevant in the explanation of the endogenous regressor, which in this case is children's cognitive ability; and second, it must be exogenous in the sense that it should not be directly correlated with the dependent variable, that is, children's time allocation patterns. In this case, children's 'height-for-age' z score is selected as an instrument for their IQ z score.

One of the conditions for a valid instrument is that it should introduce a source of exogenous variation in the endogenous regressor. In this context, one way to introduce exogenous variation is to isolate the portion of ability that is due to genetic factors using height, an anthropometric measure that is known to have a strong positive relationship with cognitive ability (Spears, 2012; Humphreys, Davey, & Park, 1985). Even though there is an environmental component to both height and cognition (Gale, 2005), there is evidence suggesting that a significant portion of the strong correlation observed between these two variables can be attributable to common genetic sources. A twin study for the Norwegian case, for instance, found that 35 percent of the height-intelligence association can be attributed to significant effects coming from correlated genes (Sundet, Tambs, Harris, Magnus, & Torjussen, 2005). A similar result has been found in a different study for Sweden, where researchers conclude there is a significant within-family correlation between height and intelligence, suggesting the presence of 'pleitropy', a term that refers to the production by a single gene of two or more apparently unrelated effects (Beauchamp, Cesarini, Johannesson, Lindqvist, & Apicella, 2011). Additional evidence suggests that such a relationship could be attributed to the high correlation between body height and brain grey and white matter volume (Taki, et al., 2012).

In order for height to be a good instrument in this context, it should also be exogenous, meaning that it should not be directly correlated with the dependent variable in question, namely, children's time allocation. Even though there is no reason to suspect the existence of a direct relationship between a child's height and their participation in work, school or housework, it is possible that factors such as health status might be strongly correlated with both time allocation and height. However, as children's health status has been already been considered in our baseline estimations[47], it is not likely that the instrument's variation could be contained in the error term of the structural regression.

Also, it is important to mention that the suitability of the instrumental variable chosen for the analysis ('height-for-age') is subject to a number of assumptions that may not always hold. For instance, we need to assume that the child's height alone does not have a direct effect on the way the child's time is allocated; however, if taller children are perceived as more mature or 'look more like grown-ups' and that has an influence on their probability of them working, then the exogeneity of height as an instrumental variable would be compromised. Similarly, if taller children are assigned more housework because they are perceived as being physically stronger or simply because they can reach high places in the household, height could not be considered as a good instrument. Nevertheless, since the definition of housework in the survey has to do with activities for which height does not offer any significant advantage, (such as sweeping/mopping, dusting, washing dishes or washing clothes) and given that most of the child jobs in Mexico do not actually require children to 'look like grown ups' (as it involves basic chores such as packing groceries in supermarkets or delivering messages, where these jobs are traditionally expected to be done by kids), it is not likely that height will be correlated with time allocation. In other words, the assumption that I am implicitly making that height does not directly affect children's time allocation is not likely to be broken.

Since the sample under analysis consists of children whose physical development is not complete yet, our measure of height should consider how tall or short a child is in reference to other children of the same age and gender. Differently from the IQ-for-age *z* scores, for which a reference population was not available, the height-for-age *z* scores

[47] Children's health status is included in the set of controls "Child's characteristics' in Tables 4.1 to 4.4. Health status is proxied by the parents' subjective assessment of the child's health and a couple of dummy variables indicating whether the child suffers from a disability or has a visible health problem.

were built using the WHO child growth standards of 2006 (for preschool children, based on a sample of developing countries) and 2007 (for children aged over 6 years old, based on a sample from the United States). The *z* scores were obtained by subtracting each child's value of height minus the mean height on a reference population of the same age and gender, divided by the standard deviation of height in such reference population.

a) Instrumental variables estimation using pooled sample.

Table 4.4 shows the IV regression results from using children's height-for-age z-score as an instrument for IQ-for-age z-score in the explanation of their time allocation between work, school and housework[48]. For each regression, Table 4.4 presents the regression coefficients and general diagnostics associated with both stages of the IV methodology, those related to the structural equation and the ones referring to the relevance of the instrument and the general suitability of the IV approach.

Regarding children's participation in paid work, employing an IV methodology does not seem to change the main results obtained under previous methodologies, as the coefficient associated with cognitive ability is generally small and not significant (except for the last two specifications where the instrument does not prove to be valid due to lack of relevance). This outcome is in line with the small statistics associated with the Wald test of exogeneity, suggesting that there is not enough evidence to reject the null hypothesis of no endogeneity. In other words, reverse causality might not be an issue in this particular case, implying that participation in work is not likely to have an effect on children's ability. Hence, there is no reason to believe our previous results under a pooled sample framework were necessarily biased.

Results are very different regarding children's enrolment in school. Now that an IV approach is followed the positive regression coefficient for IQ-for-age becomes even stronger in significance with respect to their equivalent results under pooled sample methodologies. This outcome is consistent with the high values obtained for the Wald test statistics, which allow us to reject the null hypothesis of no endogeneity across specifications. Not surprisingly, being enrolled in school does have a significant effect on children's ability, thus measuring the relationship between these two variables using a simple pooled sample approach might not be ideal. However, in this case, it can be concluded that even when the analysis partials out the potential reverse effect that school enrolment might have on children's ability, on average, more able children also tend to be more likely to go to school.

Out of the three activities being studied, it is participation in housework the one for which the use of an IV methodology seems to modify results the most. Once height is

[48] Similarly, the interaction term between ability and gender (male=1) has been instrumented by the interaction between height and gender.

used as an instrument for ability, the previously negative relationship found under the pooled sample framework turns positive and stronger in terms of statistical significance. This result, along with the relatively high values obtained for the Wald test statistic, might be suggesting the presence of reverse causality from participation in housework to cognitive ability. It is possible that participation in housework might have a negative effect on children's cognitive ability by decreasing their engagement in intellectually stimulating activities at home. For instance, there is evidence suggesting that for in-school children housework take time away from studies (Reich, et al., 2013), which in turn might slow down their cognitive development in comparison with children who do not participate in it. Once the endogenous variation in ability is removed from the estimation, the relationship becomes positive, implying that on average, more able children also tend to be more prone to participate in housework (a similar result as the one obtained under a fixed effects approach). This result might be representing parents' choice to delegate housework responsibilities to children who might be perceived as relatively more 'trustworthy' to get chores done properly.

Just as in the case of participation, the number of hours children dedicate to work does not seem to be significantly related to their cognitive ability, a result that is similar to what the pooled sample estimation shows. Once again, the Wald test of exogeneity does not provide evidence to believe cognitive ability is endogenous in this case. On the other hand, the number of hours spent at school seems to have a significant positive correlation with children's IQ-for-age *z*-score, the regression coefficients being considerably stronger in size under an IV approach compared to those obtained using a pooled sample framework. This suggests that, even controlling from the potential reverse causality coming from school attendance to cognitive ability, the latter still shows a significant effect on the former. Finally, results are not as clear regarding the number of hours spent doing housework since the relationship between cognitive ability and the number of hours spent doing housework loses its statistical significance once the analysis controls for the child's characteristics and family income.

Table 4.4: Instrumental variables analysis for children's participation and number of hours spent on each activity; using IV probit and IV Tobit regressions, respectively.

					Controls			
					(I)	(II)	(III)	(IV)
				None	Child's characteristics	(I) + Family Income	(II) + Parental education /work status	(III) + Other controls
Participation	Work	IQ z-score		-0.128	0.465	0.650	1.261***	1.289***
		IQ z-score*Male(=1)			-0.625	-0.669	-0.721*	-0.825**
		Wald Chi-Square		0.813	165.700	220.656	989.051	1099.618
		N. of cases		13163	5080	5080	2033	2033
		Instruments for IQ z-score	Height z-score	0.114***	0.061***	0.050***	0.028	0.033
			Height z-score*Male		0.027	0.026	0.019	0.022
		Instruments for IQ z-score*Male	Height z-score		-0.003**	-0.008***	-0.014***	-0.007
			Height z-score*Male		0.094***	0.094***	0.088***	0.088***
		Wald Test of Exogeneity		0.37	1.66	2.6	68.27	73.75
	School	IQ z-score		0.880***	1.096***	1.004**	-1.135***	-0.797
		IQ z-score*Male(=1)			-0.411	-0.279	0.684	0.689
		Wald Chi-Square		287.765	288.446	229.764	456.982	262.932
		N. of cases		13139	5076	5076	2022	2022
		Instruments for IQ z-score	Height z-score	0.114***	0.061***	0.050***	0.031	0.036
			Height z-score*Male		0.027	0.025	0.014	0.018
		Instruments for IQ z-score*Male	Height z-score		-0.003**	-0.008***	-0.014***	-0.007
			Height z-score*Male		0.094***	0.093***	0.088***	0.088***
		Wald Test of Exogeneity		47.72	18.10	8.30	44.42	2.02
	Housework	IQ z-score		0.141*	0.717***	0.764***	1.112***	1.116***
		IQ z-score*Male(=1)			-0.429	-0.425	-0.475	-0.518
		Wald Chi-Square		3.297	907.526	999.701	947.583	975.810
		N. of cases		13148	5080	5080	2033	2033
		Instruments for IQ z-score	Height z-score	0.114***	0.061***	0.050***	0.028	0.033
			Height z-score*Male		0.027	0.026	0.019	0.022
		Instruments for IQ z-score*Male	Height z-score		-0.003**	-0.008***	-0.014***	-0.007
			Height z-score*Male		0.094***	0.094***	0.088***	0.088***
		Wald Test of Exogeneity		3.37	12.18	11.59	20.56	21.25
Number of hours	Work	IQ z-score		-12.361	33.336	47.366	251.033	255.828
		IQ z-score*Male(=1)			-57.416	-61.519	-174.223	-191.251
		Wald Chi-Square		0.882	488.377	110.044	41.878	57.396
		N. of cases		13114	5064	5064	2025	2025
		Instruments for IQ z-score	Height z-score	0.114***	0.061***	0.050***	0.027	0.033
			Height z-score*Male		0.026	0.025	0.016	0.019
		Instruments for IQ z-score*Male	Height z-score		0.026	0.025	0.016	0.019
			Height z-score*Male		0.093***	0.092***	0.085***	0.085***
		Wald Test of Exogeneity		0.56	1.53	1.65	43.67	51.46
	School	IQ z-score		2.071***	3.242**	3.341*	4.453	4.663
		IQ z-score*Male(=1)			-0.867	-0.868	-2.946	-2.497
		Wald Chi-Square		23.284	129.965	132.098	69.721	80.349
		N. of cases		11898	4630	4630	1848	1848
		Instruments for IQ z-score	Height z-score	0.122***	0.064***	0.052***	0.018	0.026
			Height z-score*Male		0.026	0.025	0.033	0.038
		Instruments for IQ z-score*Male	Height z-score		-0.004**	-0.009***	-0.016***	-0.008
			Height z-score*Male		0.096***	0.095***	0.094***	0.095***
		Wald Test of Exogeneity		12.71	9.38	7.19	0.96	2.79
	Housework	IQ z-score		-1.188*	3.079	3.287	11.932	11.516
		IQ z-score*Male(=1)			-1.867	-1.722	-5.115	-6.023
		Wald Chi-Square		3.026	477.036	478.804	94.732	106.115
		N. of cases		11131	4233	4233	1746	1746
		Instruments for IQ z-score	Height z-score	0.113***	0.058***	0.049***	0.027	0.034
			Height z-score*Male		0.032	0.028	0.019	0.023
		Instruments for IQ z-score*Male	Height z-score		-0.003**	-0.007***	-0.017***	-0.010
			Height z-score*Male		0.096***	0.094***	0.088***	0.088***
		Wald Test of Exogeneity		2.29	2.58	2.32	7.39	8.13

Note: MxFLS 2002,2005-2006, and 2009-2012. The stars in the estimated coefficients indicate their significance (***p<0.01, ** p<0.05, * p<0.10), using clustered standard errors by household. Child's characteristics in column (I) include: age, gender, birth order and health and disability status. Other controls in column (IV) include household size, proportion of male children, as well as region and time fixed effects.

b) Instrumental variables estimation using household fixed effects

Finally, instrumental variables regressions are estimated with household fixed effects using the Stata module "xtivreg2"[49]. From the previous fixed effects results from Table 4.2, the analysis found that once the estimation focuses only on the intrahousehold variation, there still seems to be evidence of a strong relationship between ability and children's attendance to school for boys, meaning that for any particular household a more able boy with respect to their siblings is more likely to go to school. However, this result was not accounting for the presence of reverse causality. Hence, the next question one should ask is whether the strong and significant correlation previously found between ability and school attendance still holds when the estimation introduces a source of exogenous variation, namely, height.

Once instrumental variables regressions are used to study intrahousehold variations the ability-school attendance relationship becomes non-significant and even switches in sign (see Table C31 in Appendix C). Although this result might be suggesting the presence of reverse causality in the previous estimations, the lack of significance of these new coefficients should be interpreted with caution. When using instrumental variables in a pooled sample, the instrument (in this case height-for-age z-score) helped extract some exogenous variation out of our endogenous regressor: cognitive ability. However, when dealing with pure intrahousehold variations, height-for-age might not introduce enough exogeneity to the estimation, and in that case, it could not be a good instrument for ability (as shown in Table C31 in Appendix C, height is not significant in most of the first stage regressions, thus results are not reported here). In other words, differences in children's height-for-age among siblings in the same household at the same point in time might not be large enough to explain intrahousehold variations in cognitive ability. In order to overcome this limitation, one ideally should introduce a new source of exogenous variation that actually "varies" across children in the same household, such as unique and specific habits or behaviours that could be also correlated with ability. Unfortunately, the data set used in this study does not cover such specific information.

[49] Mark E Schaffer, 2005. "XTIVREG2: Stata module to perform extended IV/2SLS, GMM and AC/HAC, LIML and k-class regression for panel data models," Statistical Software Components S456501, Boston College Department of Economics, revised 22 Feb 2015. Even though this methodology does not support the use of Tobit or probit models, results still capture the direction and statistical strength of the ability-time allocation relationship.

Overall, results from following an IV approach seem to suggest that even though cognitive ability does not affect children's participation or number of hours spent on work, it does have a significant relationship with participation in housework and school enrolment, as well as the number of hours spent at school. Specifically, more able children are more likely to be enrolled in school, participate in housework and to spend more time at school. However, none of these results hold when studying intrahousehold variations, suggesting that parents do not actually allocate their children's time based on their relative levels of ability with respect to other children in the household. Nonetheless, results from following this methodology should be interpreted with caution, since height does not seem to be an appropriate instrument for ability in this particular case.

4.7 Conclusions

This paper analyses panel data from the Mexican Family Life Survey using fixed effects and instrumental variables methodologies in order to study the relationship between children's cognitive ability and time allocation among three activities: work, school and housework. Overall, results suggest that cognitive ability does not have a significant relationship on children's participation or time allocated to work; however, it does seem to have a strong correlation with school enrolment, number of hours spent at school and participation in housework, some of these effects being significantly different for boys and girls.

Even though the estimated correlation between ability and work-related outcomes is not significant under any of the methodologies, some of the results regarding school and housework differ slightly across specifications. For instance, when using a simple pooled sample approach, results suggest that, overall, more able children are more likely to be enrolled in school. However, once the estimations focus only on the intrahousehold variation, the analysis finds that such a strong positive relationship is only significant for boys. These differences might be suggesting that even though, in general, more able children are more likely to go to school, when it comes to the intrahousehold decision of what child to send to school (out of all children in the same family), the reinforcement selection process is stronger for boys.

Not surprisingly, the study finds strong evidence of the presence of reverse causality between school outcomes and ability. Once the issue is solved using height as an instrument for ability, the positive relationship between the latter and school enrolment becomes stronger in size and significance. Similarly, there is evidence of reverse causality issues regarding children's participation in housework, which might have a negative effect on ability since the coefficients associated with cognitive ability obtained under the IV specifications are now positive, meaning that more able children tend to be more likely to participate on housework. Finally, when applying household fixed effects on the instrumental variable regressions, the analysis finds no evidence of ability playing a role in the intrahousehold allocation of time among children; however, this result should be interpreted with caution due to the low explanatory power of height on the intrahousehold variation in ability.

4.8 References

Ahmed, S. (2011). Trade-off between Child Labour and Schooling in Bangladesh: Role of Parental Education. Monash Economics Working Papers, Discussion Paper 21/11, Monash University.

Akresh, R., Bagby, E., de Walque, D., & Kazianga, H. (2012). Child Ability and Household Human Capital Investment Decisions in Burkina Faso. *Economic Development and Cultural Change*, 157-186.

Assaad, R., Levison, D., & Zibani, N. (2010). The Effect of Domestic Work on Girls' Schooling: Evidence from Egypt. *Feminist Economics*, 79-128.

Ayalew, T. (2005). Parental Preference, Heterogeneity, and Human Capital Inequality. *Economic Development and Cultural Change*, 381-407.

Beauchamp, J. P., Cesarini, D., Johannesson, M., Lindqvist, E., & Apicella, C. (2011). On the sources of the height-intelligence correlation: New insights from a bivariate ACE model with assortative mating. *Behavior Genetics*, 242-252.

Becker, G. S., & Tomes, N. (1976). Child Endowments and the Quantity and Quality of Children. *Journal of Political Economy*, S143-S162.

Behrman, J. R., Pollack, R. A., & Taubman, P. (1982). Parental Preferences and Provision for Progeny. *Journal of Political Economy*, 52-73.

Bianchi, S. M., & Robinson, J. (1997). What Did you Do Today? Children's Use of Time, Family Composition, and the Acquisition of Social Capital. *Journal of Marriage and the Family*, 332-344.

Bonke, J. (2010). Children's housework- Are girls more active than boys? *electronic International Journal of Time Use Research*, 1-16.

Bonsang, E., & Faye, O. (2005, May). Working or Schooling: What Determine Children's Time Allocation in Senegal? CREPP Working Papers, CREPP (Research Center on Public and Population Economics).

Broberg, A. G., Wessels, H., Lamb, M. E., & Hwang, C. P. (1997). Effects of day care on the development of cognitive abilities in 8-year-olds: A longitudinal study. *Developmental Psychology*, 62-69.

Buonomo Zabaleta, M. (2011). The impact of child labor on schooling outcomes in Nicaragua. *Economics of Education Review*, 1527-1539.

Burki, A. A., & Fasih, T. (1998). Household's Non-leisure Time Allocation for Children and Determinants of Child Labour in Punjab, Pakistan. *The Pakistan Development Review*, 899-914.

Conley, D. (2000). Sibship Sex Composition: Effects on Ecucational Attainment. *Social Science Research*, 441-457.

Edmonds, E. V. (2005). Understanding siblings differences in child labor. *Journal of Population Economics*, 795-821.

Fiorini, M., & Keane, M. P. (2014). How the Allocation of Children's Time Affects Cognitive and Non-Cognitive Development. *Journal of Labor Economics*, 787-836.

Frijters, P., Johnston, D. W., Shah, M., & Shields, M. A. (2013). Intrahousehold Resource Allocation: Do Parents Reduce or Reinforce Child Ability Gaps? *Demography*, 2187-2208.

Gale, C. (2005). Commentary: Height and intelligence. *International Journal of Epidemiology*, 678-679.

Guarcello, L., Manacorda, M., Lyon, S., & Rosati, F. (2010, February). Children's work in Andhra Pradesh: Trends and determinants. Understanding Children's Work Project Working Paper Series 57410.

Hertting, K., & Kostenius, C. (2012). Organized Leisure Activities and Well-being: Children Getting it Just Right! *The Cyber Journal of Applied Leisure and Recreation Research*, 13-28.

Hofferth, S. L., & Sandberg, J. F. (2001). How American Children Spend Their Time. *Journal of Marriage and Family*, 295-308.

Humphreys, L. G., Davey, T. C., & Park, R. K. (1985). Longitudinal Correlation Analysis of Standing Height and Intelligence. *Child Development*, 1465-1478.

Ilahi, N. (2001, December). Children's Work and Schooling: Does Gender Matter? Evidence from the Peru LSMS Panel Data. Paper for The Policy Research Report on Gender.

Kamga, A. K. (2010). Trade-off between child labor and schooling in urban and rural areas: evidence from Cameroon. Mimeo. University of Yaounde II -Soa.

Koissy-Kpein, S. A. (2013). School's Feeding Programs and the Trade-off between Child Labor and Schooling: Evidence from BRIGHT Survey. *Research in Applied Economics*, 59-77.

Kondylis, F., & Manacorda, M. (2012). School Proximity and Child Labor E. *The Journal of Human Resources*, 32-63.

Ligeve, S. N., & Poipoi, M. W. (2012). The Influence of Child Labour on Academic Achievement of Primary School Pupils in Suba and Homa-Bay Districts, Kenya. *International Journal of Learning and Development*, 189-197.

Majid, H. (2012). Parental Decision-Making and Intra-Household Resource Allocation. PhD Dissertation. Ohio State University.

Makharia, A., Nagarajan, A., Mishra, A., Peddisetty, S., Chahal, D., & Singh, Y. (2016). Effect of environmental factors on intelligence quotient of children. *Industrial Psychiatry Journal*, 189-194.

McKay, C. (2012). The psychological benefits of participation in leisure pursuits for adolescents. Honors Thesis. University of New Hampshire.

Morduch, J. (2000). Sibling Rivalry in Africa. *American Economic Review*, 405-409.

Orazem, P. F., & Gunnarsson, V. (2003, October). Child labour, school attendance and performance: A review. ILO/IPEC Working Paper. International Labour Organization.

Pörtner, C. C. (2016). Effects of parental absence on child labor and school attendance in the Philippines. *Review of Economics of the Household*, 103-130.

Raley, S., & Bianchi, S. (2006). Sons, Daughters, and Family Processes: Does Gender of Children Matter? *Annual Review of Sociology*, 401-421.

Rammohan, A. (2014). The trade-off between child labour and schooling in India. *Education Economics*, 484-510.

Reich, J., Hein, S., Krivulskaya, S., Hart, L., Gumkowski, N., Learning Disabilities Project: Zambia, & Grigorenko, E. L. (2013). Associations between household responsibilities and academic competencies in the context of education accessibility in Zambia. *Learning and Individual Differences*, 250-257.

Rosati, F. C., & Rossi, M. (2001, October). Children's Working Hours, School Enrolment and Human Capital Accumulation: Evidence from Pakistan and Nicaragua. Understanding Children's Work project. .

Rosati, F. C., & Rossi, M. (2007). Impact of School Quality on Child Labor and School Attendance: The Case of the CONAFE Compensatory Education Program in Mexico. *Well-Being and Social Policy*, 3-20.

Sequeira, M. (2013, September). Is there an association between child work and cognitive ability? Evidence from Peru. Student Paper. London School of Hygiene and Tropical Medicine, University of London.

Sharkey, P., & Elwert, F. (2011). The Legacy of Disadvantage: Multigenerational Neighborhood Effects on Cognitive Ability. *American Journal of Sociology*, 1934-1981.

Spears, D. (2012). Height and cognitive achievement among Indian children. *Economics and Human Biology*, 210-219.

Sundet, J. M., Tambs, K., Harris, J. R., Magnus, P., & Torjussen, T. M. (2005). Resolving the Genetic and Environmental Sources of the Correlation Between Height and Intelligence: A Study of Nearly 2600 Norwegian Male Twin Pairs. *Twin Research and Human Genetics*, 307-311.

Taki, Y., Hashizume, H., Sassa, Y., Takeuchi, H., Asano, M., Asano, K., . . . Kawashima, R. (2012). Correlation among body height, intelligence, and brain gray matter volume in healthy children. *NeuroImage*, 1023-1027.

Webbink, E., Smits, J., & de Jong, E. (2012). Hidden Child Labour: Determinants of Housework and Family Business Work of Children in 16 Developing Countries. *World Development*, 631-642.

Whitebread, D., Basilio, M., Kuvalja, M., & Verma, M. (2012, April). The importance of play. A report on the value of children's play with a series of policy recommendations. Written for Toy Industries of Europe (TIE).

Chapter 5
Conclusions

5.1 Discussion of key findings and concluding remarks

The main objective of this thesis has been to examine three specific socioeconomic issues from an intrahousehold perspective using data from the Mexican Family Life Survey (MxFLS), a nationally representative longitudinal data set. Matters such as the intergenerational persistence of obesity, women's participation in decision-making and children's time allocation between work and school are all particularly relevant for Mexico's public agenda, their study being essential for the design of appropriate policy. Chapter 5 is organised as follows: in the first section the main results from each empirical chapter are briefly summarised and discussed, while the second section presents the limitations of the analyses and a few suggestions for future research.

The first empirical chapter of this thesis (Chapter 2) analysed the intergenerational transmission of obesity from parents to children by quantifying the relationship between the Body Mass Index (BMI) of both groups. After using different methodologies (including fixed effects at the individual and household level), it is possible to confirm the existence of a strong association between the anthropometric status of parents and children, this being particularly significant for the father-child relationship. Whilst the mother-child link seems to be mainly composed by time-invariant aspects (such as genetics and shared time-invariant environmental conditions), the father-child relationship seems to be driven in a higher proportion by factors that do show some change over time, such as variable habits and behaviours. Furthermore, the size of the parent-child transmission varies across the distribution of the child's age, the family's income, parental occupation and employment status and the anthropometric status of the parents. Specifically, the study finds evidence suggesting that as children grow up their BMI tends to be more similar to the one of the parents and that the father-child anthropometric transmission tends to be stronger in the higher end of the income distribution. Results also suggest that fathers with jobs in which they hold a position of power (managers or business owners) tend to transmit more of their own anthropometric status to their children; similarly, children of mothers who work tend to experience a higher level of maternal transmission. Finally, the study finds evidence of an intergenerational vicious cycle in which obese parents are more likely to transmit their own condition to their children, with respect to normal weight individuals.

The presence of an intergenerational transmission process in the BMI has multiple implications in terms of public health policy. Specifically, the fact that at least 20 and 40 per cent of the maternal and paternal transmission, respectively, cannot be explained by genetic factors suggests that a child being obese or overweight is not an inevitable consequence of the genetic endowment provided by the parents, and therefore there is still room for external interventions that exploit the intergenerational nature of the problem. The recently published Mexican National Strategy for the Prevention and Control of Overweight and Diabetes[50], considers a set of policies in terms of public health, medical care and sanitary regulations, which are expected to promote a healthy lifestyle that includes a balanced diet and regular exercise. For the case of children, most of these policies focus on the availability of junk food in schools and the discouragement of its consumption by restricting junk food advertising during children's television programs. However, it is important to keep in mind that the quality of food that children consume is not only a function of their own preferences and the influences they receive at school or through the media, but also has to do with their parents' habits and information. In this regard, it is likely that restricting the contents of sugar and fat of the snacks and drinks sold at school or increasing the availability of natural water in public spaces will not have very strong effects in child obesity reduction if children still have access to high-calorie snacks and sugary drinks provided by the parents at home. Likewise, restricting junk food advertising during children's television programs is not likely to be very effective if the parents are exposed to the advertising and end up getting unhealthy food that soon becomes available for everyone in the household. Following this reasoning, it is reasonable to conclude that the best policies against child obesity and overweight are those that also attempt to modify the parents' behaviours and preferences.

