Differences that Count:
Effects of Household Poverty on Children in Rural Mexico

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ABSTRACT

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Early childhood has been identified as a crucial period in human life. It is during the first five years when vital physiological, cognitive, motor, and emotional developmental processes take place. Consequently, when resources are limited, it could seem more difficult to ensure the adequate development of children. Research has indicated that poverty suffered during childhood has been found to be associated with negative and long-lasting consequences for people. Nevertheless, there is inconclusive evidence on whether depth, timing, and changes in household poverty are associated with indicators of well-being at pre-school age. This thesis aims to contribute in these topics.

This thesis explores the effects of poverty on children in Mexico. In that country, more than 50% of children aged 0-5 years live in poverty. Childhood poverty is especially evident in rural areas and amongst indigenous groups. Using a quantitative methodology, this thesis explores whether (a) deeper levels of poverty, (b) poverty suffered at various moments in the child´s life, and (c) changes in household poverty, are associated with developmental indicators. The study includes around 2,000 children born and raised in poor rural communities in Mexico.

The examination is conducted with Structural Equation Modelling. Child well-being is measured by indicators of physical health, cognitive ability, motor co-ordination, and emotional competence at age 4-6 years. Poverty is measured by household income, durables, quality of housing, and agricultural and non-agricultural means throughout the child´s life.

Results indicate that deeper levels of household poverty are associated with worse indicators of physical, cognitive, and motor co-ordination. Also, poverty suffered at around birth and around 18 months of age is associated with cognitive outcomes at age 4-6 years. Furthermore, improvements over time in household income are generally associated with better child outcomes. Conversely, declines in household income are associated with worse developmental indicators. Finally, household composition, maternal education, and ethnicity proved to be significant explanatory factors of child well-being at pre-school age.

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This thesis is dedicated to Mexico, which has been suffering during the last few years.

List of Abbreviations

ACBC	Achenbach Child Behaviour Checklist
BCS70	British Cohort Study 1970
BMI	Body Mass Index
CFI	Comparative Fit Index
ChiSq	Chi Square
CONEVAL	National Council for Evaluation of Social Policy *(Consejo Nacional Para la Evaluación de la Política Social)*
df	degrees of freedom
DIF	National System for Integral Development of the Family *(Sistema Nacional para el Desarrollo Integral de la Familia)*
DTP	Diphteria-Tetanus-Pertussis vaccine
ENCASEH	Survey of Socio-Economic Characteristics of the Households *(Encuesta de Características Socioeconómicas de los Hogares)*
ENCEL	Household Evaluation Surveys, Rural Sample *(Encuesta de Evaluación de los Hogares, Rural)*
ENCELURB	Household Evaluation Surveys, Urban Sample *(Encuesta de Evaluación de los Hogares, Urbana)*
FA	Factor Analysis
FAO	Food and Agriculture Organisation of the United Nations
G-20	Group of Twenty Finance Ministers and Central Bank Governors
GM	Growth Model
GNI	Gross National Income
HCI	Human Capital Investment
INEGI	National Institute for Statistics and Geography *(Instituto Nacional de Estadística y Geografía)*
IQ	Intellectual Quotient
IMAN	Mexican Institute for Child Assistance *(Instituto Mexicano de Asistencia a la Niñez)*
INPI	National Institute for the Protection of the Child *(Instituto Nacional de la Protección a la Infancia*)
MIMIC	Multiple Indicator Multiple Cause Model
MxFLS	Mexican Family Life Survey
MXP	Mexican Peso
N	Number of cases

NAFTA	North America Free Trade Agreement
NCDS	National Child Development Survey
NICHD	National Institute of Child Health and Human Development
NLSY	National Longitudinal Survey of Youth
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Square Regression
PCA	Principal Component Analysis
PPVT	Peabody Picture Vocabulary Test
PROGRESA	Programme for Education, Health, and Nutrition *(Programa de Educación, Salud y Alimentación)*
PRONASOL	National Programme for Solidarity *(Programa Nacional de Solidaridad)*
PSID	Panel Study of Income Dynamics
RMSEA	Root Mean Square Error of Approximation
SD	Standard Deviation
SEM	Structural Equation Modelling
SES	Socio-Economic Status
TLI	Tucker-Lewis Index
UK	United Kingdom
UNDP	United Nations Development Programme
UNICEF	United Nations Children´s Fund
USA	United States of America
USD	United States Dollar
WHO	World Health Organisation
WJ	Woodcock-Johnson Test

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CHAPTER 1

Introduction

Mexico has the largest proportion of children living in poverty among countries of the Organisation for Economic Co-operation and Development (OECD). At the time of writing, official figures estimate that around half of the children in Mexico are considered to be poor (CONEVAL, 2011). Despite socio-economic advances achieved during the last few decades, the number of children who suffer the consequences of poverty in the country is considerable. The image of children working or begging in the streets is common; children working in agricultural activities are still a feature of the rural economy.