[50] Mexico's 'National Strategy to the Prevention and Control of Overweight, Obesity and Diabetes'(2013). Available at: https://www.gob.mx/cms/uploads/attachment/file/276108/estrategia_sobrepeso_diabetes_obesidad.pdf

In the second empirical section (Chapter 3), this thesis focuses on one of the secondary results derived from the previous analyses which suggests that mothers who work outside the household tend to transmit more of their own anthropometric status to their children, in comparison with women who do not work. This outcome is particularly interesting as it might be signalling the effects that female employment has on their influence on domestic decisions and more importantly, the intrahousehold balance of power overall. In line with this notion, findings from Chapter 3 confirm the presence of a strong impact of women's education and employment on their level of decision-making power regarding several aspects of family life, the magnitude of this effect being heterogenous across decisions and levels of decision-making power.

Results from Chapter 3 offer a deeper understanding on the effect of education on women's power, which seems to be more complex than a mere linear positive relationship. First of all, education shows to have a highly desirable impact on most aspects of decision-making, which not always means providing women with the maximum level of power. For instance, more educated women are more likely to share their power with other family members (as opposed to having exclusive control) when it comes to children's wellbeing or large household expenditures, which can be perceived as a desirable outcome since it implies a more equal share of the responsibilities that come along with decision-making power. At the same time, education tends to provide women with additional potential to become exclusive decision-makers regarding other specific issues such as their own working status or cash transfers to women's relatives, making them more able to be completely in charge of their own career decisions and the economic contributions they wish to make towards other family members outside the household. Secondly, education has the potential to affect the intrahousehold balance of power between spouses. As the fixed effects analysis shows, even though acquiring an additional year of education does not necessarily increase women's power, increasing the woman's advantage in years of education with respect to her spouse does provide her with additional decision-making power; a result that also reassures the importance of studying the relative position of women in the household, instead of limiting the analysis to absolute measures. Thirdly, the effect of education on women's intrahousehold decision-making power seems to have also a social dimension, where the strength of the positive effect of education is conditioned by women's social environment. Most likely because of unwritten social norms and conventions, women who have a higher level of education than the community average do not benefit as much from it. One explanation for this result could be that highly educated women might be perceived as 'successful' outside the household, which contradicts the social norm establishing the man as the main breadwinner and supporter of the family. Hence, these women might choose to relinquish their power and adopt submissive attitudes at home as a way to restore the expected balance of power that the social norm dictates, an effect that has been previously identified in other studies[51]. Even though this result does not seem very promising, it also highlights the presence of a positive externality that can be exploited. As more women get educated, it becomes easier for other women in the community to benefit from their own education, the empowering effect of the latter becoming stronger and more effective.

Employment has also an important positive effect on women's decision-making power. In fact, results suggest that employed women are more likely to share power and even become exclusive decision-makers for most aspects of family life. Similarly, the event of getting a job (namely, passing from unemployment to employment) has a strong positive effect on women's level of power regarding large expenditures, one of the most transcendental aspects of decision-making in the domestic sphere. Nevertheless, policies attempting to use employment alone as an empowering tool might not be effective in some households where women are not even allowed to decide whether they can work or not; regardless of how good the job market conditions for women get, some of them will not benefit from it. Education, on the other hand, can make women more likely to participate in the decision-making process regarding their employment status, which in turn reinforces the empowering effect. Therefore, the best empowering policies might be the ones that tackle both: women's access to education and participation in paid employment.

Finally, in Chapter 4 this thesis analyses one particular intrahousehold decision-making process: children's time allocation between school and work. Specifically, the main objective of this chapter has been to determine whether children's cognitive endowment plays a role in the manner they distribute their time between work, housework and school, and if such relationship exists, whether it can be associated with a reinforcement or a compensation effect. Even though results from quantitative

[51] Please refer to the literature review in Chapter 3.

analyses in Chapter 4 do not offer enough evidence to suggest the presence of a significant relationship between children's cognitive ability and their likelihood of participating in paid employment under any of the methodologies, they do seem to show a link between children's IQ measures and school enrolment, as well as the number of hours they spend in it. Likewise, there seems to be a significant relationship between children's ability and their participation in housework.

One noteworthy finding is the great variation of results across methodologies, highlighting the importance of considering both pooled OLS and fixed effects regressions in order to offer a better understanding of the relationship under study. Pooled OLS results suggest, for instance, that children with a higher level of cognitive ability are more likely to be enrolled in school, which confirms the presence of a reinforcement strategy where children who are more likely to succeed at school are actually more likely to be sent to it. However, once household-year fixed effects are considered in the estimation, controlling for all the factors that remain constant for all siblings living in the same household in the same years, the study finds that such a reinforcement strategy only remains for boys, not for girls. In order to make sense of these apparently contradictory results, it is important to keep in mind that the pooled OLS and the fixed effects regressions are both valid in their own context and are answering the same question, only through different perspectives. Pooled OLS results confirm that, on average, more able children are more likely to be enrolled in school, but do not provide much information on the intrahousehold decision-making process taking place within each individual family. On the other hand, fixed effects results suggest that within any particular household, more able boys tend to be more likely to go to school, this effect being non-existent for girls. The presence of a reinforcement pattern that is only valid for boys is also an interesting finding itself and might be mirroring the particular gender-stratified nature of the cultural environment where the sample was extracted. Since boys are expected to grow up to become future household heads and breadwinners, parents might be more cautious when making investment decisions regarding their education. More able boys are more likely to be sent to school, because they are more likely to retrieve the benefits of such investment in the future. On the other hand, if most girls are traditionally expected to become housewives and stay at home, the decision of whether they are sent to school or not will have little to do with their cognitive endowment and their future potential income, but will be likely to be determined by a different set of factors.

A major challenge in the measurement of the effect of children's ability on their time allocation patterns is the possible presence of reverse causality. Since children's cognitive ability is continuously developing, it is quite possible that the way they allocate their time has an effect on it; for instance, children who go to school are likely to have, on average, a higher level of cognitive ability with respect to other children. In this case, height-for-age is used as an instrumental variable for children's IQ measures in an attempt to eliminate the endogenous variation in the latter. As a result from following this approach, the positive relationship between children's cognitive ability and their probability to be enrolled in school now seems to be stronger and more significant. Similarly, introducing an exogenous source of variation in cognitive ability makes the relationship between the latter and participation in housework positive and highly significant, meaning that more able children also tend to be more likely to participate in housework. These changes in size, magnitude and in some cases even the sign of the regression coefficients from the pooled OLS estimations to the instrumental variables can be interpreted as an indicator of the presence of endogeneity in the former. Therefore, it is essential that any attempt to identify a causal relationship between children's cognitive ability and time allocation consider the use of techniques that remove the endogenous portion of the variation in the former. Following this idea, the estimations in Chapter 4 also use instrumental variables under a fixed effects framework in order to remove possible endogeneity from the intrahousehold analysis. Even though the link between cognitive ability and time allocation does not show to be significant under any specifications, it is not possible to conclude that there is no meaningful relationship between children's ability and their time allocation within each particular household, since the instrument used (height-for-age) does not actually provide enough intrahousehold variation to explain the differences in cognitive ability among siblings. The selection of an appropriate instrument is generally a considerably complex process, which becomes particularly challenging when working with intrahousehold variations. In this case, any candidate for a good instrument should not only be strongly related to the endogenous variable but most also show a high degree of intrahousehold variation, a combination of characteristics that is not easily found in the typical household survey.

Overall, results from Chapter 4 do suggest the presence of a reinforcement pattern where more able children tend to be more likely to be sent to school, this effect being especially strong for boys. Even though this strategy might make sense at the household level since it is likely to maximise the present value of total earnings, it also highlights the presence of a negative cycle where less able children, who are also more likely to have low income in the future as it is, are getting limited access to education. This outcome is particularly worrisome in terms of social policy, as it might be indicating an important source of economic inequality in the near future. Thus, it is reasonable to suggest that social projects aimed to maximise children's school enrolment and attendance consider the intrahousehold selection processes that take place when a family makes the decision of whether a child will be sent to school or not, paying special attention to those children in conditions of disadvantage.

5.2 Limitations and suggestions for future research

Even though the main objectives set in the three empirical chapters of this thesis were tackled in the most appropriate manner according to the author's best knowledge and ability, it is pertinent to mention some of the limitations restricting the quantitative analyses and areas of opportunity that might be worth exploring in future research.

Most of the limitations of this thesis have to do with the unavailability of data. One important challenge of working with the MxFLS is that although it covers a 10-year period, the information is only collected in three waves. This means that for every subject there are only a maximum of three observations to study intrahousehold and within-individual variations. Having an observation per year would probably improve the quality of the fixed-effects estimations. Also, having a longer period of time covered in the survey would make it possible to widen the scope of some of the research questions. In Chapter 2, for instance, this thesis aims to study the intergenerational transmission of obesity by analysing the Body Mass Index (BMI) of parents and children contained in the sample; however, results do not provide much information on the persistence of the intergenerational link, which would ideally require data on more than two generations. If a Mexican data set which such characteristics becomes available in the near future, a study of persistence of the BMI intergenerational link would offer a good contribution to the literature.

Similarly, the analysis in Chapter 3 could benefit from the inclusion of information regarding the nature of the intrahousehold allocation of resources, specifically, whether husband and wife pool their resources or not. Unfortunately, the MxFLS does not include any information on this matter. The questionnaire asks individuals about their income, and then this variable is aggregated for the household, but the survey does not actually deepen the analysis into a differentiation between pooled and non-pooled income. An alternative approach would be to analyse information on savings and on whether husband and wife have separate saving devices, however saving information is only available at the household level and does not include any details about individual saving accounts. The nature of the questions asked in the MxFLS seems to implicitly assume resource pooling.

Also, even though the MxFLS does gather information on a wide variety of aspects of family life, some of the analyses in this thesis could benefit from the use of more variables at the community level, which unfortunately are not included in the survey. For example, the absence of some variables beyond the household level prevents the analysis in Chapter 3 to include factors such as the level of political participation of women in the community as an additional control in the estimations.

The measurement of the relationships under study in Chapter 4 face a few challenges that have to do with the nature of the dependent variables. For instance, the dependent variable indicating whether the child works is a dummy variable that takes the value of 1 if the child worked in the last 12 months. Although choosing such a long span of time makes sense in terms of representativeness across time (asking if the child worked last week would not necessarily represent the child's general situation), it raises the question on whether it actually captures the true essence of the child labour issue, since this variable will also be capturing summer jobs and part-time employment that do not necessarily compromise the child's time allocated to school or other academic activities. Similarly, it is possible that children's involvement in housework has little to do with cognitive ability and substitution with respect to school attendance, but simply representing the parents' wish to educate their children in values related to cooperation and discipline at home.

One important challenge of studying the research question in Chapter 4 is the choice of a measurement for children's cognitive ability. Although the result of a Raven test might not be a perfect proxy for it, it is the only variable available in the data set that would capture at least some portion of the variation in cognitive ability, and there is no reason to believe that using any other index or method of measurement would significantly alter the results. Another limitation of the empirical analysis in Chapter 4 is that even though the instrument 'height-for-age' does seem to work well under pooled OLS schemes, it does not show enough variability to explain intrahousehold variations in cognitive ability. As commented earlier in this chapter, finding an instrument that complies with both relevance and exogeneity in this particular case becomes a difficult, if not impossible task. However, it is the author's belief that this does not undermine the chapter's general conclusions regarding the relationship under study.

Finally, just as in the previous chapters, it is important to recognise that the analysis in Chapter 4 could also significantly benefit from the inclusion of additional variables that unfortunately are not available in the data set. Factors such as single-parenting, extreme poverty, domestic violence, etc, could potentially have an influence on both: children's cognitive ability and the parents' choice to allocate children's time in a certain manner. If that is the case, the large data set analysis with marginal effects at the means would be inappropriate.

APPENDIX A

Table A1. Number of observations per year.

Year	Observations	Per cent	Cumulative
Total number of children in the sample			
2002	10,523	34.83	34.83
2005	9,744	32.26	67.09
2009	9,942	32.91	100
Total	30,209	100	
Mother-child pairs			
2002	9,061	40.61	40.61
2005	6,347	28.44	69.05
2009	6,906	30.95	100
Total	22,314	100	
Father-child pairs			
2002	6,275	40.87	40.87
2005	4,340	28.27	69.14
2009	4,739	30.86	100
Total	15,354	100	
Mother-father-child sets			
2002	5,996	42.32	42.32
2005	4,047	28.56	70.88
2009	4,126	29.12	100
Total	14,169	100	

Table A2. Number of times each observation appears in the panel.

Number of waves	Observations	Per cent	Cum.
1	8,622	28.54	28.54
2	11,066	36.63	65.17
3	10,521	34.83	100
Total	30,209	100	

Table A3. Individual Fixed Effects (restricted sample: children whose both parents work).

	(1)	(2)	(3)
BMI z-score mother	0.121	0.073	0.046
	(0.104)	(0.125)	(0.135)
BMI z-score father	0.069	0.082	0.085
	(0.078)	(0.078)	(0.082)
Child´s age	0.037	0.000	-0.032
	(0.079)	(0.083)	(0.078)
Child's age squared	-0.004	-0.003	-0.003
	(0.003)	(0.003)	(0.003)
Gender (Male)*age	0.019	0.027	0.025
	(0.023)	(0.024)	(0.024)
Mother´s age	-0.152	-0.216*	-0.248**
	(0.110)	(0.113)	(0.113)
Father´s age	0.159	0.239**	0.219*
	(0.107)	(0.121)	(0.116)
Mother's age squared	0.002	0.003**	0.003**
	(0.001)	(0.001)	(0.001)
Father's age squared	-0.002*	-0.003**	-0.002**
	(0.001)	(0.001)	(0.001)
WHO 2007 reference	0.395	0.503**	0.487**
	(0.240)	(0.249)	(0.246)
Constant	-0.235	-1.415	0.349
	(1.742)	(1.974)	(2.713)
Household socioeconomic level		Y	Y
Region dummies			Y
Time dummies			Y
Region*time interactions			Y
R-squared	0.080	0.118	0.131
N. of cases	2,749	2,589	2,589
N. of groups	2,323	2,184	2,184

Table A4. Household Fixed Effects (restricted sample: children whose both parents work).

	(1)	(2)	(3)
BMI z-score mother	0.180*	0.162	0.139
	(0.104)	(0.116)	(0.121)
BMI z-score father	0.033	-0.003	-0.036
	(0.073)	(0.074)	(0.081)
Child's gender: Male	0.100	0.051	0.053
	(0.137)	(0.139)	(0.139)
Child´s age	0.010	0.013	0.014
	(0.041)	(0.043)	(0.043)
Child's age squared	-0.002	-0.002	-0.002
	(0.002)	(0.002)	(0.002)
Gender (Male)*age	-0.002	0.002	0.002
	(0.011)	(0.011)	(0.011)
Mother´s age	-0.060	-0.106	-0.121
	(0.092)	(0.091)	(0.092)
Father´s age	0.067	0.128	0.136
	(0.100)	(0.104)	(0.105)
Mother's age squared	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)
Father's age squared	-0.001	-0.002	-0.002
	(0.001)	(0.001)	(0.001)
WHO 2007 reference	0.304**	0.310**	0.310**
	(0.130)	(0.133)	(0.134)
Constant			
Household socioeconomic level		Y	Y
Region dummies			Y
Time dummies			Y
Region*time interactions			Y
R-squared	0.021	0.030	0.031
N. of cases	2,749	2,589	2,589
N. of groups	1,108	1,051	1,051

Table A5. Quantile Regression for Children's BMI z-score

	Quantile								
	0.10	**0.20**	**0.30**	**0.40**	**0.50**	**0.60**	**0.70**	**0.80**	**0.90**
Mother's BMI z-score	0.211	0.220	0.238	0.253	0.270	0.267	0.264	0.258	0.223
Bootstrapped Standard Errors	*0.020*	*0.016*	*0.014*	*0.015*	*0.014*	*0.014*	*0.016*	*0.014*	*0.020*
Father's BMI z-score	0.188	0.174	0.163	0.179	0.181	0.191	0.218	0.243	0.246
Bootstrapped Standard Errors	*0.020*	*0.019*	*0.015*	*0.013*	*0.013*	*0.010*	*0.014*	*0.015*	*0.015*
Household Income (per capita)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bootstrapped Standard Errors	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*
Mother's Education	0.002	-0.001	0.006	0.007	0.008	0.011	0.015	0.015	0.018
Bootstrapped Standard Errors	*0.004*	*0.004*	*0.004*	*0.005*	*0.005*	*0.006*	*0.004*	*0.005*	*0.004*
Father's Education	-0.010	-0.002	-0.005	-0.003	0.000	0.005	0.006	0.009	0.011
Bootstrapped Standard Errors	*0.005*	*0.004*	*0.004*	*0.005*	*0.005*	*0.006*	*0.004*	*0.005*	*0.005*

APPENDIX B

Table B1: Number of observations per year

Year	Observations	Percent	Cumulative
2002	6,132	33.29	33.29
2005	5,963	32.37	65.67
2009	6,324	34.33	100
Total	18,419	100	

Table B2: Number of times each observation appears in the panel

Number of waves	Observations	Percent	Cumulative
1	2,742	14.89	14.89
2	3,405	18.49	33.37
3	12,272	66.63	100
Total	18,419	100	

Table B3(a): Descriptive statistics for explanatory variables.

	2002			2005			2009		
	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.
Education (years)	6132	6.224	4.370	5963	6.489	4.377	6324	6.919	4.421
Work (=1)	6127	0.241	0.428	5959	0.212	0.409	6313	0.242	0.428
Age	6125	40.301	13.872	5938	41.667	14.530	6281	42.014	15.063
Married (=1)	6114	0.828	0.377	5883	0.809	0.393	5939	0.767	0.423
Age at marriage	6060	20.754	5.955	5802	21.026	6.121	6084	21.213	6.097
Previous unions (=1)	6114	0.081	0.273	5963	0.069	0.253	6324	0.068	0.251
Indigenous group (=1)	6131	0.123	0.328	5960	0.122	0.327	6324	0.128	0.334
Number of children	4542	2.911	1.921	4553	2.730	1.950	5127	2.527	1.929
Age of children	5230	12.819	8.865	4934	14.901	9.663	4798	16.656	10.238
Proportion of male children	5232	0.503	0.366	4954	0.510	0.355	4803	0.514	0.360
Couple's Difference in Age	6117	-3.410	5.728	5918	-3.263	5.698	6263	-3.330	5.367
Couple's Difference in Education (years)	5114	-0.635	4.191	4917	-0.523	4.599	5110	-0.490	4.782

Table B3(b): Descriptive statistics for explanatory variables.

	2002		2005		2009	
	Obs.	Percentage	Obs.	Percentage	Obs.	Percentage
Region						
North	1389	22.66	1316	22.07	1406	22.24
Center-North	1958	31.95	1954	32.77	2034	32.18
Center-North	1536	25.06	1498	25.13	1650	26.1
South	1246	20.33	1194	20.03	1231	19.47
	6129	100	5962	100	6321	100
Community Size						
Less than 2500	2617	42.7	2425	40.67	2958	46.8
Between 2,500 and 15,000	656	10.7	757	12.69	632	10
Between 15,000 and 100,000	577	9.41	617	10.35	673	10.65
More than 100,000	2279	37.18	2164	36.29	2058	32.56
	6129	100	5963	100	6321	100

Table B4: Brant Tests for Parallel Regression Assumption (P-values)

	Daily Life	Children's wellbeing		Economic decisions		Autonomy	
	Food	Children's Education	Children's Health Care	Large Expenditures	Cash Transfers to Her Relatives	If She Should Work	Contraceptive Use
Individual Level							
Education (years)	0.692	0.000	0.000	0.013	0.001	0.000	0.000
Work	0.194	0.992	0.020	0.000	0.001	0.000	0.443
Age	0.003	0.439	0.246	0.167	0.551	0.075	0.140
Married	0.137	0.901	0.019	0.029	0.006	0.012	0.042
Age at marriage	0.304	0.071	0.278	0.020	0.267	0.018	0.978
Previous unions	0.012	0.000	0.003	0.021	0.629	0.001	0.173
Indigenous group	0.185	0.122	0.220	0.218	0.939	0.973	0.001
Number of children	0.869	0.259	0.163	0.976	0.323	0.889	0.116
Age of children (mean)	0.010	0.000	0.000	0.977	0.710	0.711	0.091
Proportion of male children	0.494	0.728	0.847	0.403	0.367	0.532	0.077
Couple Level							
Difference in Age	0.234	0.345	0.966	0.764	0.126	0.976	0.005
Difference in Education	0.417	0.000	0.011	0.290	0.810	0.985	0.068
Household Level: Quantile of Net Income							
2nd	0.375	0.481	0.062	0.977	0.411	0.233	0.032
3rd	0.832	0.454	0.172	0.312	0.714	0.063	0.116
4th	0.353	0.822	0.638	0.102	0.192	0.004	0.255
Community/Locality Level: Population (Base: Less than 2,500)							
Between 2,500 and 15,000	0.001	0.484	0.245	0.253	0.051	0.099	0.143
Between 15,000 and 100,000	0.442	0.775	0.934	0.077	0.196	0.612	0.957
More than 100,000	0.620	0.185	0.000	0.008	0.000	0.732	0.002

Note: MxFLS 2002,2005-2006, and 2009-2012.

Table B5. Level of decision-making power by aspect of decision-making, using women's perception (frequencies in percentages).

	Level of Decision-Making Power			
	1	2	3	
	Does not participate in the decision-making process	Shares decision-making process with at least one other family member	Makes decision by herself	Total (%)
Food	10.41	35.64	53.94	100
Children's education	23.76	67.95	8.29	100
Health care and medicines for children	23.04	67.52	9.44	100
Large expenditures	36.2	58.43	5.36	100
Cash transfers to her parents/relatives	12.5	57.13	30.37	100
If she should work	24.76	33.97	41.26	100
Contraceptive use	6.36	87.12	6.52	100

Note: MxFLS 2002,2005-2006, and 2009-2012.

APPENDIX C

Section I: Complete regression results from Table 4.1

Table C1: Work in the last 12 months, logit regression.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
IQ-for-age z score	-0.088*	-0.100**	-0.110**	-0.085	-0.171	-0.164	-0.167	-0.140	-0.145
	(0.046)	(0.045)	(0.045)	(0.068)	(0.110)	(0.111)	(0.146)	(0.149)	(0.150)
Age		-0.002	-0.006	-0.005	0.344	0.339	0.380	0.320	0.378
		(0.245)	(0.246)	(0.246)	(0.384)	(0.385)	(0.534)	(0.533)	(0.537)
Age2		0.020	0.021	0.021	0.005	0.005	0.003	0.006	0.001
		(0.013)	(0.013)	(0.013)	(0.020)	(0.020)	(0.028)	(0.028)	(0.029)
Male (=1)			0.711	0.706	0.868	0.940	1.480	1.330	1.413
			(0.500)	(0.500)	(0.869)	(0.871)	(1.163)	(1.147)	(1.180)
Male*Age			-0.001	-0.001	-0.019	-0.027	-0.098	-0.082	-0.083
			(0.048)	(0.048)	(0.082)	(0.082)	(0.112)	(0.111)	(0.112)
Male*IQ-for-age z score				-0.038	0.172	0.184	0.128	0.090	0.086
				(0.088)	(0.153)	(0.155)	(0.218)	(0.217)	(0.224)
First Born(=1)					-0.008	0.031	-0.120	-0.110	0.112
					(0.230)	(0.236)	(0.385)	(0.397)	(0.383)
Parental health assessment (Base: "Very good"=1)									
Good					-0.231	-0.242	-0.557	-0.562	-0.650*
					(0.234)	(0.235)	(0.374)	(0.370)	(0.380)
Regular					0.277	0.221	-0.072	-0.072	-0.206
					(0.260)	(0.262)	(0.413)	(0.407)	(0.425)
Bad					0.425	0.448	0.209	0.326	0.204
					(0.764)	(0.748)	(1.096)	(1.083)	(1.020)
Very bad					0.000	0.000	0.000	0.000	0.000
					(.)	(.)	(.)	(.)	(.)
Disability (=1)					0.614	0.636	0.835	0.977	1.061
					(0.761)	(0.763)	(1.059)	(1.138)	(1.052)
Visible illness (=1)					0.509	0.541	0.585	0.593	0.491
					(0.509)	(0.516)	(0.624)	(0.649)	(0.683)
Income quantile: Q2						1.137***	0.712*	0.724**	0.709*
						(0.251)	(0.365)	(0.368)	(0.369)
Income quantile: Q3						0.501*	0.228	0.197	0.112
						(0.266)	(0.359)	(0.359)	(0.374)
Income quantile: Q4						0.352	0.485	0.355	0.355
						(0.274)	(0.352)	(0.375)	(0.380)
Mother's education (years)							-0.039	-0.051	-0.036
							(0.032)	(0.032)	(0.034)
Father's education (years)							-0.030	-0.034	-0.024
							(0.043)	(0.045)	(0.047)
Mother works (=1)								0.706**	0.679**
								(0.305)	(0.296)
Household size									0.192*
									(0.104)
Proportion of male children									-0.120
									(0.408)
Region 2									0.371
									(0.386)
Region 3									0.471
									(0.339)
Region 4									-0.570
									(0.499)
2005									-0.022
									(0.404)
2009									-0.377
									(0.300)
Constant	-3.410***	-5.298***	-5.701***	-5.699***	-7.495***	-8.023***	-6.992***	-6.745***	-8.119***
	(0.050)	(1.113)	(1.149)	(1.150)	(1.850)	(1.855)	(2.468)	(2.440)	(2.721)
Pseudo R-squared	0.001	0.067	0.079	0.079	0.095	0.112	0.096	0.107	0.129
Wald Chi-Square	3.661	292.609	342.049	345.342	129.812	154.998	72.651	75.037	99.279
N. of cases	16540	16146	16146	16146	5795	5794	2321	2308	2308

Table C2: School attendance in the current academic year, logit regression

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
IQ-for-age z score	0.325***	0.348***	0.350***	0.274***	0.286**	0.245*	0.259	0.316	0.411
	(0.043)	(0.047)	(0.047)	(0.069)	(0.129)	(0.128)	(0.225)	(0.231)	(0.271)
Age		2.602***	2.641***	2.640***	3.043***	3.047***	5.163***	5.201***	5.310***
		(0.152)	(0.148)	(0.148)	(0.311)	(0.312)	(0.696)	(0.697)	(0.751)
Age2		-0.138***	-0.137***	-0.137***	-0.161***	-0.160***	-0.276***	-0.278***	-0.284***
		(0.009)	(0.009)	(0.009)	(0.018)	(0.018)	(0.040)	(0.041)	(0.044)
Male (=1)			0.517**	0.539**	0.424	0.441	0.861	0.916	1.266
			(0.260)	(0.262)	(0.519)	(0.524)	(0.849)	(0.852)	(0.941)
Male*Age			-0.089**	-0.086**	-0.027	-0.028	-0.095	-0.096	-0.090
			(0.035)	(0.035)	(0.067)	(0.067)	(0.109)	(0.111)	(0.118)
Male*IQ-for-age z score				0.142	0.133	0.140	0.199	0.163	0.239
				(0.095)	(0.199)	(0.200)	(0.368)	(0.370)	(0.426)
First Born(=1)					0.043	-0.059	-0.101	-0.082	-0.119
					(0.197)	(0.201)	(0.455)	(0.453)	(0.484)
Parental health assessment (Base: "Very good"=1)									
Good					-0.172	-0.100	-0.521	-0.514	-0.731
					(0.271)	(0.270)	(0.514)	(0.516)	(0.519)
Regular					-0.510*	-0.390	-0.349	-0.354	-0.589
					(0.303)	(0.304)	(0.602)	(0.599)	(0.644)
Bad					-1.584**	-1.356*	-1.690	-1.614	-2.087*
					(0.718)	(0.750)	(1.078)	(1.104)	(1.190)
Very bad					0.000	0.000	0.000	0.000	0.000
					(.)	(.)	(.)	(.)	(.)
Disability (=1)					-1.443**	-1.496**	0.000	0.000	0.000
					(0.686)	(0.662)	(.)	(.)	(.)
Visible illness (=1)					-0.982**	-0.966**	0.027	-0.079	-0.614
					(0.429)	(0.416)	(1.073)	(1.090)	(1.101)
Income quantile: Q2						0.069	-0.417	-0.399	-0.537
						(0.235)	(0.416)	(0.420)	(0.417)
Income quantile: Q3						-0.027	0.558	0.519	0.638
						(0.238)	(0.467)	(0.469)	(0.483)
Income quantile: Q4						1.142***	0.238	0.165	0.102
						(0.285)	(0.471)	(0.472)	(0.480)
Mother's education (years)							0.181***	0.178***	0.210***
							(0.056)	(0.056)	(0.058)
Father's education (years)							0.079	0.080	0.075
							(0.055)	(0.056)	(0.059)
Mother works (=1)								0.646	0.691
								(0.453)	(0.477)
Household size									-0.115
									(0.132)
Proportion of male children									-0.847
									(0.649)
Region 2									1.257***
									(0.451)
Region 3									1.461***
									(0.478)
Region 4									1.761***
									(0.499)
2005									0.170
									(0.433)
2009									1.155*
									(0.676)
Constant	3.245***	-7.790***	-8.034***	-8.047***	-9.097***	-9.438***	-18.720***	-18.978***	-19.620***
	(0.047)	(0.569)	(0.562)	(0.563)	(1.201)	(1.229)	(2.780)	(2.768)	(3.125)
Pseudo R-squared	0.012	0.134	0.135	0.136	0.177	0.194	0.371	0.375	0.419
Wald Chi-Square	57.125	681.747	692.774	697.434	257.891	272.488	155.742	158.155	183.169
N. of cases	16433	16039	16039	16039	5764	5763	2299	2286	2286

Table C3: Participation in housework last week, logit regression

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
IQ-for-age z score	-0.007	-0.011	-0.001	-0.008	-0.084**	-0.095**	-0.086	-0.088	-0.079
	(0.017)	(0.018)	(0.018)	(0.025)	(0.042)	(0.043)	(0.069)	(0.070)	(0.072)
Age		0.583***	0.627***	0.627***	0.572***	0.571***	0.684***	0.650***	0.678***
		(0.061)	(0.063)	(0.063)	(0.103)	(0.103)	(0.161)	(0.161)	(0.162)
Age2		-0.018***	-0.015***	-0.015***	-0.011*	-0.011*	-0.019**	-0.017*	-0.017*
		(0.004)	(0.004)	(0.004)	(0.006)	(0.006)	(0.009)	(0.009)	(0.009)
Male (=1)			0.719***	0.719***	0.750***	0.775***	0.524	0.574	0.662*
			(0.138)	(0.138)	(0.234)	(0.234)	(0.369)	(0.371)	(0.376)
Male*Age			-0.180***	-0.180***	-0.193***	-0.196***	-0.157***	-0.162***	-0.175***
			(0.016)	(0.016)	(0.026)	(0.026)	(0.041)	(0.041)	(0.041)
Male*IQ-for-age z score				0.015	0.105*	0.108*	0.049	0.052	0.034
				(0.034)	(0.058)	(0.058)	(0.093)	(0.093)	(0.096)
First Born(=1)					-0.088	-0.100	0.009	0.001	-0.132
					(0.066)	(0.066)	(0.109)	(0.109)	(0.114)
Parental health assessment (Base: "Very good"=1)									
Good					-0.056	-0.052	-0.229	-0.221	-0.235
					(0.089)	(0.089)	(0.145)	(0.145)	(0.149)
Regular					0.071	0.082	-0.173	-0.162	-0.273
					(0.103)	(0.104)	(0.168)	(0.168)	(0.172)
Bad					-0.486	-0.453	-0.582	-0.564	-0.627
					(0.376)	(0.376)	(0.579)	(0.568)	(0.562)
Very bad					0.000	0.000	0.000	0.000	0.000
					(.)	(.)	(.)	(.)	(.)
Disability (=1)					-0.013	-0.026	-0.759	-0.712	-0.856
					(0.476)	(0.481)	(0.884)	(0.882)	(0.943)
Visible illness (=1)					0.260	0.271	0.255	0.282	0.180
					(0.254)	(0.250)	(0.370)	(0.386)	(0.384)
Income quantile: Q2						0.220**	0.047	0.058	0.130
						(0.097)	(0.164)	(0.165)	(0.169)
Income quantile: Q3						0.094	0.104	0.094	0.152
						(0.090)	(0.146)	(0.148)	(0.152)
Income quantile: Q4						0.267***	0.170	0.125	0.140
						(0.087)	(0.147)	(0.150)	(0.153)
Mother's education (years)							0.005	-0.002	0.002
							(0.016)	(0.016)	(0.016)
Father's education (years)							0.008	0.010	0.011
							(0.015)	(0.015)	(0.015)
Mother works (=1)								0.317***	0.260**
								(0.117)	(0.121)
Household size									-0.142***
									(0.041)
Proportion of male children									0.053
									(0.187)
Region 2									0.553***
									(0.142)
Region 3									0.771***
									(0.155)
Region 4									0.321**
									(0.155)
2005									-0.128
									(0.142)
2009									0.155
									(0.120)
Constant	-0.078***	-3.656***	-3.872***	-3.872***	-3.540***	-3.695***	-3.920***	-3.837***	-3.779***
	(0.018)	(0.254)	(0.264)	(0.264)	(0.444)	(0.448)	(0.719)	(0.720)	(0.765)
Pseudo R-squared	0.000	0.065	0.099	0.099	0.106	0.108	0.101	0.104	0.121
Wald Chi-Square	0.178	1266.577	1764.648	1764.864	704.290	709.586	267.006	273.233	292.462
N. of cases	16511	16117	16117	16117	5794	5793	2321	2308	2308

Table C4: Average number of hours per week spent at work, Tobit regression.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
IQ-for-age z score	-2.645	-3.071*	-3.406*	-2.310	-4.725	-4.774	-3.139	-3.052	-3.070
	(1.909)	(1.852)	(1.836)	(2.804)	(4.661)	(4.561)	(5.698)	(5.751)	(5.623)
Age		15.814*	13.925	13.992	13.167	15.158	7.836	6.675	8.138
		(8.581)	(8.622)	(8.607)	(14.251)	(13.916)	(17.540)	(17.627)	(17.408)
Age2		0.018	0.032	0.029	0.075	-0.035	0.370	0.422	0.244
		(0.453)	(0.452)	(0.451)	(0.742)	(0.728)	(0.950)	(0.956)	(0.955)
Male (=1)			0.739	0.556	6.283	9.678	30.230	27.788	22.599
			(20.630)	(20.621)	(31.816)	(31.343)	(37.263)	(37.207)	(37.886)
Male*Age			2.574	2.582	1.968	1.598	-1.018	-0.754	-0.150
			(2.024)	(2.023)	(3.099)	(3.051)	(3.736)	(3.738)	(3.721)
Male*IQ-for-age z score				-1.804	4.296	4.984	2.295	1.828	1.233
				(3.567)	(6.182)	(6.102)	(8.075)	(8.123)	(8.019)
First Born(=1)					-1.333	-0.178	-7.209	-7.716	2.664
					(8.854)	(9.058)	(13.716)	(13.759)	(11.609)
Parental health assessment (Base: "Very good"=1)									
Good					-3.645	-4.451	-8.513	-7.761	-11.488
					(9.393)	(9.367)	(13.295)	(13.137)	(13.049)
Regular					16.546	14.584	7.208	7.480	1.830
					(10.606)	(10.533)	(15.048)	(14.951)	(14.851)
Bad					25.578	24.590	7.831	10.681	3.541
					(31.210)	(31.054)	(36.589)	(36.248)	(34.376)
Very bad					-408.771	-430.975	0.000	0.000	0.000
					(.)	(.)	(.)	(.)	(.)
Disability (=1)					20.376	19.996	27.249	30.594	32.514
					(27.733)	(27.508)	(36.285)	(37.249)	(34.446)
Visible illness (=1)					19.276	21.441	25.234	26.284	23.367
					(19.769)	(19.794)	(23.423)	(23.850)	(24.286)
Income quantile: Q2						49.705***	31.647**	31.380**	29.447**
						(10.085)	(13.598)	(13.670)	(13.535)
Income quantile: Q3						25.558**	14.887	13.723	10.567
						(10.640)	(13.966)	(13.947)	(14.048)
Income quantile: Q4						20.565*	23.993*	21.729	20.825
						(10.806)	(13.524)	(14.092)	(13.996)
Mother's education (years)							-1.190	-1.447	-0.884
							(1.227)	(1.244)	(1.275)
Father's education (years)							-1.040	-1.024	-0.841
							(1.648)	(1.676)	(1.567)
Mother works (=1)								13.947	13.623
								(10.908)	(10.509)
Household size									7.121*
									(3.656)
Proportion of male children									0.376
									(14.666)
Region 2									8.771
									(13.266)
Region 3									13.150
									(11.817)
Region 4									-22.221
									(17.978)
2005									-4.190
									(14.129)
2009									-15.509
									(10.522)
Constant	-175.096***	-316.008***	-311.748***	-312.041***	-311.277***	-342.430***	-261.887***	-257.477***	-295.788***
	(6.818)	(41.153)	(42.595)	(42.497)	(70.313)	(69.003)	(83.801)	(84.084)	(91.640)
sigma									
Constant	91.757***	86.014***	85.031***	85.046***	86.479***	84.898***	80.417***	80.357***	79.170***
	(3.120)	(3.014)	(2.998)	(2.997)	(4.595)	(4.633)	(6.552)	(6.560)	(6.523)
Pseudo R-squared	0.000	0.043	0.050	0.050	0.048	0.058	0.047	0.048	0.059
F statistic	1.920	76.164	53.386	45.971	.	.	4.420	4.272	3.913
N. of cases	16471	16078	16078	16078	5777	5776	2313	2300	2300

Table C5: Average number of hours per week spent at school, Tobit regression.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

IQ-for-age z score	0.684***	0.645***	0.648***	0.564***	0.554***	0.522***	0.476**	0.476**	0.434**
	(0.073)	(0.067)	(0.067)	(0.089)	(0.135)	(0.135)	(0.196)	(0.196)	(0.196)
Age		11.480***	11.523***	11.521***	8.962***	8.928***	8.682***	8.776***	8.638***
		(0.426)	(0.428)	(0.428)	(0.704)	(0.702)	(1.119)	(1.122)	(1.110)
Age2		-0.571***	-0.571***	-0.571***	-0.432***	-0.430***	-0.417***	-0.422***	-0.412***
		(0.022)	(0.022)	(0.022)	(0.037)	(0.036)	(0.058)	(0.058)	(0.057)
Male (=1)			0.584	0.586	0.516	0.611	0.205	-0.066	0.447
			(0.746)	(0.746)	(1.154)	(1.151)	(1.797)	(1.803)	(1.821)
Male*Age			-0.087	-0.087	-0.056	-0.065	-0.025	0.003	-0.010
			(0.077)	(0.077)	(0.117)	(0.117)	(0.182)	(0.182)	(0.182)
Male*IQ-for-age z score				0.171	-0.088	-0.087	0.105	0.111	0.123
				(0.128)	(0.192)	(0.191)	(0.285)	(0.285)	(0.282)
First Born(=1)					-0.131	-0.183	-0.245	-0.267	-0.467
					(0.206)	(0.206)	(0.303)	(0.305)	(0.315)
Parental health assessment (Base: "Very good"=1)									
Good					0.062	0.086	0.465	0.465	0.444
					(0.255)	(0.256)	(0.372)	(0.372)	(0.371)
Regular					0.267	0.335	0.942**	0.885**	0.670
					(0.311)	(0.312)	(0.436)	(0.437)	(0.445)
Bad					-1.645	-1.557	-5.019*	-4.990	-5.142*
					(1.638)	(1.633)	(3.038)	(3.036)	(3.077)
Very bad					1.273**	1.515***	0.000	0.000	0.000
					(0.520)	(0.540)	(.)	(.)	(.)
Disability (=1)					-4.549**	-4.487**	-2.077	-1.949	-2.099
					(1.902)	(1.891)	(1.540)	(1.559)	(1.590)
Visible illness (=1)					-1.846**	-1.805**	-0.883	-1.150*	-0.979
					(0.781)	(0.783)	(0.716)	(0.671)	(0.694)
Income quantile: Q2						-0.257	-1.401***	-1.355***	-1.373***
						(0.280)	(0.435)	(0.437)	(0.432)
Income quantile: Q3						-0.239	-0.374	-0.348	-0.334
						(0.278)	(0.368)	(0.372)	(0.366)
Income quantile: Q4						0.467**	-0.409	-0.438	-0.440
						(0.235)	(0.365)	(0.376)	(0.367)
Mother's education (years)							0.077**	0.069*	0.079**
							(0.038)	(0.039)	(0.039)
Father's education (years)							0.078**	0.075**	0.069*
							(0.035)	(0.035)	(0.036)
Mother works (=1)								0.346	0.317
								(0.288)	(0.282)
Household size									-0.231**
									(0.112)
Proportion of male children									-0.716
									(0.477)
Region 2									-0.382
									(0.345)
Region 3									1.074***
									(0.374)
Region 4									0.641*
									(0.375)
2005									0.045
									(0.360)
2009									0.159
									(0.315)
Constant	23.690***	-31.414***	-31.703***	-31.696***	-20.199***	-20.128***	-19.843***	-20.240***	-18.677***
	(0.072)	(1.978)	(2.020)	(2.020)	(3.346)	(3.338)	(5.376)	(5.391)	(5.414)
sigma									
Constant	7.270***	6.575***	6.574***	6.574***	5.980***	5.972***	5.346***	5.348***	5.309***
	(0.123)	(0.113)	(0.113)	(0.113)	(0.166)	(0.166)	(0.180)	(0.181)	(0.179)
Pseudo R-squared	0.001	0.033	0.033	0.033	0.029	0.029	0.039	0.039	0.042
F statistic	86.988	359.025	216.476	180.636	27.531	23.047	11.577	11.117	8.268
N. of cases	13580	13240	13240	13240	4811	4811	1933	1921	1921

Table C6: Average number of hours per week spent doing housework, Tobit regression.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
IQ-for-age z score	-0.155*	-0.175*	-0.108	-0.184*	-0.324*	-0.355**	-0.258	-0.277	-0.215
	(0.092)	(0.089)	(0.086)	(0.109)	(0.166)	(0.167)	(0.266)	(0.269)	(0.270)
Age		2.247***	2.511***	2.511***	2.033***	2.031***	1.917***	1.842***	2.157***
		(0.299)	(0.291)	(0.290)	(0.461)	(0.460)	(0.659)	(0.662)	(0.650)
Age2		-0.055***	-0.051***	-0.051***	-0.023	-0.023	-0.025	-0.021	-0.040
		(0.017)	(0.016)	(0.016)	(0.026)	(0.026)	(0.038)	(0.038)	(0.037)
Male (=1)			3.134***	3.135***	3.568***	3.725***	3.802**	3.945**	2.961*
			(0.670)	(0.670)	(1.093)	(1.092)	(1.690)	(1.697)	(1.649)
Male*Age			-0.798***	-0.798***	-0.836***	-0.853***	-0.818***	-0.833***	-0.768***
			(0.073)	(0.073)	(0.118)	(0.118)	(0.183)	(0.184)	(0.180)
Male*IQ-for-age z score				0.167	0.294	0.292	0.297	0.323	0.293
				(0.159)	(0.268)	(0.267)	(0.413)	(0.415)	(0.416)
First Born(=1)					-0.676**	-0.681**	-0.117	-0.157	-0.331
					(0.286)	(0.285)	(0.430)	(0.433)	(0.460)
Parental health assessment (Base: "Very good"=1)									
Good					0.856**	0.874**	0.373	0.383	0.261
					(0.427)	(0.425)	(0.744)	(0.746)	(0.739)
Regular					1.517***	1.544***	0.601	0.638	-0.089
					(0.468)	(0.467)	(0.805)	(0.808)	(0.799)
Bad					-1.740	-1.615	-1.209	-1.185	-1.946
					(1.662)	(1.649)	(2.497)	(2.476)	(2.379)
Very bad					-42.193	-42.555	0.000	0.000	0.000
					(.)	(.)	(.)	(.)	(.)
Disability (=1)					0.664	0.550	-1.337	-1.212	0.275
					(1.738)	(1.735)	(3.318)	(3.322)	(3.103)
Visible illness (=1)					-0.006	0.030	0.120	0.232	-0.455
					(1.130)	(1.109)	(1.488)	(1.518)	(1.552)
Income quantile: Q2						1.255***	0.249	0.264	-0.090
						(0.428)	(0.682)	(0.688)	(0.686)
Income quantile: Q3						0.904**	0.921	0.892	0.767
						(0.427)	(0.674)	(0.685)	(0.685)
Income quantile: Q4						1.258***	0.680	0.610	0.257
						(0.401)	(0.655)	(0.670)	(0.671)
Mother's education (years)							0.032	0.019	0.048
							(0.065)	(0.066)	(0.068)
Father's education (years)							-0.080	-0.073	-0.067
							(0.062)	(0.062)	(0.063)
Mother works (=1)								0.602	0.308
								(0.495)	(0.490)
Household size									-0.283
									(0.209)
Proportion of male children									1.043
									(0.811)
Region 2									1.672***
									(0.628)
Region 3									2.344***
									(0.660)
Region 4									0.813
									(0.702)
2005									-0.312
									(0.541)
2009									-49.583
									(.)
Constant	-2.544***	-17.419***	-18.114***	-18.115***	-16.612***	-17.510***	-14.911***	-14.755***	-14.731***
	(0.135)	(1.280)	(1.271)	(1.271)	(2.082)	(2.088)	(2.964)	(2.972)	(3.113)
sigma									
Constant	8.538***	8.078***	7.778***	7.777***	7.400***	7.386***	7.409***	7.426***	7.085***
	(0.166)	(0.173)	(0.176)	(0.176)	(0.275)	(0.275)	(0.442)	(0.445)	(0.446)
Pseudo R-squared	0.000	0.027	0.042	0.042	0.045	0.046	0.037	0.038	0.074
F statistic	2.842	337.310	314.714	263.014	.	.	13.792	13.125	.
N. of cases	14145	13785	13785	13785	4877	4876	2016	2004	2004

Section II: Complete regression results from Table 4.2

Table C7: Work in the last 12 months, logit regression with household fixed effects.

	(1)	(2)	(3)	(4)	(5)	(6)
IQ-for-age z score	0.070	-0.008	0.053	-0.037	0.145	0.145
	(0.127)	(0.176)	(0.190)	(0.238)	(0.692)	(0.692)
Age		-0.783**	-1.203***	-1.204***	-0.812	-0.812
		(0.393)	(0.439)	(0.438)	(1.432)	(1.432)
Age2		0.076***	0.093***	0.093***	0.113	0.113
		(0.023)	(0.024)	(0.024)	(0.084)	(0.084)
Male (=1)			-1.516	-1.572	0.017	0.017
			(1.190)	(1.200)	(3.665)	(3.665)
Male*Age			0.278**	0.288**	0.209	0.209
			(0.125)	(0.127)	(0.381)	(0.381)
Male*IQ-for-age z score				0.193	0.441	0.441
				(0.308)	(0.695)	(0.695)
First Born(=1)					-1.188	-1.188
					(1.338)	(1.338)
Parental health assessment (Base: "Very good"=1)						
					-2.194*	-2.194*
Good					(1.285)	(1.285)
					-2.161	-2.161
Regular					(1.486)	(1.486)
					-14.531	-14.531
Bad					(3540.637)	(3540.637)
					0.000	0.000
Very bad					(.)	(.)
					3.250	3.250
Disability (=1)					(5.538)	(5.538)
					3.928	3.928
Visible illness (=1)					(3.461)	(3.461)
						0.000
Income quantile: Q2						(.)
						0.000
Income quantile: Q3						(.)
						0.000
Income quantile: Q4						(.)
						(1.474)
Pseudo R-squared	0.001	0.438	0.497	0.498	0.722	0.722
Wald Chi-Square	0.307	149.815	170.245	170.637	87.398	87.398
N. of cases	496	482	482	482	170	170
N. of groups	191	186	186	186	66	66

Table C8: School attendance in the current academic year, logit regression with household fixed effects.

	(1)	(2)	(3)	(4)	(5)	(6)
IQ-for-age z score	-0.073	0.048	0.025	-0.024	-1.102	-1.102
	(0.087)	(0.139)	(0.142)	(0.205)	(0.740)	(0.740)
Age		4.238***	4.357***	4.340***	8.305***	8.305***
		(0.433)	(0.450)	(0.452)	(2.176)	(2.176)
Age2		-0.223***	-0.229***	-0.228***	-0.447***	-0.447***
		(0.025)	(0.026)	(0.026)	(0.121)	(0.121)
Male (=1)			-0.770	-0.769	-0.104	-0.104
			(0.892)	(0.892)	(2.416)	(2.416)
Male*Age			0.007	0.010	0.119	0.119
			(0.104)	(0.105)	(0.274)	(0.274)
Male*IQ-for-age z score				0.077	2.687**	2.687**
				(0.230)	(1.145)	(1.145)
First Born(=1)					-0.110	-0.110
					(1.094)	(1.094)
Parental health assessment (Base: "Very good"=1)						
Good					-2.448*	-2.448*
					(1.410)	(1.410)
Regular					-4.244**	-4.244**
					(2.057)	(2.057)
Bad					-22.332	-22.332
					(2955.233)	(2955.233)
Very bad					0.000	0.000
					(.)	(.)
Disability (=1)					-16.161	-16.161
					(3714.446)	(3714.446)
Visible illness (=1)					-0.326	-0.326
					(7.587)	(7.587)
Income quantile: Q2						0.000
						(.)
Income quantile: Q3						0.000
						(.)
Income quantile: Q4						0.000
						(.)
Pseudo R-squared	0.000	0.269	0.395	0.395	0.405	0.405
Wald Chi-Square	0.058	653.159	960.153	960.259	359.342	359.342
N. of cases	842	832	832	832	215	215
N. of groups	304	301	301	301	82	82

Table C9: Participation in housework last week, logit regression with household fixed effects

	(1)	(2)	(3)	(4)	(5)	(6)
IQ-for-age z score	-0.011	-0.025	0.011	0.030	0.168	0.168
	(0.045)	(0.056)	(0.062)	(0.083)	(0.154)	(0.154)
Age		1.222***	1.311***	1.313***	1.304***	1.304***
		(0.152)	(0.167)	(0.167)	(0.283)	(0.283)
Age2		-0.047***	-0.043***	-0.043***	-0.043***	-0.043***
		(0.009)	(0.010)	(0.010)	(0.016)	(0.016)
Male (=1)			0.618	0.613	0.371	0.371
			(0.405)	(0.405)	(0.687)	(0.687)
Male*Age			-0.242***	-0.242***	-0.223***	-0.223***
			(0.046)	(0.046)	(0.076)	(0.076)
Male*IQ-for-age z score				-0.031	-0.096	-0.096
				(0.096)	(0.171)	(0.171)
First Born(=1)					-0.251	-0.251
					(0.247)	(0.247)
Parental health assessment (Base: "Very good"=1)						
Good					0.044	0.044
					(0.348)	(0.348)
Regular					0.201	0.201
					(0.424)	(0.424)
Bad					-0.485	-0.485
					(1.411)	(1.411)
Very bad					0.000	0.000
					(.)	(.)
Disability (=1)					-0.046	-0.046
					(1.100)	(1.100)
Visible illness (=1)					-0.546	-0.546
					(0.800)	(0.800)
Income quantile: Q2						0.000
						(.)
Income quantile: Q3						0.000
						(.)
Income quantile: Q4						0.000
						(.)
Pseudo R-squared	0.000	0.269	0.395	0.395	0.403	0.403
Wald Chi-Square	0.058	653.159	960.153	960.259	335.927	335.927
N. of cases	3475	3365	3365	3365	1162	1162
N. of groups	1352	1311	1311	1311	469	469

Table C10: Average number of hours spent at work, uncensored regression with household fixed effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
IQ-for-age z score	0.024	0.036	0.036	-0.002	0.274	0.274	0.368	0.366	0.366
	(0.117)	(0.119)	(0.119)	(0.147)	(0.288)	(0.288)	(0.520)	(0.520)	(0.520)
Age		-0.722**	-0.968***	-0.971***	-0.404	-0.404	-0.261	-0.250	-0.250
		(0.334)	(0.341)	(0.341)	(0.551)	(0.551)	(0.967)	(0.971)	(0.971)
Age2		0.067***	0.068***	0.068***	0.030	0.030	0.026	0.025	0.025
		(0.021)	(0.021)	(0.021)	(0.035)	(0.035)	(0.061)	(0.062)	(0.062)
Male (=1)			-3.526***	-3.529***	-4.065***	-4.065***	-3.356	-3.370	-3.370
			(0.830)	(0.831)	(1.269)	(1.269)	(2.112)	(2.116)	(2.116)
Male*Age			0.468***	0.469***	0.541***	0.541***	0.522**	0.523**	0.523**
			(0.106)	(0.106)	(0.149)	(0.149)	(0.242)	(0.242)	(0.242)
Male*IQ-for-age z score				0.070	-0.167	-0.167	-0.346	-0.347	-0.347
				(0.172)	(0.315)	(0.315)	(0.559)	(0.559)	(0.559)
First Born(=1)					0.045	0.045	0.162	0.158	0.158
					(0.397)	(0.397)	(0.821)	(0.821)	(0.821)
Parental health assessment (Base: "Very good"=1)									
Good					-1.061	-1.061	-0.800	-0.802	-0.802
					(0.701)	(0.701)	(0.665)	(0.666)	(0.666)
Regular					-0.502	-0.502	-0.351	-0.342	-0.342
					(0.779)	(0.779)	(0.883)	(0.887)	(0.887)
Bad					-1.561	-1.561	-0.611	-0.607	-0.607
					(1.134)	(1.134)	(0.821)	(0.822)	(0.822)
Very bad					0.000	0.000	0.000	0.000	0.000
					(.)	(.)	(.)	(.)	(.)
Disability (=1)					-0.739	-0.739	3.408	3.408	3.408
					(1.868)	(1.868)	(2.823)	(2.822)	(2.822)
Visible illness (=1)					1.917	1.917	5.841	5.833	5.833
					(2.623)	(2.623)	(4.696)	(4.698)	(4.698)
Income quantile: Q2						0.000	0.000	0.000	0.000
						(.)	(.)	(.)	(.)
Income quantile: Q3						0.000	0.000	0.000	0.000
						(.)	(.)	(.)	(.)
Income quantile: Q4						0.000	0.000	0.000	0.000
						(.)	(.)	(.)	(.)
Mother's education (years)							0.114	0.117	0.117
							(0.283)	(0.284)	(0.284)
Father's education (years)							0.098	0.097	0.097
							(0.238)	(0.239)	(0.239)
Mother works (=1)								0.000	0.000
								(.)	(.)
Household size									0.000
									(.)
Proportion of male children									0.000
									(.)
Region 2									0.000
									(.)
Region 3									0.000
									(.)
Region 4									0.000
									(.)
2005									0.000
									(.)
2009									0.000
									(.)
Constant	1.027***	1.927	3.739***	3.748***	2.641	2.641	-0.430	-0.486	-0.486
	(0.000)	(1.274)	(1.328)	(1.330)	(2.103)	(2.104)	(4.290)	(4.316)	(4.316)
R-squared	0.000	0.025	0.032	0.032	0.040	0.040	0.051	0.051	0.051
F statistic	0.042	24.023	15.269	12.783	3.079	3.079	.	.	.
N. of cases	16471	16078	16078	16078	5777	5776	2313	2300	2300
N. of groups	11941	11683	11683	11683	4218	4217	1582	1571	1571

Table C11: Average number of hours spent at school, uncensored regression with household fixed effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
IQ-for-age z score	0.042	0.117	0.116	-0.034	-0.129	-0.129	0.242	0.247	0.247
	(0.177)	(0.149)	(0.148)	(0.183)	(0.297)	(0.297)	(0.446)	(0.446)	(0.446)
Age		11.927***	11.998***	11.993***	10.050***	10.050***	11.047***	11.048***	11.048***
		(0.545)	(0.546)	(0.545)	(0.961)	(0.961)	(1.381)	(1.381)	(1.381)
Age2		-0.592***	-0.592***	-0.591***	-0.479***	-0.479***	-0.529***	-0.529***	-0.529***
		(0.029)	(0.029)	(0.029)	(0.052)	(0.052)	(0.075)	(0.075)	(0.075)
Male (=1)			1.129	1.137	0.859	0.859	3.927	3.930	3.930
			(1.199)	(1.198)	(1.906)	(1.906)	(2.758)	(2.758)	(2.758)
Male*Age			-0.150	-0.148	-0.114	-0.114	-0.408	-0.407	-0.407
			(0.125)	(0.125)	(0.199)	(0.199)	(0.282)	(0.282)	(0.282)
Male*IQ-for-age z score				0.279	0.208	0.208	-0.119	-0.117	-0.117
				(0.210)	(0.332)	(0.332)	(0.462)	(0.462)	(0.462)
First Born(=1)					-0.606	-0.606	-0.341	-0.350	-0.350
					(0.535)	(0.535)	(0.708)	(0.709)	(0.709)
Parental health assessment (Base: "Very good"=1)									
Good					0.963	0.963	-0.201	-0.199	-0.199
					(0.725)	(0.725)	(1.058)	(1.058)	(1.058)
Regular					1.300	1.300	0.015	-0.008	-0.008
					(0.804)	(0.804)	(1.194)	(1.196)	(1.196)
Bad					-4.294	-4.294	-7.494*	-7.501*	-7.501*
					(3.071)	(3.071)	(4.055)	(4.055)	(4.055)
Very bad					0.000	0.000	0.000	0.000	0.000
					(.)	(.)	(.)	(.)	(.)
Disability (=1)					-6.322**	-6.322**	-2.042**	-2.032**	-2.032**
					(3.081)	(3.081)	(0.890)	(0.891)	(0.891)
Visible illness (=1)					-2.916**	-2.916**	-2.800*	-2.786*	-2.786*
					(1.337)	(1.337)	(1.508)	(1.509)	(1.509)
Income quantile: Q2						0.000	0.000	0.000	0.000
						(.)	(.)	(.)	(.)
Income quantile: Q3						0.000	0.000	0.000	0.000
						(.)	(.)	(.)	(.)
Income quantile: Q4						0.000	0.000	0.000	0.000
						(.)	(.)	(.)	(.)
Mother's education (years)							0.000	0.000	0.000
							(.)	(.)	(.)
Father's education (years)							0.000	0.000	0.000
							(.)	(.)	(.)
Mother works (=1)								0.000	0.000
								(.)	(.)
Household size									0.000
									(.)
Proportion of male children									0.000
									(.)
Region 2									0.000
									(.)
Region 3									0.000
									(.)
Region 4									0.000
									(.)
2005									0.000
									(.)
2009									0.000
									(.)
Constant	23.791***	-33.600***	-34.148***	-34.144***	-26.338***	-26.338***	-30.294***	-30.315***	-30.315***
	(0.001)	(2.478)	(2.534)	(2.531)	(4.515)	(4.515)	(6.572)	(6.572)	(6.572)
R-squared	0.000	0.298	0.299	0.300	0.288	0.288	0.390	0.390	0.390
F statistic	0.056	220.416	133.033	111.907	18.864	18.864	10.415	10.376	10.376
N. of cases	13580	13240	13240	13240	4811	4811	1933	1921	1921
N. of groups	10321	10087	10087	10087	3731	3731	1435	1424	1424

Table C12: Average number of hours spent doing housework, uncensored regression with household fixed effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
IQ-for-age z score	-0.042	-0.024	-0.009	-0.053	-0.010	-0.010	0.109	0.105	0.105
	(0.090)	(0.085)	(0.082)	(0.106)	(0.183)	(0.183)	(0.274)	(0.274)	(0.274)
Age		0.031	0.332*	0.329*	-0.116	-0.116	-0.437	-0.433	-0.433
		(0.202)	(0.192)	(0.193)	-0.308	-0.308	-0.465	-0.466	-0.466
Age2		0.030**	0.029**	0.030**	0.048**	0.048**	0.071**	0.071**	0.071**
		(0.012)	(0.011)	(0.012)	(0.019)	(0.019)	(0.029)	(0.029)	(0.029)
Male (=1)			3.431***	3.427***	2.605***	2.605***	2.901**	2.894**	2.894**
			(0.476)	(0.475)	(0.731)	(0.731)	(1.145)	(1.146)	(1.146)
Male*Age			-0.591***	-0.590***	-0.500***	-0.500***	-0.540***	-0.541***	-0.541***
			(0.055)	(0.055)	(0.085)	(0.085)	(0.138)	(0.138)	(0.138)
Male*IQ-for-age z score				0.084	0.233	0.233	0.370	0.367	0.367
				(0.122)	(0.180)	(0.180)	(0.274)	(0.274)	(0.274)
First Born(=1)					0.039	0.039	-0.214	-0.210	-0.210
					(0.244)	(0.244)	(0.327)	(0.328)	(0.328)
Parental health assessment (Base: "Very good"=1)									
Good					-0.281	-0.281	-0.562	-0.565	-0.565
					(0.465)	(0.465)	(0.698)	(0.698)	(0.698)
Regular					-0.223	-0.223	-0.681	-0.657	-0.657
					(0.503)	(0.503)	(0.766)	(0.768)	(0.768)
Bad					-1.671**	-1.671**	-2.587***	-2.580***	-2.580***
					(0.662)	(0.662)	(0.939)	(0.940)	(0.940)
Very bad					0.000	0.000	0.000	0.000	0.000
					(.)	(.)	(.)	(.)	(.)
Disability (=1)					-3.196**	-3.196**	-0.256	-0.259	-0.259
					(1.542)	(1.542)	(1.363)	(1.364)	(1.364)
Visible illness (=1)					-0.012	-0.012	1.044	1.030	1.030
					(0.782)	(0.782)	(0.914)	(0.911)	(0.911)
Income quantile: Q2						0.000	0.000	0.000	0.000
						(.)	(.)	(.)	(.)
Income quantile: Q3						0.000	0.000	0.000	0.000
						(.)	(.)	(.)	(.)
Income quantile: Q4						0.000	0.000	0.000	0.000
						(.)	(.)	(.)	(.)
Mother's education (years)							-0.014	-0.009	-0.009
							(0.111)	(0.111)	(0.111)
Father's education (years)							-0.504***	-0.504***	-0.504***
							(0.110)	(0.110)	(0.110)
Mother works (=1)								0.000	0.000
								(.)	(.)
Household size									0.000
									(.)
Proportion of male children									0.000
									(.)
Region 2									0.000
									(.)
Region 3									0.000
									(.)
Region 4									0.000
									(.)
2005									0.000
									(.)
2009									0.000
									(.)
Constant	2.200***	-0.383	-2.087***	-2.076***	0.413	0.413	6.013***	5.957***	5.957***
	(0.000)	(0.809)	(0.784)	(0.787)	(1.354)	(1.354)	(2.057)	(2.067)	(2.067)
R-squared	0.000	0.095	0.155	0.156	0.163	0.163	0.176	0.177	0.177
F statistic	0.215	125.104	117.239	99.367	22.852	22.852	.	.	.
N. of cases	14145	13785	13785	13785	4877	4876	2016	2004	2004
N. of groups	9595	9370	9370	9370	3308	3307	1282	1272	1272

Section III: Complete regression results from Table 4.3

Table C13: Work in the last 12 months, logit regression using the lag of the IQ-for-age z-score.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
lag of IQ-for-age z score	-0.093**	-0.023	-0.036	-0.024	0.017	0.037	0.060	0.110	0.145
	(0.046)	(0.073)	(0.073)	(0.075)	(0.112)	(0.108)	(0.197)	(0.183)	(0.185)
Age		1.408*	1.374	1.315	0.096	0.028	-2.170	-2.352	-1.607
		(0.839)	(0.911)	(0.923)	(1.574)	(1.591)	(1.802)	(1.854)	(1.729)
Age2		-0.045	-0.054	-0.051	0.013	0.016	0.111	0.118	0.083
		(0.039)	(0.043)	(0.044)	(0.073)	(0.074)	(0.086)	(0.090)	(0.085)
Male (=1)			-3.806***	-3.735**	-3.212	-3.234	-4.468	-5.037	-4.904
			(1.452)	(1.462)	(2.285)	(2.294)	(3.000)	(3.337)	(3.753)
Male*Age			0.402***	0.395***	0.339*	0.339*	0.438	0.498	0.439
			(0.132)	(0.133)	(0.202)	(0.202)	(0.273)	(0.306)	(0.340)
Male*IQ-for-age z score				-0.105	-0.096	-0.060	-0.335	-0.382	-0.449
				(0.095)	(0.175)	(0.174)	(0.289)	(0.288)	(0.328)
First Born(=1)					-0.356	-0.337	-0.668	-0.651	-0.291
					(0.415)	(0.435)	(0.799)	(0.861)	(0.651)
Parental health assessment (Base: "Very good"=1)									
Good					-0.209	-0.199	-0.442	-0.460	-0.675
					(0.331)	(0.331)	(0.590)	(0.604)	(0.531)
Regular					0.247	0.204	0.122	0.076	-0.206
					(0.382)	(0.381)	(0.647)	(0.657)	(0.615)
Bad					0.890	0.923	3.505*	3.749**	3.531*
					(1.179)	(1.084)	(1.879)	(1.782)	(1.807)
Very bad					0.000	0.000	0.000	0.000	0.000
					(.)	(.)	(.)	(.)	(.)
Disability (=1)					1.077	1.167	0.000	0.000	0.000
					(1.124)	(1.116)	(.)	(.)	(.)
Visible illness (=1)					0.759	0.613	0.000	0.000	0.000
					(1.013)	(0.986)	(.)	(.)	(.)
Income quantile: Q2						0.622*	-1.383*	-1.227	-1.446*
						(0.337)	(0.781)	(0.778)	(0.815)
Income quantile: Q3						0.015	-0.648	-0.658	-0.922
						(0.379)	(0.603)	(0.581)	(0.629)
Income quantile: Q4						-0.136	-0.039	-0.338	-0.503
						(0.433)	(0.581)	(0.723)	(0.647)
Mother's education (years)							-0.113**	-0.128**	-0.130*
							(0.056)	(0.058)	(0.067)
Father's education (years)							0.103	0.112	0.121
							(0.069)	(0.071)	(0.075)
Mother works (=1)								0.977	1.263**
								(0.651)	(0.528)
Household size									0.409*
									(0.239)
Proportion of male children									1.210
									(0.766)
Region 2									0.412
									(0.715)
Region 3									0.066
									(0.633)
Region 4									-0.315
									(0.838)
2005									0.477
									(0.475)
2009									0.000
									(.)
Constant	-2.583***	-12.982***	-11.824**	-11.536**	-5.647	-5.413	8.270	9.219	2.222

	(0.047)	(4.522)	(4.806)	(4.850)	(8.470)	(8.523)	(9.225)	(9.449)	(8.565)
Pseudo R-squared	0.001	0.038	0.053	0.054	0.068	0.078	0.117	0.138	0.178
Wald Chi-Square	4.105	44.738	69.806	72.449	41.480	43.292	32.079	40.961	44.650
N. of cases	7933	4799	4799	4797	1864	1864	509	508	508
Wooldrige's Serial Correlation F test in the original model	10710.628	0.755	0.766	0.707	0.170	0.465	*0.495*	*2.144*	*5.094*

Table C14: School attendance in the current academic year, logit regression using the lag of the IQ-for-age z-score.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
lag of IQ-for-age z score	0.452***	0.352***	0.357***	0.302***	0.353	0.328	0.349	0.283
	(0.059)	(0.113)	(0.113)	(0.115)	(0.276)	(0.267)	(0.357)	(0.415)
Age		1.610*	1.590	1.824*	3.569***	3.186**	10.918***	11.031***
		(0.945)	(0.969)	(1.070)	(1.170)	(1.325)	(4.020)	(3.906)
Age2		-0.092**	-0.093**	-0.105**	-0.189***	-0.169**	-0.538***	-0.541***
		(0.044)	(0.044)	(0.051)	(0.059)	(0.067)	(0.195)	(0.191)
Male (=1)			-1.318	-1.540	1.202	1.153	9.054	9.278
			(1.879)	(1.911)	(3.831)	(3.960)	(8.341)	(7.980)
Male*Age			0.073	0.109	0.069	0.086	-0.434	-0.464
			(0.173)	(0.175)	(0.321)	(0.334)	(0.560)	(0.547)
Male*IQ-for-age z score				0.515***	1.905***	1.942***	3.911**	3.947**
				(0.141)	(0.375)	(0.404)	(1.855)	(1.803)
First Born(=1)					0.455	0.245	-0.581	-0.676
					(0.691)	(0.710)	(1.548)	(1.505)
Parental health assessment (Base: "Very good"=1)								
Good					1.300*	1.216	-1.592	-1.599
					(0.744)	(0.805)	(3.542)	(3.660)
Regular					-0.178	-0.272	-4.493*	-4.458*
					(0.623)	(0.706)	(2.411)	(2.517)
Bad					0.000	0.000	0.000	0.000
					(.)	(.)	(.)	(.)
Very bad					0.000	0.000	0.000	0.000
					(.)	(.)	(.)	(.)
Disability (=1)					0.000	0.000	0.000	0.000
					(.)	(.)	(.)	(.)
Visible illness (=1)					-2.355*	-2.102	0.000	0.000
					(1.274)	(1.544)	(.)	(.)
Income quantile: Q2						-0.155	-0.322	-0.369
						(0.772)	(2.774)	(2.863)
Income quantile: Q3						-1.097*	-2.816*	-2.877**
						(0.663)	(1.479)	(1.443)
Income quantile: Q4						0.000	0.000	0.000
						(.)	(.)	(.)
Mother's education (years)							0.292	0.293
							(0.356)	(0.360)
Father's education (years)							0.030	0.031
							(0.094)	(0.095)
Mother works (=1)								-0.381
								(0.883)

Constant	3.210***	-2.356	-1.695	-2.788	-12.350**	-10.121	-45.361**	-46.066**
	(0.064)	(5.020)	(5.315)	(5.668)	(5.552)	(6.298)	(21.595)	(20.854)
Pseudo R-squared	0.024	0.036	0.043	0.062	0.237	0.248	0.648	0.648
Wald Chi-Square	59.551	30.111	35.392	48.872	50.354	72.802	56.052	57.344
N. of cases	7869	4790	4790	4788	1846	1279	339	338
Wooldrige's Serial Correlation F test in the original model	322.301	256.433	256.380	255.881	165.266	95.512	*0.989*	*0.881*

Table C15: Participation in housework last week, logit regression using the lag of the IQ-for-age z-score.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
lag of IQ-for-age z score	-0.052**	-0.055*	-0.051	-0.052*	-0.034	-0.049	0.000	0.032	0.077
	(0.024)	(0.030)	(0.031)	(0.031)	(0.052)	(0.052)	(0.098)	(0.098)	(0.105)
Age		0.236	0.273	0.286	0.520	0.451	-0.347	-0.581	-1.208
		(0.283)	(0.293)	(0.295)	(0.502)	(0.499)	(1.057)	(1.073)	(1.109)
Age2		-0.002	0.003	0.002	-0.005	-0.002	0.033	0.043	0.074
		(0.014)	(0.014)	(0.015)	(0.025)	(0.025)	(0.052)	(0.052)	(0.054)
Male (=1)			1.084**	1.067**	1.439*	1.493*	1.680	1.415	1.453
			(0.470)	(0.471)	(0.827)	(0.824)	(1.562)	(1.587)	(1.630)
Male*Age			-0.215***	-0.213***	-0.263***	-0.270***	-0.262*	-0.236	-0.247
			(0.046)	(0.046)	(0.079)	(0.079)	(0.148)	(0.150)	(0.154)
Male*IQ-for-age z score				0.020	0.081	0.079	0.067	0.030	-0.067
				(0.043)	(0.072)	(0.072)	(0.137)	(0.141)	(0.155)
First Born(=1)					-0.267**	-0.285**	-0.294	-0.269	-0.360
					(0.134)	(0.134)	(0.256)	(0.254)	(0.279)
Parental health assessment (Base: "Very good"=1)									
Good					0.107	0.118	-0.236	-0.246	-0.366
					(0.146)	(0.147)	(0.263)	(0.263)	(0.288)
Regular					0.328*	0.329*	-0.480	-0.513	-0.626*
					(0.178)	(0.179)	(0.327)	(0.330)	(0.352)
Bad					0.588	0.570	-1.174	-1.062	-1.244
					(0.681)	(0.676)	(1.074)	(1.061)	(1.002)
Very bad					0.000	0.000	0.000	0.000	0.000
					(.)	(.)	(.)	(.)	(.)
Disability (=1)					-0.229	-0.214	0.429	0.507	0.596
					(0.914)	(0.939)	(1.551)	(1.546)	(2.084)
Visible illness (=1)					1.599**	1.524**	0.000	0.000	0.000
					(0.726)	(0.715)	(.)	(.)	(.)
Income quantile: Q2						0.550***	0.617*	0.716**	0.883**
						(0.166)	(0.327)	(0.327)	(0.345)
Income quantile: Q3						0.272*	0.535*	0.543**	0.831***
						(0.153)	(0.276)	(0.277)	(0.304)
Income quantile: Q4						0.426***	0.624**	0.497*	0.654**
						(0.146)	(0.277)	(0.286)	(0.295)
Mother's education (years)							-0.039	-0.051*	-0.021
							(0.029)	(0.030)	(0.033)
Father's education (years)							0.020	0.019	0.024
							(0.029)	(0.029)	(0.030)
Mother works (=1)								0.785***	0.716***
								(0.233)	(0.243)
Household size									-0.062
									(0.084)
Proportion of male children									0.221
									(0.436)
Region 2									1.021***
									(0.267)
Region 3									1.097***
									(0.310)
Region 4									1.791***
									(0.378)
2005									-0.600***
									(0.225)
2009									0.000

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
									(.)
Constant	0.408***	-1.955	-2.248	-2.309	-3.797	-3.760	1.226	2.453	4.970
	(0.025)	(1.419)	(1.473)	(1.484)	(2.514)	(2.495)	(5.324)	(5.424)	(5.705)
Pseudo R-squared	0.000	0.013	0.069	0.069	0.095	0.101	0.070	0.088	0.148
Wald Chi-Square	4.868	87.105	394.320	393.042	211.459	225.056	40.744	51.371	87.044
N. of cases	7867	4788	4788	4786	1864	1864	513	512	512
Wooldrige's Serial Correlation F test in the original model	1.706	3.166	3.766	3.658	0.711	0.660	*11.384*	*7.954*	*1.655*

Table C16: Average number of hours per week spent at work, Tobit regression using the lag of the IQ-for-age z-score.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
lag of IQ-for-age z score	-3.194	1.945	1.526	1.913	4.511	5.062	8.069	9.361	10.301
	(2.191)	(3.206)	(3.206)	(3.278)	(4.771)	(4.551)	(7.003)	(6.705)	(6.404)
Age		42.758	36.217	34.559	-21.780	-25.410	-112.158*	-124.178**	-106.206**
		(34.341)	(34.121)	(34.489)	(50.529)	(51.054)	(58.287)	(55.797)	(51.958)
Age2		-1.192	-1.255	-1.169	1.564	1.726	5.331*	5.853**	4.948**
		(1.593)	(1.601)	(1.625)	(2.358)	(2.387)	(2.731)	(2.630)	(2.422)
Male (=1)			-111.462**	-109.036*	-106.765	-107.169	-216.538**	-227.875**	-239.451**
			(55.937)	(56.133)	(80.299)	(79.771)	(106.838)	(111.377)	(120.073)
Male*Age			12.791**	12.555**	12.105*	12.013*	22.205**	23.450**	23.315**
			(5.158)	(5.180)	(7.325)	(7.267)	(9.980)	(10.467)	(10.943)
Male*IQ-for-age z score				-3.598	-4.650	-3.172	-12.920	-14.377	-12.756
				(3.947)	(6.648)	(6.506)	(9.501)	(9.323)	(9.696)
First Born(=1)					-11.938	-12.211	-23.471	-24.124	-9.991
					(16.936)	(17.382)	(24.033)	(24.945)	(19.670)
Parental health assessment (Base: "Very good"=1)									
Good					0.597	0.541	6.857	8.973	4.189
					(14.255)	(14.313)	(19.760)	(19.234)	(17.498)
Regular					19.629	17.825	20.855	21.516	17.843
					(16.159)	(16.170)	(22.463)	(22.206)	(20.697)
Bad					40.550	34.937	133.075***	140.979***	132.862***
					(43.660)	(39.863)	(50.705)	(48.900)	(51.287)
Very bad					0.000	0.000	0.000	0.000	0.000
					(.)	(.)	(.)	(.)	(.)
Disability (=1)					42.809	45.520	-339.670	-360.368	-329.383
					(43.231)	(43.216)	(.)	(.)	(.)
Visible illness (=1)					31.081	22.902	-302.221	-328.069	-334.241
					(40.902)	(39.580)	(.)	(.)	(.)
Income quantile: Q2						26.988*	-43.325	-39.705	-41.820
						(13.790)	(29.521)	(29.576)	(29.023)
Income quantile: Q3						2.077	-24.894	-27.365	-33.368
						(15.696)	(22.203)	(21.871)	(22.903)
Income quantile: Q4						-1.624	-4.798	-10.927	-14.678
						(17.284)	(20.705)	(23.512)	(23.283)
Mother's education (years)							-3.375	-3.777*	-3.667
							(2.051)	(2.104)	(2.289)
Father's education (years)							4.137*	4.398*	4.041*
							(2.357)	(2.428)	(2.213)
Mother works (=1)								23.938	31.225*
								(18.901)	(17.984)
Household size									11.781**
									(5.969)
Proportion of male children									32.084
									(26.557)
Region 2									2.421
									(20.518)
Region 3									-9.671
									(22.372)
Region 4									-7.620
									(26.134)
2005									5.118
									(14.120)
2009									0.000

									(.)
Constant	-144.339***	-477.694***	-412.333**	-404.485**	-112.442	-95.780	457.704	518.225*	354.607
	(5.473)	(184.558)	(182.257)	(183.535)	(269.798)	(270.783)	(300.996)	(288.348)	(272.845)
sigma									
Constant	92.306***	88.970***	87.464***	87.449***	86.702***	85.797***	72.992***	72.963***	72.395***
	(2.770)	(4.640)	(4.561)	(4.566)	(6.759)	(6.794)	(9.789)	(9.812)	(10.229)
Pseudo R-squared	0.000	0.018	0.026	0.027	0.029	0.034	0.063	0.068	0.080
F statistic	2.124	13.330	12.350	10.655	3.194	2.825	.	.	.
N. of cases	7830	4772	4772	4770	1854	1854	515	514	514
Wooldrige's Serial Correlation F test in the original model	182.068	0.441	1.152	1.170	0.612	0.484	-	-	-

Table C17: Average number of hours per week spent at school, Tobit regression using the lag of the IQ-for-age z-score.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
lag of IQ-for-age z score	0.888***	0.241***	0.245***	0.215***	0.179	0.166	-0.013	-0.023	0.002
	(0.098)	(0.082)	(0.082)	(0.082)	(0.119)	(0.118)	(0.206)	(0.205)	(0.201)
Age		0.720	0.838	0.876	0.361	0.324	0.745	0.815	1.591
		(0.861)	(0.857)	(0.879)	(1.383)	(1.384)	(3.744)	(3.767)	(3.780)
Age2		-0.029	-0.030	-0.033	-0.003	-0.001	-0.028	-0.031	-0.069
		(0.043)	(0.043)	(0.044)	(0.069)	(0.069)	(0.184)	(0.185)	(0.185)
Male (=1)			1.581	1.438	0.531	0.546	-0.893	-0.812	-0.384
			(1.304)	(1.303)	(1.979)	(1.969)	(4.074)	(4.050)	(4.190)
Male*Age			-0.188	-0.175	-0.057	-0.058	0.059	0.050	0.099
			(0.129)	(0.129)	(0.195)	(0.194)	(0.399)	(0.396)	(0.397)
Male*IQ-for-age z score				0.415***	0.363	0.343	1.201**	1.214**	1.243**
				(0.137)	(0.238)	(0.240)	(0.506)	(0.505)	(0.491)
First Born(=1)					0.051	0.004	-0.353	-0.361	-0.236
					(0.340)	(0.340)	(0.606)	(0.608)	(0.544)
Parental health assessment (Base: "Very good"=1)									
Good					0.486	0.496	1.026*	1.029*	1.110*
					(0.350)	(0.350)	(0.603)	(0.605)	(0.616)
Regular					0.745	0.775	1.158	1.172	1.044
					(0.473)	(0.473)	(0.840)	(0.846)	(0.881)
Bad					3.866*	3.913*	5.802*	5.766*	5.815
					(2.111)	(2.114)	(3.379)	(3.370)	(3.969)
Very bad					0.000	0.000	0.000	0.000	0.000
					(.)	(.)	(.)	(.)	(.)
Disability (=1)					-2.722*	-2.551*	-3.704	-3.718	-3.348
					(1.416)	(1.423)	(2.306)	(2.295)	(2.169)
Visible illness (=1)					-3.603*	-3.557*	-0.648	-0.593	-0.062
					(1.908)	(1.930)	(1.110)	(1.079)	(0.935)
Income quantile: Q2						-0.164	-0.765	-0.797	-0.985
						(0.452)	(0.814)	(0.814)	(0.770)
Income quantile: Q3						-0.323	-0.521	-0.525	-0.999
						(0.419)	(0.648)	(0.652)	(0.652)
Income quantile: Q4						0.219	-0.262	-0.217	-0.333
						(0.345)	(0.609)	(0.633)	(0.609)
Mother's education (years)							0.084	0.088	0.100
							(0.065)	(0.066)	(0.070)
Father's education (years)							0.053	0.053	0.049
							(0.061)	(0.061)	(0.060)
Mother works (=1)								-0.242	-0.052
								(0.514)	(0.520)
Household size									-0.103
									(0.208)
Proportion of male children									-1.787**
									(0.878)
Region 2									-1.918***
									(0.620)
Region 3									0.249
									(0.741)
Region 4									-0.247
									(0.681)
2005									0.493
									(0.507)
2009									0.000
									(.)
Constant	25.615***	20.774***	19.873***	19.699***	21.327***	21.554***	19.159	18.793	16.221
	(0.098)	(4.278)	(4.269)	(4.362)	(6.872)	(6.846)	(18.882)	(19.015)	(19.456)
sigma									
Constant	8.135***	5.768***	5.764***	5.758***	5.559***	5.556***	5.074***	5.078***	4.970***
	(0.172)	(0.201)	(0.200)	(0.200)	(0.332)	(0.332)	(0.381)	(0.381)	(0.376)
Pseudo R-squared	0.002	0.000	0.001	0.001	0.003	0.003	0.010	0.010	0.017
F statistic	82.638	4.213	3.496	4.373	2.668	2.269	1.825	1.734	2.084
N. of cases	7794	4739	4739	4737	1844	1844	510	509	509
Wooldrige's Serial Correlation F test in the original model	113.757	34.331	34.229	34.157	140.471	121.318	.	.	.

Table C18: Average number of hours per week spent doing housework, Tobit regression using the lag of the IQ-for-age z-score.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
lag of IQ-for-age z score	-0.413***	-0.389**	-0.327*	-0.306*	-0.036	-0.084	0.098	0.175	-0.233***
	(0.152)	(0.175)	(0.168)	(0.170)	(0.258)	(0.255)	(0.475)	(0.478)	(0.047)
Age		-3.647**	-3.209**	-3.216**	-4.496*	-4.799*	- 13.585**	- 14.204**	-9.909***
		(1.450)	(1.425)	(1.427)	(2.500)	(2.484)	(6.665)	(6.732)	(0.038)
Age2		0.216***	0.219***	0.219***	0.288**	0.302**	0.704**	0.731**	0.529***
		(0.071)	(0.069)	(0.070)	(0.121)	(0.120)	(0.319)	(0.322)	(0.003)
Male (=1)			4.627*	4.672*	3.812	4.082	1.619	1.205	-6.116***
			(2.392)	(2.394)	(3.927)	(3.868)	(7.907)	(7.890)	(0.389)
Male*Age			-0.986***	-0.990***	-0.891**	-0.923**	-0.602	-0.563	0.200***
			(0.231)	(0.231)	(0.369)	(0.363)	(0.752)	(0.750)	(0.037)
Male*IQ-for-age z score				-0.213	-0.261	-0.255	0.263	0.175	-0.030
				(0.260)	(0.424)	(0.422)	(0.817)	(0.815)	(0.079)
First Born(=1)					-1.476**	-1.412**	-1.747	-1.660	-1.845***
					(0.601)	(0.591)	(1.144)	(1.137)	(0.339)
Parental health assessment (Base: "Very good"=1)									
Good					2.152***	2.249***	2.778*	2.706*	2.859***
					(0.726)	(0.719)	(1.530)	(1.525)	(0.349)
Regular					2.637***	2.617***	1.015	0.983	0.125
					(0.793)	(0.783)	(1.682)	(1.673)	(0.238)
Bad					-0.398	-0.728	-43.032	-42.702	-41.347
					(2.234)	(2.059)	(.)	(.)	(.)
Very bad					0.000	0.000	0.000	0.000	0.000
					(.)	(.)	(.)	(.)	(.)
Disability (=1)					-0.143	-0.416	3.720	3.919	5.409***
					(2.833)	(2.967)	(4.823)	(4.736)	(0.293)
Visible illness (=1)					-0.510	-0.932	0.000	0.000	0.000
					(3.882)	(3.806)	(.)	(.)	(.)
Income quantile: Q2						3.108***	3.524**	3.579**	1.998***
						(0.790)	(1.749)	(1.752)	(0.286)
Income quantile: Q3						2.407***	3.424**	3.341**	3.171***
						(0.776)	(1.590)	(1.591)	(0.296)
Income quantile: Q4						2.049***	1.731	1.477	0.821***
						(0.742)	(1.589)	(1.593)	(0.283)
Mother's education (years)							0.047	0.025	0.056
							(0.176)	(0.180)	(0.038)
Father's education (years)							-0.034	-0.037	-0.023
							(0.167)	(0.167)	(0.034)
Mother works (=1)								1.352	0.556**
								(1.234)	(0.260)
Household size									-0.581***
									(0.071)
Proportion of male children									0.912*
									(0.518)
Region 2									5.897***
									(0.283)
Region 3									5.281***
									(0.257)
Region 4									7.227***
									(0.255)
2005									48.426***
									(0.399)
2009									0.000
									(.)
Constant	-1.478***	12.300*	10.389	10.426	15.562	15.196	61.497*	64.952*	-5.470***
	(0.199)	(7.269)	(7.278)	(7.286)	(12.876)	(12.668)	(34.257)	(34.669)	(0.399)
sigma									
Constant	9.394***	8.691***	8.257***	8.254***	7.552***	7.481***	7.752***	7.740***	6.647***
	(0.266)	(0.317)	(0.328)	(0.327)	(0.424)	(0.423)	(0.732)	(0.735)	(0.068)
Pseudo R-squared	0.000	0.004	0.027	0.027	0.035	0.039	0.034	0.035	0.132
F statistic	7.419	16.872	62.951	52.513	13.304	12.297	.	.	.
N. of cases	5681	3584	3584	3584	1380	1380	330	330	330
Wooldrige's Serial Correlation F test in the original model	11.520	13.818	13.534	13.522	66.808	58.788	n.a.	n.a.	n.a.

Section IV: Complete regression results from Table 4.4

Table C19: Work in the last 12 months, IV probit regression.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
IQ-for-age z score	-0.128	0.028	0.052	0.417*	0.465	0.650	1.252***	1.261***	1.289***
	(0.142)	(0.154)	(0.154)	(0.214)	(0.549)	(0.523)	(0.208)	(0.204)	(0.197)
Age		0.133	0.135	0.133	0.289	0.268	0.171	0.159	0.169
		(0.125)	(0.124)	(0.118)	(0.201)	(0.199)	(0.192)	(0.189)	(0.188)
Age2		0.003	0.002	0.002	-0.005	-0.005	-0.005	-0.004	-0.005
		(0.007)	(0.007)	(0.006)	(0.010)	(0.010)	(0.009)	(0.008)	(0.009)
Male (=1)			0.094	0.094	0.231	0.247	0.170	0.107	0.033
			(0.252)	(0.240)	(0.394)	(0.378)	(0.327)	(0.315)	(0.327)
Male*Age			0.020	0.019	0.011	0.007	-0.003	0.003	0.006
			(0.025)	(0.024)	(0.038)	(0.036)	(0.031)	(0.030)	(0.031)
Male*IQ-for-age z score				-0.630**	-0.625	-0.669	-0.694*	-0.721*	-0.825**
				(0.271)	(0.578)	(0.530)	(0.397)	(0.391)	(0.367)
First Born(=1)					-0.048	-0.051	-0.146*	-0.144	-0.085
					(0.112)	(0.108)	(0.087)	(0.089)	(0.087)
Parental health assesment (Base: "Very good"=1)									
Good					-0.074	-0.063	-0.112	-0.103	-0.114
					(0.119)	(0.119)	(0.116)	(0.114)	(0.120)
Regular					0.135	0.128	0.006	0.020	0.011
					(0.127)	(0.120)	(0.110)	(0.109)	(0.114)
Bad					0.270	0.240	-0.274	-0.248	-0.289
					(0.351)	(0.335)	(0.360)	(0.366)	(0.339)
Very bad					0.000	0.000	0.000	0.000	0.000
					(.)	(.)	(.)	(.)	(.)
Disability (=1)					0.536	0.569	0.736	0.772	0.768
					(0.372)	(0.358)	(0.524)	(0.547)	(0.546)
Visible illness (=1)					0.321	0.347	0.310	0.318	0.311
					(0.253)	(0.251)	(0.291)	(0.302)	(0.308)
Income quantile: Q2						0.428***	0.004	-0.005	-0.001
						(0.155)	(0.129)	(0.133)	(0.123)
Income quantile: Q3						0.216*	0.035	0.017	0.005
						(0.119)	(0.100)	(0.100)	(0.098)
Income quantile: Q4						0.051	-0.035	-0.073	-0.066
						(0.164)	(0.115)	(0.114)	(0.110)
Mother's education (years)							-0.029***	-0.032***	-0.029***
							(0.010)	(0.010)	(0.010)
Father's education (years)							-0.036***	-0.036***	-0.034***
							(0.011)	(0.011)	(0.011)
Mother works (=1)								0.166	0.175
								(0.111)	(0.109)
Household size									0.048
									(0.035)
Proportion of male children									0.155
									(0.134)
Region 2									0.094
									(0.096)
Region 3									0.061
									(0.110)
Region 4									-0.147
									(0.125)
2005									0.029
									(0.091)
2009									-0.047
									(0.097)
Constant	-1.805***	-3.362***	-3.469***	-3.305***	-4.134***	-4.073***	-1.396	-1.332	-1.719
	(0.032)	(0.582)	(0.587)	(0.579)	(1.175)	(1.342)	(1.501)	(1.506)	(1.566)
Instruments for IQ-for-age z score:									
Height-for-age z-score	0.114***	0.114***	0.115***	0.119***	0.061***	0.050***	0.028	0.028	0.033
	(0.008)	(0.008)	(0.008)	(0.011)	(0.017)	(0.017)	(0.026)	(0.026)	(0.026)
Male*Height-for-age z-score				-0.009	0.027	0.026	0.020	0.019	0.022
				(0.014)	(0.023)	(0.022)	(0.036)	(0.036)	(0.036)
*Instruments for Male*IQ-for-age z score:*									
Height-for-age z-score				0.000	-0.003**	-0.008***	-0.014***	-0.014***	-0.007
				(0.000)	(0.001)	(0.002)	(0.005)	(0.005)	(0.006)
Male*Height-for-age z-score				0.110***	0.094***	0.094***	0.089***	0.088***	0.088***
				(0.011)	(0.016)	(0.016)	(0.026)	(0.026)	(0.026)
Wald Test of Exogeneity	0.37	0.27	0.52	5.88	1.66	2.6	70.99	68.27	73.75
Wald Chi-Square	0.813	229.680	275.332	346.597	165.700	220.656	989.095	989.051	1099.618
N. of cases	13163	12867	12867	12867	5080	5080	2043	2033	2033

Table C20: School attendance in the current academic year, IV probit regression.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
IQ-for-age z score	0.880***	0.902***	0.901***	0.827***	1.096***	1.004**	-1.140***	-1.135***	-0.797
	(0.052)	(0.048)	(0.048)	(0.135)	(0.304)	(0.399)	(0.386)	(0.388)	(1.013)
Age		0.709***	0.723***	0.722***	0.691**	0.759**	1.021	0.997	1.784
		(0.104)	(0.105)	(0.105)	(0.289)	(0.339)	(0.891)	(0.889)	(1.627)
Age2		-0.038***	-0.038***	-0.038***	-0.037**	-0.040**	-0.055	-0.054	-0.097
		(0.006)	(0.006)	(0.006)	(0.015)	(0.018)	(0.049)	(0.049)	(0.089)
Male (=1)			0.108	0.120	-0.046	-0.011	-0.007	0.002	-0.007
			(0.148)	(0.148)	(0.283)	(0.301)	(0.391)	(0.387)	(0.666)
Male*Age			-0.024	-0.023	0.012	0.010	0.009	0.009	0.051
			(0.016)	(0.016)	(0.031)	(0.033)	(0.044)	(0.043)	(0.079)
Male*IQ-for-age z score				0.146	-0.411	-0.279	0.711	0.684	0.689
				(0.249)	(0.577)	(0.666)	(0.779)	(0.784)	(1.094)
First Born(=1)					-0.130	-0.139	0.039	0.036	-0.006
					(0.085)	(0.091)	(0.160)	(0.157)	(0.251)
Parental health assesment									
(Base: "Very good"=1)									
Good					0.127	0.126	-0.199	-0.195	-0.625
					(0.109)	(0.118)	(0.238)	(0.236)	(0.665)
Regular					0.009	-0.009	-0.252	-0.257	-0.833
					(0.127)	(0.139)	(0.254)	(0.252)	(0.743)
Bad					-0.469	-0.521	4.649	4.720	3.788
					(0.390)	(0.413)	(.)	(.)	(.)
Very bad					0.000	0.000	0.000	0.000	0.000
					(.)	(.)	(.)	(.)	(.)
Disability (=1)					-0.298	-0.376	0.000	0.000	0.000
					(0.431)	(0.489)	(.)	(.)	(.)
Visible illness (=1)					0.108	0.095	4.011	5.478	4.497
					(0.314)	(0.332)	(.)	(.)	(.)
Income quantile: Q2						0.111	-0.036	-0.019	-0.207
						(0.130)	(0.216)	(0.212)	(0.391)
Income quantile: Q3						-0.143	-0.118	-0.101	-0.215
						(0.097)	(0.194)	(0.191)	(0.335)
Income quantile: Q4						0.218	0.114	0.133	0.056
						(0.211)	(0.173)	(0.169)	(0.308)
Mother's education (years)							0.061*	0.062*	0.126
							(0.034)	(0.034)	(0.085)
Father's education (years)							0.058**	0.057**	0.073**
							(0.023)	(0.023)	(0.033)
Mother works (=1)								-0.026	-0.073
								(0.133)	(0.229)
Household size									-0.057
									(0.068)
Proportion of male children									-0.751
									(0.496)
Region 2									0.345
									(0.428)
Region 3									0.805
									(0.651)
Region 4									0.867
									(0.731)
2005									-0.309
									(0.334)
2009									-0.316
									(0.333)
Constant	1.397***	-1.725***	-1.783***	-1.786***	-1.576*	-1.785	-3.796	-3.731	-5.796
	(0.140)	(0.371)	(0.378)	(0.378)	(0.938)	(1.096)	(2.873)	(2.870)	(4.878)
Instruments for IQ-for-age z score:									
Height-for-age z-score	0.114***	0.114***	0.114***	0.119***	0.061***	0.050***	0.032	0.031	0.036
	(0.008)	(0.008)	(0.008)	(0.011)	(0.017)	(0.017)	(0.026)	(0.027)	(0.027)
Male*Height-for-age z-score				-0.009	0.027	0.025	0.015	0.014	0.018
				(0.014)	(0.023)	(0.022)	(0.036)	(0.036)	(0.036)
*Instruments for Male*IQ-for-age z score:*									
Height-for-age z-score				0.000	-0.003**	-0.008***	-0.014***	-0.014***	-0.007
				(0.000)	(0.001)	(0.002)	(0.005)	(0.005)	(0.006)
Male*Height-for-age z-score				0.109***	0.094***	0.093***	0.089***	0.088***	0.088***
				(0.011)	(0.016)	(0.016)	(0.026)	(0.026)	(0.026)
Wald Test of Exogeneity	47.72	51.64	51.2	160.91	18.10	8.30	41.88	44.42	2.02
Wald Chi-Square	287.765	949.306	944.950	959.726	288.446	229.764	396.610	456.982	262.932
N. of cases	13139	12843	12843	12843	5076	5076	2032	2022	2022

Table C21. Participation in housework last week, IV probit regression.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
IQ-for-age z score	0.141*	0.265***	0.256***	0.339***	0.717***	0.764***	1.118***	1.112***	1.116***
	(0.078)	(0.077)	(0.078)	(0.107)	(0.261)	(0.279)	(0.319)	(0.330)	(0.346)
Age		0.356***	0.383***	0.382***	0.233**	0.224**	0.163	0.151	0.165
		(0.054)	(0.055)	(0.055)	(0.095)	(0.098)	(0.150)	(0.147)	(0.145)
Age2		-0.011***	-0.009***	-0.009***	-0.002	-0.002	-0.003	-0.003	-0.003
		(0.003)	(0.003)	(0.003)	(0.005)	(0.005)	(0.007)	(0.007)	(0.007)
Male (=1)			0.475***	0.472***	0.377**	0.364**	0.094	0.079	0.040
			(0.107)	(0.106)	(0.166)	(0.169)	(0.253)	(0.254)	(0.267)
Male*Age			-0.114***	-0.114***	-0.096***	-0.093***	-0.040	-0.039	-0.044
			(0.012)	(0.012)	(0.022)	(0.024)	(0.039)	(0.040)	(0.041)
Male*IQ-for-age z score				-0.171	-0.429	-0.425	-0.492	-0.475	-0.518
				(0.157)	(0.337)	(0.335)	(0.446)	(0.460)	(0.475)
First Born(=1)					-0.167***	-0.163***	-0.118*	-0.115*	-0.148**
					(0.043)	(0.042)	(0.062)	(0.062)	(0.062)
Parental health assesment (Base: "Very good"=1)									
Good					0.021	0.023	-0.094	-0.090	-0.089
					(0.056)	(0.056)	(0.084)	(0.084)	(0.087)
Regular					0.150**	0.143**	-0.029	-0.021	-0.034
					(0.066)	(0.064)	(0.092)	(0.093)	(0.104)
Bad					-0.254	-0.258	-0.588	-0.584*	-0.569
					(0.222)	(0.216)	(0.360)	(0.352)	(0.360)
Very bad					0.000	0.000	0.000	0.000	0.000
					(.)	(.)	(.)	(.)	(.)
Disability (=1)					0.310	0.317	0.510	0.541	0.500
					(0.257)	(0.249)	(0.370)	(0.369)	(0.381)
Visible illness (=1)					0.151	0.153	0.232	0.230	0.196
					(0.166)	(0.165)	(0.284)	(0.290)	(0.293)
Income quantile: Q2						0.106*	-0.060	-0.066	-0.032
						(0.064)	(0.097)	(0.099)	(0.104)
Income quantile: Q3						0.046	0.030	0.018	0.042
						(0.057)	(0.089)	(0.090)	(0.094)
Income quantile: Q4						-0.031	-0.081	-0.113	-0.100
						(0.081)	(0.093)	(0.093)	(0.093)
Mother's education (years)							-0.018*	-0.022**	-0.021**
							(0.010)	(0.010)	(0.010)
Father's education (years)							-0.027**	-0.027**	-0.025**
							(0.011)	(0.011)	(0.011)
Mother works (=1)								0.145*	0.135*
								(0.082)	(0.075)
Household size									-0.033
									(0.036)
Proportion of male children									0.182
									(0.116)
Region 2									0.197*
									(0.116)
Region 3									0.208
									(0.160)
Region 4									0.056
									(0.105)
2005									-0.019
									(0.081)
2009									0.075
									(0.068)
Constant	0.041***	-2.218***	-2.355***	-2.345***	-1.605***	-1.569***	-0.585	-0.532	-0.667
	(0.012)	(0.241)	(0.248)	(0.248)	(0.450)	(0.489)	(0.838)	(0.834)	(0.773)
Instruments for IQ-for-age z score:									
Height-for-age z-score	0.114***	0.114***	0.115***	0.119***	0.061***	0.050***	0.028	0.028	0.033
	(0.008)	(0.008)	(0.008)	(0.011)	(0.017)	(0.017)	(0.026)	(0.026)	(0.026)
Male*Height-for-age z-score				-0.009	0.027	0.026	0.020	0.019	0.022
				(0.014)	(0.023)	(0.022)	(0.036)	(0.036)	(0.036)
*Instruments for Male*IQ-for-age z score:*									
Height-for-age z-score				0.000	-0.003**	-0.008***	-0.014***	-0.014***	-0.007
				(0.000)	(0.001)	(0.002)	(0.005)	(0.005)	(0.006)
Male*Height-for-age z-score				0.110***	0.094***	0.094***	0.089***	0.088***	0.088***
				(0.011)	(0.016)	(0.016)	(0.026)	(0.026)	(0.026)
Wald Test of Exogeneity	3.37	11.58	9.84	12.65	12.18	11.59	21.52	20.56	21.25
Wald Chi-Square	3.297	891.189	1479.776	1487.654	907.526	999.701	933.696	947.583	975.810
N. of cases	13148	12852	12852	12852	5080	5080	2043	2033	2033

Table C22: Average number of hours per week spent at work, IV Tobit regression.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
IQ-for-age z score	-12.361	1.130	3.636	40.863*	33.336	47.366	251.481	251.033	255.828
	(13.165)	(13.191)	(13.098)	(22.145)	(63.983)	(71.911)	(236.229)	(243.449)	(231.688)
Age		24.290**	23.667**	24.285**	37.174**	36.928**	43.598	42.147	43.580
		(11.755)	(11.601)	(11.660)	(18.238)	(18.347)	(31.650)	(31.652)	(32.175)
Age2		-0.388	-0.433	-0.456	-1.075	-1.069	-1.443	-1.398	-1.591
		(0.603)	(0.598)	(0.601)	(0.919)	(0.925)	(1.656)	(1.657)	(1.697)
Male (=1)			3.079	4.263	4.509	7.473	1.163	-5.589	-24.899
			(23.326)	(23.593)	(38.988)	(38.534)	(63.023)	(63.358)	(67.229)
Male*Age			2.323	2.240	2.828	2.467	3.669	4.296	5.006
			(2.260)	(2.291)	(3.791)	(3.764)	(6.521)	(6.572)	(6.498)
Male*IQ-for-age z score				-63.105**	-57.416	-61.519	-172.809	-174.223	-191.251
				(27.611)	(67.064)	(68.223)	(150.547)	(152.612)	(159.251)
First Born(=1)					-5.673	-5.925	-33.854	-33.243	-21.199
					(11.266)	(11.503)	(28.162)	(28.358)	(25.400)
Parental health assesment (Base: "Very good"=1)									
Good					-3.959	-3.463	-9.283	-8.203	-10.828
					(11.239)	(11.528)	(19.229)	(19.034)	(18.976)
Regular					15.667	15.432	13.159	15.233	11.804
					(13.050)	(13.148)	(22.600)	(22.844)	(23.744)
Bad					36.414	35.841	-44.806	-40.861	-50.077
					(33.380)	(33.219)	(97.225)	(98.892)	(91.717)
Very bad					-565.507***	-533.767	0.000	0.000	0.000
					(81.173)	(.)	(.)	(.)	(.)
Disability (=1)					42.071	45.436	143.529	147.743	147.485
					(35.472)	(37.604)	(139.013)	(143.395)	(138.107)
Visible illness (=1)					28.924	32.547	70.603	71.001	68.491
					(23.870)	(24.641)	(66.672)	(67.414)	(68.055)
Income quantile: Q2						46.701***	11.719	9.381	8.438
						(10.844)	(25.694)	(27.425)	(24.573)
Income quantile: Q3						27.443**	19.278	15.799	12.677
						(11.342)	(20.084)	(20.046)	(19.965)
Income quantile: Q4						13.817	2.961	-3.160	-3.371
						(16.319)	(27.219)	(30.788)	(27.943)
Mother's education (years)							-5.168	-5.542	-5.011
							(4.176)	(4.456)	(4.330)
Father's education (years)							-6.529	-6.531	-6.155
							(5.969)	(6.163)	(5.544)
Mother works (=1)								23.141	24.470
								(16.687)	(16.643)
Household size									9.053
									(5.919)
Proportion of male children									33.319
									(45.190)
Region 2									14.558
									(19.667)
Region 3									12.744
									(18.521)
Region 4									-30.127
									(23.043)
2005									-0.101
									(18.680)
2009									-15.070
									(16.400)
Constant	-168.767***	-357.819***	-359.795***	-363.187***	-435.359***	-454.971***	-366.962**	-359.010**	-420.318**
	(6.988)	(57.877)	(57.704)	(58.018)	(94.456)	(95.118)	(168.748)	(169.127)	(167.302)
Instruments for IQ-for-age z score:									
Height-for-age z-score	0.114***	0.114***	0.114***	0.119***	0.061***	0.050***	0.028	0.027	0.033
	(0.008)	(0.008)	(0.008)	(0.011)	(0.017)	(0.017)	(0.026)	(0.026)	(0.026)
Male*Height-for-age z-score				-0.010	0.026	0.025	0.017	0.016	0.019
				(0.014)	(0.023)	(0.022)	(0.036)	(0.036)	(0.036)
*Instruments for Male*IQ-for-age z score:*									
Height-for-age z-score				0.000	-0.003**	-0.008***	-0.014***	-0.014***	-0.006
				(0.000)	(0.001)	(0.002)	(0.005)	(0.005)	(0.006)
Male*Height-for-age z-score				0.109***	0.093***	0.092***	0.086***	0.085***	0.085***
				(0.011)	(0.016)	(0.016)	(0.026)	(0.026)	(0.026)
Wald Test of Exogeneity	0.56	0.10	0.31	7.28	1.53	1.65	44.51	43.67	51.46
Wald Chi-Square	0.882	182.985	217.434	220.331	488.377	110.044	40.650	41.878	57.396
N. of cases	13114	12819	12819	12819	5064	5064	2035	2025	2025

Table C23: Average number of hours per week spent at school, IV Tobit regression.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
IQ-for-age z score	2.071***	2.632***	2.616***	2.415***	3.242**	3.341*	3.588	4.453	4.663
	(0.429)	(0.434)	(0.432)	(0.539)	(1.553)	(1.756)	(6.236)	(6.663)	(3.699)
Age		3.660***	3.684***	3.684***	1.703***	1.702***	-0.080	-0.128	-0.162
		(0.420)	(0.422)	(0.421)	(0.635)	(0.637)	(0.982)	(1.010)	(0.986)
Age2		-0.170***	-0.170***	-0.170***	-0.060*	-0.060*	0.026	0.028	0.032
		(0.022)	(0.022)	(0.022)	(0.033)	(0.033)	(0.052)	(0.053)	(0.052)
Male (=1)			0.111	0.122	0.523	0.517	-0.748	-0.895	-0.846
			(0.710)	(0.709)	(1.011)	(1.015)	(1.451)	(1.520)	(1.571)
Male*Age			-0.050	-0.052	-0.063	-0.063	0.100	0.122	0.113
			(0.074)	(0.074)	(0.106)	(0.107)	(0.156)	(0.164)	(0.164)
Male*IQ-for-age z score				0.418	-0.867	-0.868	-2.342	-2.946	-2.497
				(0.772)	(1.688)	(1.724)	(4.083)	(4.433)	(2.895)
First Born(=1)					-0.441*	-0.454*	-0.328	-0.394	-0.584
					(0.263)	(0.271)	(0.576)	(0.595)	(0.427)
Parental health assesment (Base: "Very good"=1)									
Good					0.379	0.387	0.584	0.579	0.503
					(0.278)	(0.285)	(0.390)	(0.414)	(0.416)
Regular					0.658*	0.657*	1.046**	1.041**	0.844*
					(0.349)	(0.353)	(0.449)	(0.481)	(0.505)
Bad					-0.266	-0.335	-1.455	-1.724	-1.962
					(1.536)	(1.564)	(2.866)	(2.947)	(2.237)
Very bad					5.719**	5.879**	0.000	0.000	0.000
					(2.468)	(2.702)	(.)	(.)	(.)
Disability (=1)					-4.047*	-3.981	-0.672	-0.028	0.320
					(2.396)	(2.436)	(4.331)	(4.675)	(3.271)
Visible illness (=1)					-0.425	-0.424	0.021	0.210	0.427
					(0.728)	(0.739)	(1.365)	(1.497)	(1.166)
Income quantile: Q2						-0.136	-1.203	-1.278	-1.397**
						(0.291)	(0.744)	(0.826)	(0.603)
Income quantile: Q3						-0.419	-0.440	-0.459	-0.543
						(0.295)	(0.414)	(0.431)	(0.434)
Income quantile: Q4						-0.296	-0.616	-0.788	-0.892
						(0.382)	(0.654)	(0.766)	(0.552)
Mother's education (years)							0.024	0.003	-0.007
							(0.097)	(0.107)	(0.075)
Father's education (years)							-0.005	-0.027	-0.050
							(0.158)	(0.167)	(0.095)
Mother works (=1)								0.465	0.482
								(0.350)	(0.337)
Household size									-0.201
									(0.125)
Proportion of male children									-0.046
									(0.738)
Region 2									-0.657*
									(0.385)
Region 3									0.527
									(0.443)
Region 4									0.028
									(0.495)
2005									0.170
									(0.412)
2009									-0.198
									(0.348)
Constant	24.313***	5.568***	5.522***	5.515***	13.822***	14.043***	22.863***	23.356***	24.954***
	(0.065)	(1.947)	(1.991)	(1.988)	(3.006)	(3.015)	(5.369)	(5.591)	(4.871)
Instruments for IQ-for-age z score:									
Height-for-age z-score	0.122***	0.122***	0.122***	0.128***	0.064***	0.052***	0.019	0.018	0.026
	(0.008)	(0.008)	(0.008)	(0.012)	(0.018)	(0.018)	(0.029)	(0.029)	(0.025)
Male*Height-for-age z-score				-0.011	0.026	0.025	0.034	0.033	0.038
				(0.015)	(0.024)	(0.024)	(0.039)	(0.039)	(0.036)
*Instruments for Male*IQ-for-age z score:*									
Height-for-age z-score				0.000	-0.004**	-0.009***	-0.015***	-0.016***	-0.008
				(0.000)	(0.001)	(0.002)	(0.005)	(0.005)	(0.007)
Male*Height-for-age z-score				0.117***	0.096***	0.095***	0.095***	0.094***	0.095***
				(0.011)	(0.017)	(0.017)	(0.028)	(0.028)	(0.028)
Wald Test of Exogeneity	12.71	23.72	23.51	29.91	9.38	7.19	0.61	0.96	2.79
Wald Chi-Square	23.284	235.445	239.713	239.852	129.965	132.098	75.481	69.721	80.349
N. of cases	11898	11628	11628	11628	4630	4630	1858	1848	1848

Table C24: Average number of hours per week spent doing housework, IV Tobit regression.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
IQ-for-age z score	-1.188*	-0.303	-0.379	0.047	3.079	3.287	11.952	11.932	11.516
	(0.683)	(0.689)	(0.670)	(0.788)	(2.565)	(2.900)	(11.027)	(11.375)	(10.133)
Age		1.657***	1.865***	1.859***	0.609	0.604	0.314	0.265	0.556
		(0.435)	(0.421)	(0.421)	(0.679)	(0.680)	(1.485)	(1.501)	(1.446)
Age2		-0.025	-0.017	-0.016	0.051	0.051	0.057	0.059	0.038
		(0.024)	(0.023)	(0.023)	(0.037)	(0.037)	(0.081)	(0.082)	(0.079)
Male (=1)			3.080***	3.083***	3.121**	3.139**	3.186	3.093	1.048
			(0.844)	(0.845)	(1.341)	(1.345)	(3.052)	(3.109)	(3.155)
Male*Age			-0.796***	-0.796***	-0.781***	-0.787***	-0.723**	-0.724**	-0.613**
			(0.089)	(0.089)	(0.146)	(0.147)	(0.324)	(0.329)	(0.313)
Male*IQ-for-age z score				-0.949	-1.867	-1.722	-5.422	-5.115	-6.023
				(1.279)	(2.909)	(2.956)	(7.495)	(7.631)	(7.736)
First Born(=1)					-1.182***	-1.153***	-1.430	-1.420	-1.468
					(0.426)	(0.437)	(1.320)	(1.334)	(1.246)
Parental health assesment (Base: "Very good"=1)									
Good					1.100**	1.108**	0.410	0.419	0.296
					(0.509)	(0.522)	(1.086)	(1.098)	(1.088)
Regular					1.994***	1.983***	0.998	1.075	0.318
					(0.585)	(0.592)	(1.257)	(1.290)	(1.287)
Bad					-2.028	-2.011	-4.574	-4.630	-5.281
					(1.943)	(1.959)	(6.526)	(6.599)	(5.833)
Very bad					-44.359	-43.937	0.000	0.000	0.000
					(.)	(.)	(.)	(.)	(.)
Disability (=1)					2.552	2.507	8.408	8.708	7.024
					(2.130)	(2.181)	(7.520)	(7.793)	(6.785)
Visible illness (=1)					-0.508	-0.426	0.963	0.893	0.084
					(1.445)	(1.478)	(3.911)	(3.969)	(3.829)
Income quantile: Q2						1.296***	-0.187	-0.299	-0.441
						(0.471)	(1.244)	(1.307)	(1.155)
Income quantile: Q3						0.995**	1.005	0.868	0.845
						(0.483)	(1.085)	(1.100)	(1.045)
Income quantile: Q4						0.426	-0.392	-0.658	-0.784
						(0.666)	(1.277)	(1.407)	(1.201)
Mother's education (years)							-0.164	-0.191	-0.158
							(0.201)	(0.216)	(0.195)
Father's education (years)							-0.417	-0.419	-0.365
							(0.321)	(0.336)	(0.274)
Mother works (=1)								1.044	0.800
								(0.890)	(0.860)
Household size									-0.261
									(0.279)
Proportion of male children									2.710
									(2.053)
Region 2									2.468**
									(1.115)
Region 3									2.434**
									(0.997)
Region 4									0.637
									(1.026)
2005									-0.107
									(0.839)
2009									-118.596
									(.)
Constant	-1.722***	-14.562***	-14.961***	-14.934***	-10.111***	-10.718***	-3.418	-3.080	-4.115
	(0.133)	(1.937)	(1.899)	(1.901)	(3.108)	(3.126)	(7.063)	(7.123)	(6.806)
Instruments for IQ-for-age z score:									
Height-for-age z-score	0.113***	0.113***	0.113***	0.116***	0.058***	0.049***	0.028	0.027	0.034
	(0.009)	(0.009)	(0.009)	(0.012)	(0.018)	(0.018)	(0.028)	(0.028)	(0.029)
Male*Height-for-age z-score				-0.006	0.032	0.028	0.020	0.019	0.023
				(0.015)	(0.024)	(0.024)	(0.038)	(0.039)	(0.039)
*Instruments for Male*IQ-for-age z score:*									
Height-for-age z-score				0.000	-0.003**	-0.007***	-0.017***	-0.017***	-0.010
				(0.000)	(0.002)	(0.002)	(0.006)	(0.006)	(0.007)
Male*Height-for-age z-score				0.109***	0.096***	0.094***	0.089***	0.088***	0.088***
				(0.011)	(0.017)	(0.017)	(0.028)	(0.028)	(0.028)
Wald Test of Exogeneity	2.29	0.02	0.16	0.94	2.58	2.32	7.67	7.39	8.13
Wald Chi-Square	3.026	658.119	1244.673	1238.455	477.036	478.804	93.400	94.732	106.115
N. of cases	11131	10854	10854	10854	4233	4233	1755	1746	1746

Section V: Complete regression results from Table 5

Table C25: Work in the last 12 months, IV Fixed Effects regression.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
IQ-for-age z score	0.104	0.263	0.250	0.394	-0.031	-0.031	-0.528	-0.442	-0.442
	(0.205)	(0.311)	(0.299)	(0.485)	(0.092)	(0.092)	(1.280)	(0.943)	(0.943)
Age		-0.031	-0.040**	-0.038*	-0.055**	-0.055**	0.005	-0.007	-0.007
		(0.020)	(0.020)	(0.023)	(0.023)	(0.023)	(0.192)	(0.145)	(0.145)
Age2		0.003**	0.003**	0.003**	0.003***	0.003***	0.001	0.001	0.001
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.010)	(0.008)	(0.008)
Male (=1)			-0.146**	-0.141*	-0.067	-0.067	0.252	0.210	0.210
			(0.066)	(0.075)	(0.058)	(0.058)	(0.649)	(0.482)	(0.482)
Male*Age			0.017***	0.014**	0.011*	0.011*	-0.018	-0.015	-0.015
			(0.006)	(0.006)	(0.006)	(0.006)	(0.057)	(0.043)	(0.043)
Male*IQ-for-age z score				-0.183	-0.035	-0.035	0.082	0.059	0.059
				(0.178)	(0.091)	(0.091)	(0.452)	(0.365)	(0.365)
First Born(=1)					0.005	0.005	0.044	0.035	0.035
					(0.018)	(0.018)	(0.144)	(0.109)	(0.109)
Parental health assesment (Base: "Very good"=1)									
Good					-0.034	-0.034	-0.023	-0.026	-0.026
					(0.021)	(0.021)	(0.069)	(0.057)	(0.057)
Regular					-0.016	-0.016	0.051	0.041	0.041
					(0.026)	(0.026)	(0.211)	(0.166)	(0.166)
Bad					-0.050	-0.050	0.110	0.084	0.084
					(0.051)	(0.051)	(0.433)	(0.327)	(0.327)
Very bad					0.000	0.000	0.000	0.000	0.000
					(.)	(.)	(.)	(.)	(.)
Disability (=1)					-0.020	-0.020	0.088	0.104	0.104
					(0.095)	(0.095)	(0.348)	(0.288)	(0.288)
Visible illness (=1)					0.101	0.101	0.028	0.055	0.055
					(0.091)	(0.091)	(0.439)	(0.335)	(0.335)
Income quantile: Q2						0.000	0.000	0.000	0.000
						(.)	(.)	(.)	(.)
Income quantile: Q3						0.000	0.000	0.000	0.000
						(.)	(.)	(.)	(.)
Income quantile: Q4						0.000	0.000	0.000	0.000
						(.)	(.)	(.)	(.)
Mother's education (years)							0.042	0.038	0.038
							(0.093)	(0.075)	(0.075)
Father's education (years)							0.000	0.000	0.000
							(.)	(.)	(.)
Mother works (=1)								0.000	0.000
								(.)	(.)
Household size									0.000
									(.)
Proportion of male children									0.000
									(.)
Region 2									0.000
									(.)
Region 3									0.000
									(.)
Region 4									0.000
									(.)
2005									0.000
									(.)
2009									0.000
									(.)
Instruments for IQ-for-age z score:									
Height-for-age z-score	0.019	0.018	0.018	-0.005	-0.049	-0.049	-0.024	-0.028	-0.028
	(0.016)	(0.016)	(0.016)	(0.020)	(0.033)	(0.033)	(0.047)	(0.048)	(0.048)
Male*Height-for-age z-score				0.048**	0.020	0.020	0.032	0.033	0.033
				(0.022)	(0.037)	(0.037)	(0.053)	(0.053)	(0.053)
*Instruments for Male*IQ-for-age z score:*									
Height-for-age z-score				-0.060***	-0.031	-0.031	-0.018	-0.021	-0.021
				(0.014)	(0.023)	(0.023)	(0.033)	(0.033)	(0.033)
Male*Height-for-age z-score				0.151***	0.078**	0.078**	0.084*	0.085*	0.085*
				(0.021)	(0.032)	(0.032)	(0.048)	(0.048)	(0.048)
F statistic	0.259	13.596	9.779	7.348	3.260	3.260	0.621	0.735	0.735

N. of cases	5777	5611	5611	5611	2208	2208	1009	1007	1007

Table C26. School attendance in the last 12 months, IV Fixed Effects regression.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
IQ-for-age z score	-0.022	-0.049	-0.045	-0.040	-0.015	-0.015	-0.115	-0.102	-0.102
	(0.182)	(0.196)	(0.194)	(0.261)	(0.104)	(0.104)	(0.388)	(0.317)	(0.317)
Age		0.096***	0.098***	0.098***	0.062***	0.062***	0.080	0.078	0.078
		(0.016)	(0.016)	(0.016)	(0.021)	(0.021)	(0.062)	(0.054)	(0.054)
Age2		-0.005***	-0.005***	-0.005***	-0.003***	-0.003***	-0.004	-0.004	-0.004
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)	(0.003)	(0.003)
Male (=1)			0.023	0.023	0.011	0.011	0.067	0.061	0.061
			(0.050)	(0.048)	(0.051)	(0.051)	(0.189)	(0.156)	(0.156)
Male*Age			-0.003	-0.003	-0.002	-0.002	-0.007	-0.006	-0.006
			(0.005)	(0.004)	(0.005)	(0.005)	(0.017)	(0.014)	(0.014)
Male*IQ-for-age z score				-0.006	0.020	0.020	0.064	0.060	0.060
				(0.090)	(0.058)	(0.058)	(0.137)	(0.121)	(0.121)
First Born(=1)					-0.013	-0.013	0.005	0.004	0.004
					(0.017)	(0.017)	(0.046)	(0.039)	(0.039)
Parental health assesment (Base: "Very good"=1)									
Good					0.002	0.002	0.002	0.001	0.001
					(0.016)	(0.016)	(0.029)	(0.028)	(0.028)
Regular					-0.009	-0.009	0.022	0.021	0.021
					(0.018)	(0.018)	(0.065)	(0.057)	(0.057)
Bad					-0.090	-0.090	0.044	0.040	0.040
					(0.090)	(0.090)	(0.127)	(0.106)	(0.106)
Very bad					0.000	0.000	0.000	0.000	0.000
					(.)	(.)	(.)	(.)	(.)
Disability (=1)					-0.208	-0.208	0.005	0.008	0.008
					(0.127)	(0.127)	(0.083)	(0.071)	(0.071)
Visible illness (=1)					-0.011	-0.011	-0.047	-0.043	-0.043
					(0.037)	(0.037)	(0.129)	(0.107)	(0.107)
Income quantile: Q2						0.000	0.000	0.000	0.000
						(.)	(.)	(.)	(.)
Income quantile: Q3						0.000	0.000	0.000	0.000
						(.)	(.)	(.)	(.)
Income quantile: Q4						0.000	0.000	0.000	0.000
						(.)	(.)	(.)	(.)
Mother's education (years)							0.000	-0.000	-0.000
							(0.025)	(0.023)	(0.023)
Father's education (years)							0.000	0.000	0.000
							(.)	(.)	(.)
Mother works (=1)								0.000	0.000
								(.)	(.)
Household size									0.000
									(.)
Proportion of male children									0.000
									(.)
Region 2									0.000
									(.)
Region 3									0.000
									(.)
Region 4									0.000
									(.)
2005									0.000
									(.)
2009									0.000
									(.)
Instruments for IQ-for-age z score:									
Height-for-age z-score	0.019	0.018	0.018	-0.005	-0.047	-0.047	-0.023	-0.028	-0.028
	(0.016)	(0.016)	(0.016)	(0.020)	(0.033)	(0.033)	(0.047)	(0.047)	(0.047)
Male*Height-for-age z-score				0.047**	0.017	0.017	0.033	0.035	0.035
				(0.022)	(0.037)	(0.037)	(0.053)	(0.053)	(0.053)
*Instruments for Male*IQ-for-age z score:*									
Height-for-age z-score				-0.059***	-0.029	-0.029	-0.018	-0.020	-0.020
				(0.014)	(0.023)	(0.023)	(0.033)	(0.033)	(0.033)
Male*Height-for-age z-score				0.150***	0.076**	0.076**	0.085*	0.087*	0.087*
				(0.021)	(0.032)	(0.032)	(0.048)	(0.048)	(0.048)
F statistic	0.014	14.033	8.814	7.497	1.318	1.318	0.466	0.492	0.492
N. of cases	5772	5606	5606	5606	2205	2205	1008	1006	1006

Table C27. Participation in housework in the last 12 months, IV Fixed Effects regression.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
IQ-for-age z score	0.600	0.658	0.735	1.149	-0.356	-0.356	-1.567	-1.273	-1.273
	(0.687)	(0.753)	(0.792)	(1.351)	(0.440)	(0.440)	(3.553)	(2.523)	(2.523)
Age		0.169***	0.174***	0.179***	0.219**	0.219**	0.409	0.368	0.368
		(0.051)	(0.054)	(0.064)	(0.086)	(0.086)	(0.553)	(0.407)	(0.407)
Age2		-0.006**	-0.006*	-0.006	-0.007	-0.007	-0.018	-0.016	-0.016
		(0.003)	(0.003)	(0.003)	(0.005)	(0.005)	(0.029)	(0.021)	(0.021)
Male (=1)			-0.031	-0.019	0.287	0.287	0.784	0.640	0.640
			(0.187)	(0.218)	(0.236)	(0.236)	(1.818)	(1.304)	(1.304)
Male*Age			-0.027	-0.033*	-0.054**	-0.054**	-0.093	-0.081	-0.081
			(0.018)	(0.017)	(0.023)	(0.023)	(0.161)	(0.117)	(0.117)
Male*IQ-for-age z score				-0.522	-0.285	-0.285	0.383	0.303	0.303
				(0.509)	(0.346)	(0.346)	(1.291)	(1.019)	(1.019)
First Born(=1)					0.005	0.005	0.154	0.126	0.126
					(0.078)	(0.078)	(0.408)	(0.299)	(0.299)
Parental health assesment (Base: "Very good"=1)									
Good					0.029	0.029	0.105	0.096	0.096
					(0.071)	(0.071)	(0.198)	(0.160)	(0.160)
Regular					0.060	0.060	0.327	0.294	0.294
					(0.085)	(0.085)	(0.586)	(0.443)	(0.443)
Bad					0.136	0.136	0.575	0.485	0.485
					(0.189)	(0.189)	(1.223)	(0.902)	(0.902)
Very bad					0.000	0.000	0.000	0.000	0.000
					(.)	(.)	(.)	(.)	(.)
Disability (=1)					-0.145	-0.145	-0.398	-0.345	-0.345
					(0.305)	(0.305)	(0.933)	(0.740)	(0.740)
Visible illness (=1)					-0.230	-0.230	-0.497	-0.405	-0.405
					(0.195)	(0.195)	(1.242)	(0.914)	(0.914)
Income quantile: Q2						0.000	0.000	0.000	0.000
						(.)	(.)	(.)	(.)
Income quantile: Q3						0.000	0.000	0.000	0.000
						(.)	(.)	(.)	(.)
Income quantile: Q4						0.000	0.000	0.000	0.000
						(.)	(.)	(.)	(.)
Mother's education (years)							0.016	0.003	0.003
							(0.272)	(0.213)	(0.213)
Father's education (years)							0.000	0.000	0.000
							(.)	(.)	(.)
Mother works (=1)								0.000	0.000
								(.)	(.)
Household size									0.000
									(.)
Proportion of male children									0.000
									(.)
Region 2									0.000
									(.)
Region 3									0.000
									(.)
Region 4									0.000
									(.)
2005									0.000
									(.)
2009									0.000
									(.)
Instruments for IQ-for-age z score:									
Height-for-age z-score	0.019	0.018	0.018	-0.005	-0.049	-0.049	-0.024	-0.028	-0.028
	(0.016)	(0.016)	(0.016)	(0.020)	(0.033)	(0.033)	(0.047)	(0.048)	(0.048)
Male*Height-for-age z-score				0.048**	0.020	0.020	0.032	0.033	0.033
				(0.022)	(0.037)	(0.037)	(0.053)	(0.053)	(0.053)
*Instruments for Male*IQ-for-age z score:*									
Height-for-age z-score				-0.060***	-0.031	-0.031	-0.018	-0.021	-0.021
				(0.014)	(0.023)	(0.023)	(0.033)	(0.033)	(0.033)
Male*Height-for-age z-score				0.151***	0.078**	0.078**	0.084*	0.085*	0.085*
				(0.021)	(0.032)	(0.032)	(0.048)	(0.048)	(0.048)
F statistic	0.765	41.712	44.910	23.547	10.244	10.244	5.558	7.739	7.739
N. of cases	5775	5609	5609	5609	2208	2208	1009	1007	1007

Table C28. Average number of hours per week spent at work, IV Fixed Effects regression.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
IQ-for-age z score	-4.110	-0.305	-0.992	-0.545	3.989	3.989	-13.189	-10.108	-10.108
	(8.043)	(7.949)	(7.890)	(10.107)	(4.159)	(4.159)	(45.202)	(29.791)	(29.791)
Age		-1.108**	-1.393***	-1.388***	-1.731*	-1.731*	0.634	0.183	0.183
		(0.485)	(0.507)	(0.504)	(0.987)	(0.987)	(6.890)	(4.642)	(4.642)
Age2		0.086***	0.087***	0.087***	0.098*	0.098*	-0.019	0.005	0.005
		(0.028)	(0.028)	(0.028)	(0.056)	(0.056)	(0.352)	(0.237)	(0.237)
Male (=1)			-4.107**	-4.089**	-5.329**	-5.329**	5.526	3.972	3.972
			(1.862)	(1.788)	(2.380)	(2.380)	(23.025)	(15.202)	(15.202)
Male*Age			0.539***	0.531***	0.639***	0.639***	-0.234	-0.105	-0.105
			(0.182)	(0.156)	(0.236)	(0.236)	(1.984)	(1.327)	(1.327)
Male*IQ-for-age z score				-0.589	0.210	0.210	-1.664	-2.091	-2.091
				(3.149)	(3.382)	(3.382)	(12.207)	(9.889)	(9.889)
First Born(=1)					-0.475	-0.475	1.689	1.376	1.376
					(0.894)	(0.894)	(5.045)	(3.427)	(3.427)
Parental health assesment (Base: "Very good"=1)									
Good					-0.890	-0.890	-0.576	-0.677	-0.677
					(1.027)	(1.027)	(2.221)	(1.705)	(1.705)
Regular					-1.125	-1.125	1.640	1.165	1.165
					(1.163)	(1.163)	(8.569)	(5.947)	(5.947)
Bad					-3.152	-3.152	2.969	1.988	1.988
					(2.246)	(2.246)	(15.315)	(10.371)	(10.371)
Very bad					0.000	0.000	0.000	0.000	0.000
					(.)	(.)	(.)	(.)	(.)
Disability (=1)					-0.570	-0.570	-1.348	-0.552	-0.552
					(3.004)	(3.004)	(13.326)	(9.413)	(9.413)
Visible illness (=1)					5.550	5.550	2.835	3.858	3.858
					(3.932)	(3.932)	(16.532)	(11.790)	(11.790)
Income quantile: Q2						0.000	0.000	0.000	0.000
						(.)	(.)	(.)	(.)
Income quantile: Q3						0.000	0.000	0.000	0.000
						(.)	(.)	(.)	(.)
Income quantile: Q4						0.000	0.000	0.000	0.000
						(.)	(.)	(.)	(.)
Mother's education (years)							1.959	1.715	1.715
							(4.137)	(2.852)	(2.852)
Father's education (years)							0.000	0.000	0.000
							(.)	(.)	(.)
Mother works (=1)								0.000	0.000
								(.)	(.)
Household size									0.000
									(.)
Proportion of male children									0.000
									(.)
Region 2									0.000
									(.)
Region 3									0.000
									(.)
Region 4									0.000
									(.)
2005									0.000
									(.)
2009									0.000
									(.)
Instruments for IQ-for-age z score:									
Height-for-age z-score	0.019	0.018	0.018	-0.005	-0.046	-0.046	-0.018	-0.022	-0.022
	(0.016)	(0.016)	(0.016)	(0.020)	(0.033)	(0.033)	(0.047)	(0.047)	(0.047)
Male*Height-for-age z-score				0.046**	0.013	0.013	0.018	0.020	0.020
				(0.022)	(0.037)	(0.037)	(0.053)	(0.053)	(0.053)
*Instruments for Male*IQ-for-age z score:*									
Height-for-age z-score				-0.060***	-0.032	-0.032	-0.021	-0.023	-0.023
				(0.014)	(0.023)	(0.023)	(0.034)	(0.034)	(0.034)
Male*Height-for-age z-score				0.151***	0.076**	0.076**	0.079	0.080*	0.080*
				(0.021)	(0.033)	(0.033)	(0.049)	(0.049)	(0.049)
F statistic	0.261	16.788	10.987	9.219	1.998	1.998	0.471	0.575	0.575
N. of cases	5745	5579	5579	5579	2190	2190	1002	1000	1000

Table C29. Average number of hours per week spent at school, IV Fixed Effects regression.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
IQ-for-age z score	-9.586	-3.410	-3.152	-3.141	3.017	3.017	2.672	0.562	0.562
	(16.250)	(9.184)	(8.926)	(12.879)	(4.555)	(4.555)	(29.952)	(18.508)	(18.508)
Age		4.428***	4.522***	4.521***	1.967	1.967	1.406	1.766	1.766
		(0.870)	(0.881)	(1.031)	(1.275)	(1.275)	(5.452)	(3.547)	(3.547)
Age2		-0.206***	-0.206***	-0.206***	-0.071	-0.071	-0.042	-0.058	-0.058
		(0.045)	(0.044)	(0.051)	(0.067)	(0.067)	(0.253)	(0.168)	(0.168)
Male (=1)			1.667	1.667	-0.917	-0.917	0.435	1.362	1.362
			(1.687)	(1.779)	(2.003)	(2.003)	(13.125)	(8.189)	(8.189)
Male*Age			-0.209	-0.209	0.047	0.047	-0.069	-0.153	-0.153
			(0.170)	(0.159)	(0.207)	(0.207)	(1.221)	(0.770)	(0.770)
Male*IQ-for-age z score				-0.010	-0.750	-0.750	-1.098	-0.328	-0.328
				(4.064)	(2.109)	(2.109)	(10.876)	(6.963)	(6.963)
First Born(=1)					-0.662	-0.662	-0.506	-0.399	-0.399
					(0.692)	(0.692)	(1.733)	(1.186)	(1.186)
Parental health assesment (Base: "Very good"=1)									
Good					0.849	0.849	-0.080	-0.043	-0.043
					(0.817)	(0.817)	(1.340)	(1.225)	(1.225)
Regular					0.706	0.706	-0.203	0.038	0.038
					(0.913)	(0.913)	(4.390)	(3.097)	(3.097)
Bad					-1.692	-1.692	-0.637	-0.249	-0.249
					(3.486)	(3.486)	(6.744)	(4.867)	(4.867)
Very bad					0.000	0.000	0.000	0.000	0.000
					(.)	(.)	(.)	(.)	(.)
Disability (=1)					-6.529	-6.529	-0.987	-1.295	-1.295
					(4.738)	(4.738)	(4.692)	(2.921)	(2.921)
Visible illness (=1)					-0.441	-0.441	-0.472	-1.248	-1.248
					(1.767)	(1.767)	(11.339)	(7.097)	(7.097)
Income quantile: Q2						0.000	0.000	0.000	0.000
						(.)	(.)	(.)	(.)
Income quantile: Q3						0.000	0.000	0.000	0.000
						(.)	(.)	(.)	(.)
Income quantile: Q4						0.000	0.000	0.000	0.000
						(.)	(.)	(.)	(.)
Mother's education (years)							0.000	0.000	0.000
							(.)	(.)	(.)
Father's education (years)							0.000	0.000	0.000
							(.)	(.)	(.)
Mother works (=1)								0.000	0.000
								(.)	(.)
Household size									0.000
									(.)
Proportion of male children									0.000
									(.)
Region 2									0.000
									(.)
Region 3									0.000
									(.)
Region 4									0.000
									(.)
2005									0.000
									(.)
2009									0.000
									(.)
Instruments for IQ-for-age z score:									
Height-for-age z-score	0.013	0.015	0.015	-0.008	-0.057	-0.057	-0.015	-0.021	-0.021
	(0.017)	(0.018)	(0.018)	(0.022)	(0.037)	(0.037)	(0.051)	(0.051)	(0.051)
Male*Height-for-age z-score				0.047*	0.041	0.041	0.049	0.051	0.051
				(0.024)	(0.042)	(0.042)	(0.058)	(0.058)	(0.058)
*Instruments for Male*IQ-for-age z score:*									
Height-for-age z-score				-0.065***	-0.037	-0.037	-0.018	-0.022	-0.022
				(0.015)	(0.026)	(0.026)	(0.037)	(0.037)	(0.037)
Male*Height-for-age z-score				0.164***	0.116***	0.116***	0.123**	0.125**	0.125**
				(0.023)	(0.037)	(0.037)	(0.054)	(0.054)	(0.054)
F statistic	0.348	32.052	20.288	17.025	4.838	4.838	2.737	2.981	2.981
N. of cases	4868	4719	4719	4719	1822	1822	834	832	832

Table C30. Average number of hours per week spent doing housework, IV Fixed Effects regression.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
IQ-for-age z score	2.268	3.495	4.381	6.803	-3.103	-3.103	-4.000	-3.135	-3.135
	(5.019)	(5.642)	(5.956)	(9.317)	(3.769)	(3.769)	(14.622)	(12.279)	(12.279)
Age		0.061	0.313	0.344	-0.143	-0.143	-0.764	-0.880	-0.880
		(0.381)	(0.408)	(0.456)	(0.681)	(0.681)	(2.175)	(1.836)	(1.836)
Age2		0.029	0.030	0.030	0.048	0.048	0.084	0.090	0.090
		(0.021)	(0.022)	(0.025)	(0.038)	(0.038)	(0.114)	(0.096)	(0.096)
Male (=1)			3.054**	3.122**	4.129**	4.129**	4.361	3.940	3.940
			(1.360)	(1.480)	(2.097)	(2.097)	(7.727)	(6.575)	(6.575)
Male*Age			-0.573***	-0.613***	-0.642***	-0.642***	-0.682	-0.647	-0.647
			(0.129)	(0.121)	(0.209)	(0.209)	(0.708)	(0.614)	(0.614)
Male*IQ-for-age z score				-3.054	-0.171	-0.171	3.837	3.616	3.616
				(3.448)	(2.711)	(2.711)	(5.704)	(5.327)	(5.327)
First Born(=1)					0.617	0.617	0.413	0.326	0.326
					(0.685)	(0.685)	(1.744)	(1.499)	(1.499)
Parental health assesment (Base: "Very good"=1)									
Good					-0.790	-0.790	-0.803	-0.829	-0.829
					(0.754)	(0.754)	(1.128)	(1.084)	(1.084)
Regular					-0.409	-0.409	-0.361	-0.463	-0.463
					(0.774)	(0.774)	(2.458)	(2.158)	(2.158)
Bad					-0.828	-0.828	-0.809	-1.076	-1.076
					(1.392)	(1.392)	(4.680)	(3.926)	(3.926)
Very bad					0.000	0.000	0.000	0.000	0.000
					(.)	(.)	(.)	(.)	(.)
Disability (=1)					-1.978	-1.978	0.560	0.726	0.726
					(1.824)	(1.824)	(3.531)	(3.061)	(3.061)
Visible illness (=1)					0.224	0.224	0.386	0.658	0.658
					(1.452)	(1.452)	(5.086)	(4.319)	(4.319)
Income quantile: Q2						0.000	0.000	0.000	0.000
						(.)	(.)	(.)	(.)
Income quantile: Q3						0.000	0.000	0.000	0.000
						(.)	(.)	(.)	(.)
Income quantile: Q4						0.000	0.000	0.000	0.000
						(.)	(.)	(.)	(.)
Mother's education (years)							-0.991	-1.032	-1.032
							(1.150)	(1.028)	(1.028)
Father's education (years)							0.000	0.000	0.000
							(.)	(.)	(.)
Mother works (=1)								0.000	0.000
								(.)	(.)
Household size									0.000
									(.)
Proportion of male children									0.000
									(.)
Region 2									0.000
									(.)
Region 3									0.000
									(.)
Region 4									0.000
									(.)
2005									0.000
									(.)
2009									0.000
									(.)
Instruments for IQ-for-age z score:									
Height-for-age z-score	0.019	0.018	0.018	-0.005	-0.049	-0.049	-0.025	-0.029	-0.029
	(0.016)	(0.016)	(0.016)	(0.020)	(0.033)	(0.033)	(0.047)	(0.048)	(0.048)
Male*Height-for-age z-score				0.048**	0.020	0.020	0.030	0.032	0.032
				(0.022)	(0.037)	(0.037)	(0.053)	(0.053)	(0.053)
*Instruments for Male*IQ-for-age z score:*									
Height-for-age z-score				-0.060***	-0.031	-0.031	-0.019	-0.022	-0.022
				(0.014)	(0.023)	(0.023)	(0.033)	(0.033)	(0.033)
Male*Height-for-age z-score				0.151***	0.077**	0.077**	0.083*	0.084*	0.084*
				(0.021)	(0.032)	(0.032)	(0.048)	(0.048)	(0.048)
F statistic	0.204	57.843	59.516	36.240	12.975	12.975	12.735	14.155	14.155
N. of cases	5771	5605	5605	5605	2206	2206	1007	1005	1005

Table C31: Instrumental variables analysis with household fixed effects for children's participation and number of hours spent on each activity (intrahousehold variation at any fixed point in time)

				Controls				
					(I)	(II)	(III)	(IV)
				None	Child's characteristics	(I) + Family Income	(II) + Parental education/work status	(III) + Other controls
Participation	Work	IQ z-score		0.104	-0.031	-0.031	-0.442	-0.442
		IQ z-score*Male(=1)			-0.035	-0.035	0.059	0.059
		F statistic		0.259	3.260	3.260	0.735	0.735
		N. of cases		5777	2208	2208	1007	1007
		Instruments for IQ z-score	Height z-score	0.019	-0.049	-0.049	-0.028	-0.028
			Height z-score*Male		0.020	0.020	0.033	0.033
		Instruments for IQ z-score*Male	Height z-score		-0.031	-0.031	-0.021	-0.021
			Height z-score*Male		0.078**	0.078**	0.085*	0.085*
	School	IQ z-score		-0.022	-0.015	-0.015	-0.102	-0.102
		IQ z-score*Male(=1)			0.020	0.020	0.060	0.060
		F statistic		0.014	1.318	1.318	0.492	0.492
		N. of cases		5772	2205	2205	1006	1006
		Instruments for IQ z-score	Height z-score	0.019	-0.047	-0.047	-0.028	-0.028
			Height z-score*Male		0.017	0.017	0.035	0.035
		Instruments for IQ z-score*Male	Height z-score		-0.029	-0.029	-0.020	-0.020
			Height z-score*Male		0.076**	0.076**	0.087*	0.087*
	Housework	IQ z-score		0.600	-0.356	-0.356	-1.273	-1.273
		IQ z-score*Male(=1)			-0.285	-0.285	0.303	0.303
		F statistic		0.765	10.244	10.244	7.739	7.739
		N. of cases		5775	2208	2208	1007	1007
		Instruments for IQ z-score	Height z-score	0.019	-0.049	-0.049	-0.028	-0.028
			Height z-score*Male		0.020	0.020	0.033	0.033
		Instruments for IQ z-score*Male	Height z-score		-0.031	-0.031	-0.021	-0.021
			Height z-score*Male		0.078**	0.078**	0.085*	0.085*
Number of hours	Work	IQ z-score		-4.110	3.989	3.989	-10.108	-10.108
		IQ z-score*Male(=1)			0.210	0.210	-2.091	-2.091
		F statistic		0.261	1.998	1.998	0.575	0.575
		N. of cases		5745	2190	2190	1000	1000
		Instruments for IQ z-score	Height z-score	0.019	-0.046	-0.046	-0.022	-0.022
			Height z-score*Male		0.013	0.013	0.020	0.020
		Instruments for IQ z-score*Male	Height z-score		-0.032	-0.032	-0.023	-0.023
			Height z-score*Male		0.076**	0.076**	0.080*	0.080*
	School	IQ z-score		-9.586	3.017	3.017	0.562	0.562
		IQ z-score*Male(=1)			-0.750	-0.750	-0.328	-0.328
		F statistic		0.348	4.838	4.838	2.981	2.981
		N. of cases		4868	1822	1822	832	832
		Instruments for IQ z-score	Height z-score	0.013	-0.057	-0.057	-0.021	-0.021
			Height z-score*Male		0.041	0.041	0.051	0.051
		Instruments for IQ z-score*Male	Height z-score		-0.037	-0.037	-0.022	-0.022
			Height z-score*Male		0.116***	0.116***	0.125**	0.125**
	Housework	IQ z-score		2.268	-3.103	-3.103	-3.135	-3.135
		IQ z-score*Male(=1)			-0.171	-0.171	3.616	3.616
		F statistic		0.204	12.975	12.975	14.155	14.155
		N. of cases		5771	2206	2206	1005	1005
		Instruments for IQ z-score	Height z-score	0.019	-0.049	-0.049	-0.029	-0.029
			Height z-score*Male		0.020	0.020	0.032	0.032
		Instruments for IQ z-score*Male	Height z-score		-0.031	-0.031	-0.022	-0.022
			Height z-score*Male		0.077**	0.077**	0.084*	0.084*

Note: MxFLS 2002,2005-2006, and 2009-2012. The stars in the estimated coefficients indicate their significance (***$p<0.01$, ** $p<0.05$, * $p<0.10$), using clustered standard errors by household. Child's characteristics in column (I) include: age, gender, birth order and health and disability status. Other controls in column (IV) include household size, proportion of male children, as well as region and time fixed effects.

APPENDIX D: Robustness Checks

Section I. Robustness checks for Chapter 2

a. Whole set of results done separately by age group (Group 1: 0-5 years old, Group 2: 6-19 years old):

AGES 0-5

Table 2.2 (a) . Baseline model, OLS estimation (Ages 0-5 years old)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
BMI z-score mother	0.188***		0.166***	0.170***	0.171***	0.180***	0.200***	0.198***
	(0.023)		(0.023)	(0.023)	(0.023)	(0.024)	(0.025)	(0.026)
BMI z-score father		0.154***	0.119***	0.120***	0.127***	0.132***	0.147***	0.147***
		(0.025)	(0.024)	(0.024)	(0.024)	(0.024)	(0.027)	(0.027)
Child's gender: Male				0.137***	0.125	0.128	0.083	0.108
				(0.045)	(0.115)	(0.115)	(0.130)	(0.129)
Child´s age				-0.074***	-0.594***	-0.589***	-0.669***	-0.723***
				(0.017)	(0.077)	(0.077)	(0.086)	(0.087)
Child's age squared					0.088***	0.089***	0.101***	0.110***
					(0.012)	(0.012)	(0.013)	(0.013)
Gender (Male)*age					0.002	0.000	0.006	-0.001
					(0.032)	(0.032)	(0.037)	(0.037)
Mother´s age						-0.004	-0.006	-0.005
						(0.006)	(0.006)	(0.006)
Father´s age						-0.005	-0.005	-0.006
						(0.005)	(0.005)	(0.005)
Constant	0.143***	0.214***	0.025	0.180**	0.752***	0.991***	-0.004	0.219
	(0.041)	(0.039)	(0.048)	(0.077)	(0.128)	(0.163)	(1.583)	(1.636)
Household socioeconomic level							Y	Y
Region*time interactions								Y
R-squared	0.027	0.016	0.036	0.046	0.066	0.068	0.090	0.099
N. of cases	3066	3066	3066	3066	3066	3066	2476	2476
Clusters (Households)	1909	1909	1909	1909	1909	1909	1604	1604

AGES 6-19

Table 2.2 (b) . Baseline model, OLS estimation (Ages 6-19 years old)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
BMI z-score mother	0.290***		0.252***	0.263***	0.263***	0.266***	0.273***	0.274***
	(0.016)		(0.016)	(0.016)	(0.016)	(0.016)	(0.018)	(0.018)
BMI z-score father		0.282***	0.239***	0.243***	0.244***	0.241***	0.239***	0.236***
		(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.018)	(0.018)
Child's gender: Male				0.034	0.198**	0.199**	0.262***	0.267***
				(0.028)	(0.080)	(0.080)	(0.089)	(0.089)
Child´s age				-0.026***	0.100***	0.105***	0.109***	0.111***
				(0.003)	(0.019)	(0.019)	(0.021)	(0.021)
Child's age squared					-0.005***	-0.005***	-0.005***	-0.005***
					(0.001)	(0.001)	(0.001)	(0.001)
Gender (Male)*age					-0.013**	-0.013**	-0.017**	-0.017***
					(0.006)	(0.006)	(0.007)	(0.007)
Mother´s age						-0.000	0.000	0.000
						(0.004)	(0.004)	(0.004)
Father´s age						-0.005*	-0.006*	-0.006*
						(0.003)	(0.003)	(0.003)
Constant	0.099***	0.187***	-0.188***	0.088*	-0.662***	-0.503***	-0.309	-0.358
	(0.032)	(0.028)	(0.035)	(0.051)	(0.121)	(0.144)	(0.387)	(0.386)
Household socioeconomic level							Y	Y
Region*time interactions								Y
R-squared	0.062	0.055	0.101	0.108	0.111	0.112	0.130	0.132
N. of cases	11103	11103	11103	11103.000	11103.000	11100.000	8589.000	8589.000
Clusters (Households)	3474	3474	3474	3474	3474	3474	2862	2862

Note: MxFLS 2002,2005-2006, and 2009-2012. The stars in the estimated coefficients indicate their significance (*** p<0.01, ** p<0.05, * p<0.10), clustered standard errors by household in parenthesis. Household socioeconomic level includes the quantile of the household's income, size of the household, bedrooms per capita, father's occupation and mother's level of education.

AGES 0 TO 5

Table 2.3 (a): Intergenerational transmission of the BMI, fixed effects estimation (Ages: 0 to 5 years old)

	(a) Household Fixed Effects			(b) Individual Fixed Effects		
	(1)	(2)	(3)	(4)	(5)	(6)
BMI z-score mother	0.125	0.036	0.040	-0.007	-0.068	-0.080
	(0.090)	(0.103)	(0.104)	(0.168)	(0.197)	(0.211)
BMI z-score father	0.029	0.038	0.035	0.028	0.025	0.035
	(0.065)	(0.079)	(0.078)	(0.116)	(0.178)	(0.191)
Child's gender: Male	-0.068	-0.118	-0.138			
	(0.150)	(0.167)	(0.167)			
Child´s age	-0.739***	-0.888***	-0.930***	-0.919***	-1.018***	-1.011***
	(0.101)	(0.115)	(0.120)	(0.171)	(0.186)	(0.193)
Child's age squared	0.111***	0.138***	0.144***	0.149***	0.186***	0.179***
	(0.016)	(0.018)	(0.018)	(0.029)	(0.032)	(0.034)
Gender (Male)*age	0.035	0.022	0.025	0.081	0.056	0.048
	(0.042)	(0.047)	(0.047)	(0.055)	(0.061)	(0.060)
Mother´s age	0.048*	0.026	0.026	0.020	-0.017	-0.059
	(0.029)	(0.038)	(0.038)	(0.086)	(0.110)	(0.113)
Father´s age	-0.044	-0.039	-0.045	-0.083	-0.174**	-0.243***
	(0.029)	(0.035)	(0.034)	(0.087)	(0.078)	(0.074)
Constant	1.184***	1.959***	2.727***	3.554*	7.026*	11.492***
	(0.342)	(0.525)	(0.880)	(2.074)	(3.590)	(4.272)
Household socioeconomic level		Y	Y		Y	Y
Region*time interactions			Y			Y
R-squared	0.065	0.099	0.108	0.136	0.249	0.270
N. of cases	3066	2476	2476	3066	2476	2476
N. of groups	1909	1604	1604	2771	2266	2266
Clusters (Households)	1909	1604	1604	1909	1604	1604

Note: MxFLS 2002,2005-2006, and 2009-2012. The stars in the estimated coefficients indicate their significance (*** p<0.01, ** p<0.05, * p<0.10), clustered standard errors by household in parenthesis. Household socioeconomic level includes the quantile of the household's income, size of the household, bedrooms per capita, father's occupation and mother's level of education.

AGES 6-19

Table 2.3 (b): Intergenerational transmission of the BMI, fixed effects estimation (Ages: 6 to 19 years old)

	(a) Household Fixed Effects			(b) Individual Fixed Effects		
	(1)	(2)	(3)	(4)	(5)	(6)
BMI z-score mother	0.082**	0.070*	0.067	0.080**	0.081*	0.081*
	(0.032)	(0.042)	(0.042)	(0.034)	(0.042)	(0.042)
BMI z-score father	0.108***	0.105***	0.107***	0.125***	0.105***	0.107***
	(0.030)	(0.034)	(0.034)	(0.034)	(0.037)	(0.038)
Child's gender: Male	0.293***	0.305***	0.301***			
	(0.079)	(0.088)	(0.088)			
Child´s age	0.114***	0.123***	0.122***	0.070***	0.064**	-0.017
	(0.018)	(0.021)	(0.021)	(0.025)	(0.031)	(0.035)
Child's age squared	-0.005***	-0.005***	-0.005***	-0.005***	-0.005***	-0.005***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Gender (Male)*age	-0.022***	-0.021***	-0.021***	-0.013*	-0.013*	-0.012
	(0.006)	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)
Mother´s age	0.023***	0.019**	0.011	0.044***	0.045**	0.019
	(0.007)	(0.009)	(0.010)	(0.013)	(0.018)	(0.017)
Father´s age	-0.010	-0.012	-0.015*	0.010	0.008	-0.001
	(0.007)	(0.008)	(0.009)	(0.010)	(0.013)	(0.011)
Constant	-0.776***	-0.367	-0.052	-1.772***	-0.988*	1.817**
	(0.175)	(0.301)	(0.439)	(0.445)	(0.572)	(0.861)
Household socioeconomic level		Y	Y		Y	Y
Region*time interactions			Y			Y
R-squared	0.018	0.019	0.021	0.037	0.048	0.056
N. of cases	11100	8589	8589	11100	8589	8589
N. of groups	3474	2862	2862	7546	6082	6082
Clusters (Households)	3474	2862	2862	3474	2862	2862

Note: MxFLS 2002,2005-2006, and 2009-2012. The stars in the estimated coefficients indicate their significance (*** p<0.01, ** p<0.05, * p<0.10), clustered standard errors by household in parenthesis. Household socioeconomic level includes the quantile of the household's income, size of the household, bedrooms per capita, father's occupation and mother's level of education.

AGES 0 TO 5

Table 2.4: Variation in the size of the transmission elasticity. Child's age and gender

	(1)	(2)
BMI z-score mother	0.238***	0.246***
	(0.068)	(0.063)
BMI z-score father	0.034	0.072
	(0.071)	(0.068)
Child´s age	-0.096**	-0.725***
	(0.041)	(0.092)
Child's age squared		0.109***
		(0.013)
Child's gender: Male	0.103	0.086
	(0.157)	(0.15)
Gender (Male)*Age	-0.002	-0.002
	(0.039)	(0.036)
Interaction terms:		
Gender:		
BMI z-score mother* Child's gender (male)	-0.040	-0.039
	(0.046)	(0.045)
BMI z-score father* Child's gender (male)	0.061	0.059
	(0.047)	(0.047)
Age as a continuous variable:		
BMI z-score mother * Child's age	-0.007	-0.009
	(0.018)	(0.017)
BMI z-score father * Child's age	0.024	0.015
	(0.018)	(0.017)
Mother's age and father's age	Y	Y
Household socioeconomic level	Y	Y
Region* time interaction dummies	Y	Y
R-squared	0.071	0.1
N. of cases	2476	2476
Clusters (Households)	1604	1604

Note: MxFLS 2002,2005-2006, and 2009-2012. The stars in the estimated coefficients indicate their significance (*** p<0.01, ** p<0.05, * p<0.10), clustered standard errors by household in parenthesis. Household socioeconomic level includes the quantile of the household's income, size of the household, bedrooms per capita, father's occupation and mother's level of education.

AGES 6 TO 19

Table 2.4: Variation in the size of the transmission elasticity. Child's age and gender

	(1)	(2)
BMI z-score mother	0.317***	0.293***
	(0.051)	(0.051)
BMI z-score father	0.214***	0.206***
	(0.050)	(0.050)
Child´s age	-0.012	0.109***
	(0.009)	(0.022)
Child's age squared		-0.005***
		(0.001)
Child's gender: Male	0.284***	0.280***
	(0.104)	(0.103)
Gender (Male)*Age	-0.017**	-0.017**
	(0.007)	(0.007)
Interaction terms:		
Gender:		
BMI z-score mother* Child's gender (male)	-0.034	-0.034
	(0.028)	(0.028)
BMI z-score father* Child's gender (male)	0.023	0.025
	(0.030)	(0.029)
Age as a continuous variable:		
BMI z-score mother * Child's age	-0.002	-0.000
	(0.004)	(0.004)
BMI z-score father * Child's age	0.001	0.001
	(0.004)	(0.004)
Mother's age and father's age	Y	Y
Household socioeconomic level	Y	Y
Region* time interaction dummies	Y	Y
R-squared	0.129	0.132
N. of cases	8589	8589
Clusters (Households)	2862	2862

Note: MxFLS 2002,2005-2006, and 2009-2012. The stars in the estimated coefficients indicate their significance (*** p<0.01, ** p<0.05, * p<0.10), clustered standard errors by household in parenthesis. Household socioeconomic level includes the quantile of the household's income, size of the household, bedrooms per capita, father's occupation and mother's level of education.

AGES 0 TO 5

Table 2.5: Variation in the size of the parental transmission. Quantile of Household Income

	(1)	(2)	(3)
BMI z-score mother	0.142**	0.198***	0.145**
	(0.058)	(0.026)	(0.058)
BMI z-score father	0.147***	0.118**	0.132**
	(0.027)	(0.052)	(0.052)
Quantile of Household Income			
2nd Quantile	-0.109	-0.141	-0.134
	(0.136)	(0.112)	(0.152)
3rd Quantile	-0.312**	-0.175	-0.278*
	(0.130)	(0.117)	(0.148)
4th Quantile	-0.303**	-0.249**	-0.374**
	(0.133)	(0.110)	(0.146)
Interaction terms:			
BMI z-score mother * 2nd Quantile	0.001		-0.003
	(0.075)		(0.075)
BMI z-score mother * 3rd Quantile	0.083		0.089
	(0.069)		(0.070)
BMI z-score mother *4th Quantile	0.121*		0.110
	(0.072)		(0.073)
BMI z-score father * 2nd Quantile		0.032	0.025
		(0.073)	(0.073)
BMI z-score father * 3rd Quantile		-0.012	-0.033
		(0.074)	(0.074)
BMI z-score father *4th Quantile		0.089	0.065
		(0.067)	(0.067)
Child's age child's age squared, mother's age and father's age	Y	Y	Y
Household socioeconomic level	Y	Y	Y
Region*time interaction dummies	Y	Y	Y
Constant and WHO 2007 reference dummy	Y	Y	Y
R-squared	0.101	0.1	0.102
N. of cases	2476	2476	2476
Clusters (Households)	1604	1604	1604

Note: MxFLS 2002,2005-2006, and 2009-2012. The stars in the estimated coefficients indicate their significance (*** p<0.01, ** p<0.05, * p<0.10), clustered standard errors by household in parenthesis. Household socioeconomic level includes: size of the household, bedrooms per capita, father's occupation and mother's level of education.

AGES 6 TO 19

Table 2.5: Variation in the size of the parental transmission. Quantile of Household Income

	(1)	(2)	(3)
BMI z-score mother	0.299***	0.274***	0.303***
	(0.034)	(0.018)	(0.034)
BMI z-score father	0.236***	0.209***	0.204***
	(0.018)	(0.036)	(0.036)
Quantile of Household Income			
2nd Quantile	0.086	0.029	0.096
	(0.090)	(0.079)	(0.104)
3rd Quantile	0.074	-0.013	0.025
	(0.084)	(0.081)	(0.102)
4th Quantile	0.178**	0.011	0.072
	(0.090)	(0.084)	(0.106)
Interaction terms:			
BMI z-score mother * 2nd Quantile	-0.046		-0.045
	(0.047)		(0.047)
BMI z-score mother * 3rd Quantile	-0.021		-0.026
	(0.042)		(0.042)

BMI z-score mother *4th Quantile	-0.030		-0.041
	(0.044)		(0.045)
BMI z-score father * 2nd Quantile		-0.019	-0.011
		(0.047)	(0.047)
BMI z-score father * 3rd Quantile		0.033	0.038
		(0.045)	(0.046)
BMI z-score father *4th Quantile		0.071	0.078*
		(0.045)	(0.045)
Child's age child's age squared, mother's age and father's age	Y	Y	Y
Household socioeconomic level	Y	Y	Y
Region*time interaction dummies	Y	Y	Y
Constant and WHO 2007 reference dummy	Y	Y	Y
R-squared	0.132	0.132	0.133
N. of cases	8589	8589	8589
Clusters (Households)	2862	2862	2862

Note: MxFLS 2002,2005-2006, and 2009-2012. The stars in the estimated coefficients indicate their significance (*** p<0.01, ** p<0.05, * p<0.10), clustered standard errors by household in parenthesis. Household socioeconomic level includes: size of the household, bedrooms per capita, father's occupation and mother's level of education.

AGES 0 TO 5

Table 2.6: Variation in the size of the parental transmission. Mother's education and work status

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
BMI z-score mother	0.196***	0.300***	0.193***	0.196***	0.191***	0.301***	0.307***
	(0.026)	(0.082)	(0.025)	(0.028)	(0.028)	(0.083)	(0.086)
BMI z-score father	0.144***	0.144***	0.130***	0.130***	0.152***	0.141***	0.127**
	(0.027)	(0.027)	(0.026)	(0.026)	(0.028)	(0.027)	(0.062)
Mother's education (Base category: High school):							
Less than high school	-0.157*	0.005				0.008	-0.033
	(0.085)	(0.144)				(0.143)	(0.152)
More than high school	0.092	0.318				0.303	0.236
	(0.138)	(0.207)				(0.206)	(0.275)
Mother's work status:							
Mother works			0.167**	0.186	0.332**	0.133	0.285**
			(0.065)	(0.115)	(0.132)	(0.117)	(0.139)
Interaction terms : Mother's education							
BMI z-score mother * Less than high school		-0.115				-0.115	-0.124
		(0.086)				(0.085)	(0.088)
BMI z-score mother * More than high school		-0.175				-0.182	-0.194
		(0.127)				(0.127)	(0.128)
BMI z-score father * Less than high school							0.042
							(0.067)
BMI z-score father * More than high school							0.069
							(0.139)
Interaction terms : Mother's work status							
BMI z-score mother * Mother works				-0.014	0.003	-0.005	0.007
				(0.061)	(0.062)	(0.063)	(0.063)
BMI z-score father * Mother works					-0.124**		-0.119*
					(0.061)		(0.063)
Child's age and age squared, mother's age and father's age,	Y	Y	Y	Y	Y	Y	Y
Household socioeconomic level	Y	Y	Y	Y	Y	Y	Y
Region*time interaction dummies	Y	Y	Y	Y	Y	Y	Y
Constant and WHO 2007 reference dummy	Y	Y	Y	Y	Y	Y	Y
R-squared	0.095	0.097	0.09	0.09	0.092	0.098	0.1
N. of cases	2476	2476	2633	2633	2633	2474	2474
Clusters (Households)	1604	1604	1681	1681	1681	1602	1602

Note: MxFLS 2002,2005-2006, and 2009-2012. The stars in the estimated coefficients indicate their significance (*** p<0.01, ** p<0.05, * p<0.10), clustered standard errors by household in parenthesis. Household socioeconomic level includes the quantile of the household's income, size of the household, bedrooms per capita, father's occupation and mother's level of education.

AGES 6-19

Table 2.6: Variation in the size of the parental transmission. Mother's education and work status

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
BMI z-score mother	0.274***	0.269***	0.260***	0.246***	0.247***	0.250***	0.242***
	(0.018)	(0.060)	(0.017)	(0.019)	(0.019)	(0.063)	(0.062)
BMI z-score father	0.238***	0.238***	0.228***	0.228***	0.223***	0.237***	0.315***
	(0.018)	(0.018)	(0.017)	(0.017)	(0.019)	(0.018)	(0.065)
Mother's education (Base category: High school):							
Less than high school	-0.154**	-0.161				-0.169	-0.044
	(0.066)	(0.123)				(0.123)	(0.162)
More than high school	-0.171*	-0.212				-0.207	-0.058
	(0.097)	(0.181)				(0.180)	(0.230)
Mother's work status:							
Mother works			0.066*	-0.038	-0.059	-0.035	-0.039
			(0.036)	(0.070)	(0.082)	(0.073)	(0.091)
Interaction terms : Mother's education							
BMI z-score mother * Less than high school		0.004				0.013	0.024
		(0.063)				(0.063)	(0.063)
BMI z-score mother * More than high school		0.027				0.015	0.026
		(0.094)				(0.093)	(0.097)
BMI z-score father * Less than high school							-0.084
							(0.065)
BMI z-score father * More than high school							-0.096
							(0.111)
Interaction terms : Mother's work status							
BMI z-score mother * Mother works				0.060*	0.057*	0.052	0.052
				(0.034)	(0.034)	(0.036)	(0.036)
BMI z-score father * Mother works					0.017		0.007
					(0.033)		(0.037)
Child's age and age squared, mother's age and father's age,	Y	Y	Y	Y	Y	Y	Y
Household socioeconomic level	Y	Y	Y	Y	Y	Y	Y
Region*time interaction dummies	Y	Y	Y	Y	Y	Y	Y
Constant and WHO 2007 reference dummy	Y	Y	Y	Y	Y	Y	Y
R-squared	0.13	0.13	0.127	0.128	0.128	0.131	0.132
N. of cases	8589	8589	9490	9490	9490	8589	8589
Clusters (Households)	2862	2862	3081	3081	3081	2862	2862

Note: MxFLS 2002,2005-2006, and 2009-2012. The stars in the estimated coefficients indicate their significance (*** p<0.01, ** p<0.05, * p<0.10), clustered standard errors by household in parenthesis. Household socioeconomic level includes the quantile of the household's income, size of the household, bedrooms per capita, father's occupation and mother's level of education.

AGES 0 TO 5

Table 2.7: Variation in the size of the parental transmission. Size of the household

	(1)	(2)	(3)
BMI z-score mother	0.182***	0.197***	0.168**
	(0.067)	(0.026)	(0.067)
BMI z-score father	0.147***	0.257***	0.261***
	(0.027)	(0.065)	(0.066)
Size Household	0.004	0.030*	0.024
	(0.020)	(0.016)	(0.022)
Interaction terms			
BMI z-score mother * Size household	0.003		0.005
	(0.011)		(0.011)
BMI z-score father * Size household		-0.019*	-0.019*
		(0.010)	(0.010)
Child's age and age squared, mother's age and father's age,	Y	Y	Y
Household socioeconomic level	Y	Y	Y
Region*time interaction dummies	Y	Y	Y
Constant and WHO 2007 reference dummy	Y	Y	Y
R-squared	0.099	0.1	0.1
N. of cases	2476	2476	2476
Clusters (Households)	1604	1604	1604

Note: MxFLS 2002,2005-2006, and 2009-2012. The stars in the estimated coefficients indicate their significance (*** p<0.01, ** p<0.05, * p<0.10), clustered standard errors by household in parenthesis. Household socioeconomic level includes the quantile of the household's income, bedrooms per capita, father's occupation and mother's level of education.

AGES 6 TO 19

Table 2.7: Variation in the size of the parental transmission. Size of the household

	(1)	(2)	(3)
BMI z-score mother	0.240***	0.275***	0.215***
	(0.057)	(0.017)	(0.058)
BMI z-score father	0.236***	0.374***	0.386***
	(0.018)	(0.061)	(0.061)
Size Household	-0.051**	-0.003	-0.018
	(0.020)	(0.017)	(0.022)
Interaction terms			
BMI z-score mother * Size household	0.006		0.010
	(0.010)		(0.010)
BMI z-score father * Size household		-0.024**	-0.026**
		(0.010)	(0.010)
Child's age and age squared, mother's age and father's age,	Y	Y	Y
Household socioeconomic level	Y	Y	Y
Region*time interaction dummies	Y	Y	Y
Constant and WHO 2007 reference dummy	Y	Y	Y
R-squared	0.132	0.133	0.133
N. of cases	8589	8589	8589
Clusters (Households)	2862	2862	2862

Note: MxFLS 2002,2005-2006, and 2009-2012. The stars in the estimated coefficients indicate their significance (*** p<0.01, ** p<0.05, * p<0.10), clustered standard errors by household in parenthesis. Household socioeconomic level includes the quantile of the household's income, bedrooms per capita, father's occupation and mother's level of education.

b. Using Mexican sample (MxFLS) to calculate the BMI z-scores.

Table 2.2. Baseline model, OLS estimation (USING MEXICAN SAMPLE AS REFERENCE)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
BMI z-score mother	0.234***		0.204***	0.205***	0.205***	0.207***	0.210***	0.209***
	(0.013)		(0.012)	(0.012)	(0.012)	(0.012)	(0.014)	(0.014)
BMI z-score father		0.224***	0.192***	0.193***	0.193***	0.191***	0.189***	0.187***
		(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.014)	(0.014)
Child's gender: Male				-0.001	0.008	0.010	0.009	0.010
				(0.020)	(0.040)	(0.040)	(0.044)	(0.044)
Child´s age				-0.004**	0.002	0.003	0.009	0.009
				(0.002)	(0.007)	(0.007)	(0.008)	(0.008)
Child's age squared					-0.000	-0.000	-0.001	-0.001
					(0.000)	(0.000)	(0.000)	(0.000)
Gender (Male)*age					-0.001	-0.001	-0.000	-0.000
					(0.003)	(0.003)	(0.004)	(0.004)
Mother´s age						0.004	0.004	0.004
						(0.003)	(0.003)	(0.003)
Father´s age						-0.004**	-0.005*	-0.005*
						(0.002)	(0.002)	(0.002)
Constant	-0.000	0.000	-0.000	0.042*	0.017	0.041	0.030	0.045
	(0.013)	(0.013)	(0.012)	(0.024)	(0.038)	(0.064)	(0.233)	(0.235)
Household socioeconomic level							Y	Y
Region*time interactions								Y
R-squared	0.055	0.05	0.091	0.091	0.091	0.092	0.103	0.106
N. of cases	14166	14156	14153	14153	14153	14153	11056	11056
Clusters (Households)	3928	3925	3925	3925	3925	3925	3281	3281

Note: MxFLS 2002,2005-2006, and 2009-2012. The stars in the estimated coefficients indicate their significance (*** p<0.01, ** p<0.05, * p<0.10), clustered standard errors by household in parenthesis. Household socioeconomic level includes the quantile of the household's income, size of the household, bedrooms per capita, father's occupation and mother's level of education.

Table 2.3 Intergenerational transmission of the BMI, fixed effects estimation (USING MEXICAN SAMPLE AS REFERENCE).

	(a) Household Fixed Effects			(b) Individual Fixed Effects		
	(1)	(2)	(3)	(4)	(5)	(6)
BMI z-score mother	0.036	0.019	0.019	0.028	0.016	0.013
	(0.025)	(0.032)	(0.032)	(0.028)	(0.034)	(0.034)
BMI z-score father	0.084***	0.077**	0.077***	0.107***	0.091***	0.098***
	(0.025)	(0.031)	(0.030)	(0.028)	(0.032)	(0.031)
Child's gender: Male	-0.010	-0.032	-0.031			
	(0.043)	(0.047)	(0.047)			
Child´s age	0.007	0.014	0.014	-0.016	-0.011	-0.058***
	(0.008)	(0.009)	(0.009)	(0.015)	(0.019)	(0.021)
Child's age squared	-0.000	-0.001*	-0.001**	-0.001	-0.001**	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Gender (Male)*age	-0.002	0.001	0.001	0.008	0.011*	0.011*
	(0.004)	(0.004)	(0.004)	(0.005)	(0.006)	(0.006)
Mother´s age	0.016***	0.015*	0.008	0.024**	0.027*	0.010
	(0.006)	(0.008)	(0.008)	(0.011)	(0.015)	(0.016)
Father´s age	-0.007	-0.008	-0.008	0.007	0.007	-0.002
	(0.006)	(0.007)	(0.007)	(0.008)	(0.012)	(0.011)
Constant	-0.318***	-0.276	0.170	-0.971***	-0.481	1.014
	(0.110)	(0.230)	(0.307)	(0.358)	(0.479)	(0.726)
Household socioeconomic level		Y	Y		Y	Y
Region*time interactions			Y			Y
R-squared	0.005	0.006	0.01	0.014	0.018	0.026
N. of cases	14153	11056	11056	14153	11056	11056
N. of groups	3925	3281	3281	9116	7451	7451
Clusters (Households)	3925	3281	3281	3925	3281	3281

Note: MxFLS 2002,2005-2006, and 2009-2012. The stars in the estimated coefficients indicate their significance (*** p<0.01, ** p<0.05, * p<0.10), clustered standard errors by household in parenthesis. Household socioeconomic level includes the quantile of the household's income, size of the household, bedrooms per capita, father's occupation and mother's level of education.

Table 2.4: Variation in the size of the transmission elasticity. Child's age and gender (USING MEXICAN SAMPLE AS REFERENCE).

	(1)	(2)	(3)
BMI z-score mother	0.152***	0.149***	0.154***
	(0.028)	(0.028)	(0.025)
BMI z-score father	0.124***	0.124***	0.130***
	(0.024)	(0.024)	(0.023)
Child´s age	-0.025***	-0.009	
	(0.005)	(0.009)	
Child's age squared		-0.001**	
		(0.000)	
Child's gender: Male	0.049	0.052	0.018
	(0.055)	(0.055)	(0.053)
Gender (Male)*Age	0.000	0.000	
	(0.004)	(0.004)	
Child's age group: 6-11 years old			-0.220***
			(0.058)
Child's age group: 12-14 years old			-0.320***
			(0.071)
Child's age group: 15-19 years old			-0.329***
			(0.078)
Gender (Male)*Child's age group: 6-11			0.050
			(0.049)
Gender (Male)* Child's age group: 12-14			0.094*
			(0.056)
Gender (Male)*Child's age group: 15-19			0.012
			(0.055)
Interaction terms:			
Gender:			
BMI z-score mother* Child's gender (male)	-0.033	-0.033	-0.033
	(0.020)	(0.020)	(0.020)
BMI z-score father* Child's gender (male)	0.004	0.003	0.003
	(0.020)	(0.020)	(0.020)
Age as a continuous variable:			
BMI z-score mother * Child's age	0.007***	0.008***	
	(0.002)	(0.002)	
BMI z-score father * Child's age	0.006***	0.006***	
	(0.002)	(0.002)	
Age in categories (Base category: 0-5 years)			
BMI z-score mother * Child's age group: 6-11 years old			0.083***
			(0.024)
BMI z-score mother * Child's age group: 12-14 years old			0.103***
			(0.029)
BMI z-score mother * Child's age group: 15-19 years old			0.095***
			(0.033)
BMI z-score father * Child's age group: 6-11 years old			0.067***
			(0.025)
BMI z-score father * Child's age group: 12-14 years old			0.073**
			(0.029)
BMI z-score father * Child's age group: 15-19 years old			0.088***
			(0.028)
Mother's age and father's age	Y	Y	Y
Household socioeconomic level	Y	Y	Y
Region* time interaction dummies	Y	Y	Y
Constant and WHO 2007 reference dummy	Y	Y	Y
R-squared	0.109	0.109	0.11
N. of cases	11056	11056	11056
Clusters (Households)	3281	3281	3281

Note: MxFLS 2002,2005-2006, and 2009-2012. The stars in the estimated coefficients indicate their significance (*** p<0.01, ** p<0.05, * p<0.10), clustered standard errors by household in parenthesis. Household socioeconomic level includes the quantile of the household's income, size of the household, bedrooms per capita, father's occupation and mother's level of education.

Table 2.5: Variation in the size of the parental transmission. Quantile of Household Income (USING MEXICAN SAMPLE AS REFERENCE).

	(1)	(2)	(3)
BMI z-score mother	0.192***	0.210***	0.196***
	(0.026)	(0.014)	(0.026)
BMI z-score father	0.187***	0.161***	0.163***
	(0.014)	(0.024)	(0.024)
Quantile of Household Income			
2nd Quantile	-0.019	-0.028	-0.022
	(0.058)	(0.048)	(0.064)
3rd Quantile	-0.070	-0.061	-0.091
	(0.056)	(0.052)	(0.065)
4th Quantile	-0.017	-0.052	-0.095
	(0.059)	(0.052)	(0.067)
Interaction terms:			
BMI z-score mother * 2nd Quantile	-0.003		-0.004
	(0.032)		(0.032)
BMI z-score mother * 3rd Quantile	0.024		0.022
	(0.029)		(0.029)
BMI z-score mother *4th Quantile	0.038		0.029
	(0.031)		(0.031)
BMI z-score father * 2nd Quantile		0.002	0.002
		(0.030)	(0.030)
BMI z-score father * 3rd Quantile		0.022	0.018
		(0.030)	(0.030)
BMI z-score father *4th Quantile		0.066**	0.061**
		(0.029)	(0.030)
Child's age child's age squared, mother's age and father's age	Y	Y	Y
Household socioeconomic level	Y	Y	Y
Region*time interaction dummies	Y	Y	Y
Constant and WHO 2007 reference dummy	Y	Y	Y
R-squared	0.106	0.107	0.107
N. of cases	11056	11056	11056
Clusters (Households)	3284	3284	3284

Note: MxFLS 2002,2005-2006, and 2009-2012. The stars in the estimated coefficients indicate their significance (*** p<0.01, ** p<0.05, * p<0.10), clustered standard errors by household in parenthesis. Household socioeconomic level includes: size of the household, bedrooms per capita, father's occupation and mother's level of education.

Table 2.6: Variation in the size of the parental transmission. Mother's education and work status (USING MEXICAN SAMPLE AS REFERENCE).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
BMI z-score mother	0.209***	0.192***	0.200***	0.192***	0.192***	0.182***	0.180***
	(0.014)	(0.038)	(0.013)	(0.015)	(0.015)	(0.039)	(0.040)
BMI z-score father	0.188***	0.188***	0.182***	0.182***	0.182***	0.187***	0.207***
	(0.014)	(0.014)	(0.013)	(0.013)	(0.014)	(0.014)	(0.033)
Mother's education (Base category: High school):							
Less than high school	- 0.126***	-0.155**				-0.153**	-0.122
	(0.047)	(0.066)				(0.066)	(0.079)
More than high school	-0.073	-0.115				-0.108	-0.039
	(0.072)	(0.105)				(0.106)	(0.139)
Mother's work status:							
Mother works			0.075***	0.011	0.011	-0.006	-0.002
			(0.028)	(0.051)	(0.062)	(0.052)	(0.065)
Interaction terms : Mother's education							
BMI z-score mother * Less than high school		0.018				0.020	0.022
		(0.036)				(0.036)	(0.037)
BMI z-score mother * More than high school		0.027				0.014	0.020
		(0.060)				(0.061)	(0.063)
BMI z-score father * Less than high school							-0.021
							(0.032)
BMI z-score father * More than high school							-0.049
							(0.071)

Interaction terms : Mother's work status							
BMI z-score mother * Mother works				0.038	0.038	0.040	0.040
				(0.026)	(0.026)	(0.027)	(0.027)
BMI z-score father * Mother works					-0.001		-0.002
					(0.025)		(0.028)
Child's age and age squared, mother's age and father's age,	Y	Y	Y	Y	Y	Y	Y
Household socioeconomic level	Y	Y	Y	Y	Y	Y	Y
Region*time interaction dummies	Y	Y	Y	Y	Y	Y	Y
Constant and WHO 2007 reference dummy	Y	Y	Y	Y	Y	Y	Y
R-squared	0.105	0.105	0.105	0.105	0.105	0.106	0.106
N. of cases	11056	11056	12114	12114	12114	11054	11054
Clusters (Households)	3281	3281	3499	3499	3499	3281	3281

Note: MxFLS 2002,2005-2006, and 2009-2012. The stars in the estimated coefficients indicate their significance (*** p<0.01, ** p<0.05, * p<0.10), clustered standard errors by household in parenthesis. Household socioeconomic level includes the quantile of the household's income, size of the household, bedrooms per capita, father's occupation and mother's level of education.

Table 2.7: Variation in the size of the parental transmission. Size of the household (USING MEXICAN SAMPLE AS REFERENCE).

	(1)	(2)	(3)
BMI z-score mother	0.187***	0.210***	0.175***
	(0.032)	(0.014)	(0.031)
BMI z-score father	0.187***	0.253***	0.258***
	(0.014)	(0.030)	(0.030)
Size Household	-0.027***	-0.004	-0.012
	(0.009)	(0.008)	(0.010)
Interaction terms			
BMI z-score mother * Size household	0.004		0.006
	(0.005)		(0.005)
BMI z-score father * Size household		-0.012**	-0.013***
		(0.005)	(0.005)
Child's age and age squared, mother's age and father's age,	Y	Y	Y
Household socioeconomic level	Y	Y	Y
Region*time interaction dummies	Y	Y	Y
Constant and WHO 2007 reference dummy	Y	Y	Y
R-squared	0.106	0.107	0.107
N. of cases	11056	11056	11056
Clusters (Households)	3281	3281	3281

Note: MxFLS 2002,2005-2006, and 2009-2012. The stars in the estimated coefficients indicate their significance (*** p<0.01, ** p<0.05, * p<0.10), clustered standard errors by household in parenthesis. Household socioeconomic level includes the quantile of the household's income, bedrooms per capita, father's occupation and mother's level of education.

Section II. Robustness checks for Chapter 3

Ordered Logit Estimates, including woman’s contribution to the couple’s income.

Table DII-3.2a . Ordered Logit estimates, based on women's opinion (INCLUDING WOMEN'S PROPORTION OF COUPLE'S INCOME)

	Daily Life	Children's wellbeing		Economic decisions		Autonomy	
	Food	Children's Education	Children's Health Care	Large Expenditures	Cash Transfers to Her Relatives	If She Should Work	Contraceptive Use
Individual Level							
Education (years)	-0.011	-0.010	0.001	0.011	0.034***	0.058***	0.042***
	(0.008)	(0.009)	(0.008)	(0.007)	(0.008)	(0.007)	(0.011)
Work	-0.087	0.133	0.061	0.385***	0.122	0.328***	0.096
	(0.075)	(0.087)	(0.082)	(0.074)	(0.082)	(0.066)	(0.114)
Age	0.041***	-0.007	-0.003	0.007	0.014*	0.029***	0.012
	(0.007)	(0.010)	(0.008)	(0.007)	(0.008)	(0.006)	(0.011)
Married	0.244***	-0.038	-0.011	-0.035	-0.074	-0.114*	-0.099
	(0.068)	(0.077)	(0.075)	(0.070)	(0.080)	(0.066)	(0.109)
Age at marriage	-0.020***	0.001	0.000	0.001	-0.021***	-0.004	-0.027**
	(0.007)	(0.010)	(0.009)	(0.007)	(0.008)	(0.007)	(0.012)
Previous unions	0.207*	0.444***	0.444***	0.130	0.348***	0.277**	0.144
	(0.116)	(0.155)	(0.138)	(0.112)	(0.128)	(0.111)	(0.181)
Indigenous group	-0.265***	-0.044	-0.075	-0.000	0.070	-0.061	-0.421***
	(0.078)	(0.092)	(0.088)	(0.078)	(0.090)	(0.075)	(0.134)
Number of children	0.023	0.091***	0.075***	0.038**	-0.005	-0.012	0.002
	(0.021)	(0.024)	(0.021)	(0.019)	(0.021)	(0.018)	(0.030)
Age of children (mean)	-0.005	-0.097***	-0.065***	0.001	0.008	0.008	-0.016
	(0.008)	(0.012)	(0.010)	(0.007)	(0.008)	(0.007)	(0.012)
Proportion of male children	-0.021	-0.090	-0.122	-0.123*	-0.205***	-0.029	0.074
	(0.071)	(0.078)	(0.076)	(0.068)	(0.077)	(0.065)	(0.106)
Couple Level							
Difference in Age	-0.001	-0.002	0.003	0.002	-0.001	-0.007	-0.014*
	(0.005)	(0.006)	(0.006)	(0.005)	(0.006)	(0.005)	(0.008)
Difference in Education	0.003	0.019***	0.022***	0.023***	0.003	-0.003	0.020***
	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.007)
Woman's contribution to couple's income (proportion)	**-0.391*** **	**0.327***	**0.561*** **	**1.037*** **	**0.749*** **	**0.688*** **	**0.387**
	(0.148)	**(0.188)**	**(0.173)**	**(0.160)**	**(0.171)**	**(0.137)**	**(0.244)**
Household Level: Quantile of Net Income							
2nd	0.030	-0.075	-0.066	-0.038	0.034	-0.003	0.027
	(0.075)	(0.084)	(0.079)	(0.075)	(0.083)	(0.069)	(0.117)
3rd	0.029	-0.071	-0.026	-0.080	0.151*	0.093	-0.025
	(0.072)	(0.082)	(0.080)	(0.073)	(0.080)	(0.067)	(0.112)
4th	0.117	-0.151	-0.106	0.010	0.123	0.143*	-0.019
	(0.080)	(0.093)	(0.090)	(0.079)	(0.088)	(0.073)	(0.123)
Community/Locality Level: Population (Base: Less than 2,500)							
Between 2,500 and 15,000	0.112	-0.030	0.075	0.054	0.154*	0.094	0.123
	(0.088)	(0.092)	(0.088)	(0.079)	(0.089)	(0.075)	(0.118)
Between 15,000 and 100,000	0.144*	-0.030	0.026	0.011	-0.010	0.093	0.006
	(0.086)	(0.099)	(0.092)	(0.083)	(0.091)	(0.079)	(0.117)
More than 100,000	0.068	-0.036	0.101	-0.020	0.163**	0.280***	0.214**
	(0.062)	(0.070)	(0.069)	(0.061)	(0.069)	(0.056)	(0.092)
Region (Base: North)							
Center-North	0.124	-0.217*	-0.156	-0.259**	0.054	-0.057	-0.034
	(0.109)	(0.119)	(0.114)	(0.106)	(0.113)	(0.095)	(0.171)
Center	0.169	-0.137	-0.284**	-0.248**	0.254**	0.069	-0.140
	(0.114)	(0.126)	(0.120)	(0.114)	(0.124)	(0.103)	(0.175)
South	-0.073	-0.191	-0.398***	-0.181	-0.156	0.217**	-0.314*
	(0.116)	(0.125)	(0.124)	(0.112)	(0.117)	(0.101)	(0.178)
Year (Base: 2002)							
2005	-0.220*	-0.301**	-0.566***	0.180	0.408***	0.198**	-0.271*
	(0.115)	(0.125)	(0.123)	(0.111)	(0.114)	(0.096)	(0.153)
2009	0.135	0.048	0.064	0.059	0.635***	0.580***	0.299
	(0.134)	(0.175)	(0.159)	(0.134)	(0.142)	(0.124)	(0.204)
τ1	-1.686***	-3.658***	-3.098***	-0.366*	-1.420***	0.643***	-3.058***
	(0.197)	(0.224)	(0.210)	(0.187)	(0.208)	(0.180)	(0.322)

τ2	0.672***	0.704***	0.844***	3.024***	1.568***	2.454***	2.219***
	(0.191)	(0.218)	(0.205)	(0.192)	(0.207)	(0.181)	(0.313)
Pseudo R-squared	0.024	0.051	0.029	0.027	0.025	0.044	0.018
Wald Chi-Square	251.334	412.583	261.534	349.075	273.249	656.417	108.244
N. of cases	7494	7369	7412	7477	5702	7476	6207

Note: MxFLS 2002,2005-2006, and 2009-2012. The stars in the estimated coefficients indicate their significance (***p<0.01, ** p<0.05, * p<0.10), clustered standard errors by household in parenthesis. The estimation also includes interaction terms between region and year.

The Das and Van Soest two-step estimator

Table DII- 3.4: Fixed Effects Ordered Logit estimates (Van and Soest estimator)

	Daily Life	Economic decisions		Autonomy
	Food	Large Expenditures	Cash Transfers to Her Relatives	If She Should Work
Individual Level				
Education (years)	0.011	0.015	-0.027	-0.017
	(0.027)	(0.024)	(0.029)	(0.024)
Work	-0.032	0.036	0.169	0.272***
	(0.101)	(0.098)	(0.120)	(0.091)
Age	0.053***	0.029	0.106***	0.074***
	(0.018)	(0.018)	(0.024)	(0.019)
Married	6.640***	0.701	6.358***	-0.497
	(0.575)	(0.639)	(0.669)	(0.634)
Age at marriage	-0.003	0.004	-0.205***	-0.075**
	(0.035)	(0.037)	(0.044)	(0.033)
Previous unions	14.475***	-13.478***	-4.690***	-8.783***
	(1.055)	(0.798)	(1.404)	(0.807)
Number of children	0.121	0.036	-0.414	0.081
	(0.189)	(0.152)	(0.282)	(0.150)
Age of children (mean)	-0.004	0.002	0.002	0.044**
	(0.018)	(0.020)	(0.027)	(0.021)
Proportion of male children	-0.007	-0.111	-0.117	0.060
	(0.279)	(0.280)	(0.349)	(0.268)
Couple Level				
Difference in Age	0.002	-0.029	0.027	-0.004
	(0.022)	(0.023)	(0.028)	(0.024)
Difference in Education	0.000	0.009	0.026**	0.012
	(0.011)	(0.010)	(0.012)	(0.010)
Household Level: Quantile of Net Income				
2nd	-0.021	0.013	0.026	-0.041
	(0.099)	(0.093)	(0.125)	(0.088)
3rd	0.006	-0.066	0.115	0.036
	(0.105)	(0.099)	(0.130)	(0.092)
4th	0.267**	0.100	0.078	0.014
	(0.117)	(0.111)	(0.146)	(0.104)
Community/Locality Level: Population (Base: Less than 2,500)				
Between 2,500 and 15,000	0.324	-0.463**	0.191	0.026
	(0.254)	(0.228)	(0.316)	(0.232)
Between 15,000 and 100,000	-0.004	1.110***	-0.169	-0.093
	(0.310)	(0.286)	(0.396)	(0.280)
More than 100,000	-0.260	0.351	-0.045	-0.148
	(0.250)	(0.234)	(0.420)	(0.227)
N. of cases	3981	4544	2939	5429
N. of groups	1528	1744	1214	2089

Note: MxFLS 2002,2005-2006, and 2009-2012. Dependent variable: women's perception of their own power as an ordered measure ("0", "1" or "2"). The stars in the estimated coefficients indicate their significance (***p<0.01, ** p<0.05, * p<0.10), clustered standard errors by household in parenthesis (since the analysis should recognise the fact that observations within one household are not independent and they might show similar variations over time). The estimation originally includes region, time and their interaction terms, however they were automatically omitted for some of the columns, due to lack of within-variation.