It is known that children living in poor households generally have lower nutritional status and perform worse in school than children living in better-off families. It is also known that children growing up in poverty often manifest worse indicators of adult well-being and social success. In Latin America, research has found that poverty is transmitted from one generation to the other; the odds of being poor largely depend on growing up in poverty. These are ideas found in political discourse and in the media and virtually anyone in Mexico would agree with them. Furthermore, research has provided evidence for all of these points. Firstly, poverty has been found to have negative consequences for children´s physical, cognitive, and emotional development (Blau, 1999; Duncan and Brooks-Gunn, 1997; Gershoff *et al*, 2007; Shonkoff and Philipps, 2000). Secondly, there is evidence about a relationship between growing up in poverty and educational attainment, occupational status, and earnings (Baydar, Brooks-Gunn, and Furstenberg, 1993; Duncan *et al*, 2009; Evans and Schamberg, 2009; Heckman and Masterov, 2004; Tomlinson, Walker, and Williams, 2008). And thirdly, there are consistent findings about low social mobility in Latin America (Aldaz-Carroll and Morán, 2001; Behrman, Gaviria, and Székely, 2001; Castañeda and Aldaz-Carroll, 1999; Silber and Deutsch, 2008; Zenteno and Solís, 2006). As Chase-Lansdale and Brooks-Gunn argued, "a sizable body of research documents the deleterious consequences of growing up poor: impaired cognitive development, problems in socioemotional adjustment, and poor physical health" (1995, p. 2)

After some decades of research, certain elements have been found to be associated with indicators of child well-being. Generally, the variables that have been found to have an impact on human development are inherent to the person (i.e. genetic endowment), household-related (i.e.

disposable income, quality of housing, durables, consumption), parent and carer related (i.e. goal-setting, motivation), and contextual-structural (i.e. location, community infrastructure, labour market conditions). Nevertheless, despite the theoretical and empirical advances in understanding the association between poverty and child well-being, there are still some gaps in our knowledge.

Firstly, there is no definitive definition of child well-being nor a finalised agreement on the dimensions that best capture child well-being. Also, there is inconclusive evidence about how different poverty manifestations are associated with the developmental processes of a person. That is, whether degree of poverty makes a difference in terms of child development, or if poverty affects indicators of well-being differently depending on when in the child´s life it happens. Also, there is insufficient information about the extent to which changes in the overall level of household material circumstances are associated with the well-being of children. Additionally, there are contested findings about the relative effects that household income and other indicators of material circumstances *vis-à-vis* socio-demographic elements such as ethnicity or maternal education level have on children.

This thesis engages with these issues by exploring the association between poverty and indicators of child well-being at pre-school age. Specifically, it looks at the ways in which depth, timing, and overall longitudinal experience of household poverty are associated with indicators of indicators of physical health, cognitive ability, motor co-ordination, and emotional competence at age 4-6 years. The study includes around 2,000 children born and raised in poor and extremely poor rural communities in Mexico. The analysis is conducted with the aid of Structural Equation Modelling and develops various types of models to test hypotheses about the ways in which poverty affects children.

The first section of this introductory chapter summarises some of the theoretical frameworks that aim to explain the elements that shape child development. The second section of this chapter reflects on the importance of looking at the effects of poverty on children. The third part offers an overview of child poverty in Mexico. The fourth section identifies a research puzzle about the effects of poverty on children and explains the research questions that sustain this examination. The last part summarises the contents of this thesis.

Theories about Child Development

In order to explore the ways in which poverty affects children, it is necessary to review some of the theories that aim to explain child development as well as the elements that are considered to be important in the developmental processes. Theories of child development lie within various disciplines; these are mainly found in Neuroscience, Psychology, Paediatrics, Sociology, and Economics. While some approaches focus on specific elements, other perspectives have taken into consideration a wider range of elements. For example, the work of Jean Piaget (1977, 1978), which concentrates on cognitive processes, contrasts with the work of Bronfenbrenner (1979), which includes variables at the individual, household, community, and larger environment level in his Ecological Systems Theory. This section provides an overview of some of the main theoretical underpinnings of child development.

One of the first contributions to the theories of child development is Jean Piaget´s Cognitive-Developmental Theory. According to this framework, children engage in active processes of knowledge-building by interacting with the world. These processes refer to the development of intelligence and are divided into four stages: The sensori-motor period, the pre-operational period, the concrete operational period, and the positional period. According to Piaget (1962, in Slater and Muir, 1999), the sensori-motor period takes place before language acquisition and is when the child utilises reflexes, gains habits, starts motor co-ordination, and achieves goals through intermediaries (i.e. pulling a carpet to obtain a toy). During this time, the child learns to assimilate new objects and to incorporate them into his or her knowledge. The pre-operational period takes place from about age 2 years to around age 7 years. During this time, the child starts to engage with symbolic functions, meanings, and representations of objects. It is also during the pre-operational period when language acquisition takes place and when the child starts to think in abstract ways, such as making plans, creating stories, or recalling the past. The concrete operational period takes place from around age 7 years to around age 12 years. During this period, the child starts to think logically, to classify things, and to be able to make calculations. Finally, the positional (or formal operational) period takes place after age 12 years. During this period, a person starts to think in complex ways and to engage with sophisticated abstract reasoning.

Another developmental psychologist that aimed to explain the mental development of children is Lev Vygotsky. This author primarily explored the processes of language acquisition and learning. Vygotsky´s theory, known as Socio-Cultural Theory, states that cultural values, beliefs, and

customs shape child development; he was pioneer in regarding the context as important. Specifically, this perspective states that children learn by interacting with society and engaging in situations that exist in their cultural context. "As children internalize [sic] the essential features of these dialogues [with adults], they can use the language within them to guide their own thought and actions to acquire new skills" (Berk, 2007, p. 23). Under Vygotsky´s perspective, child development takes place in stages according to their age. On this regard, his ideas were firm: "it is an empirical finding, frequently verified and indisputable, that learning must be congruous with the level of child development. That only at a certain age can a start be made in teaching grammar, only at a certain age has the child the ability to study algebra – it is hardly necessary to offer evidence of this" (Vygotsky, 1934; in Simon and Simon, 1963, p. 28).

Piaget´s and Vygotsky´s work concentrate in explaining the cognitive and social development of a person, especially during childhood. However, other perspectives focus on the interactions between children and their parents or carers. Mayer (1997b), Ermisch, Francesconi, and Pevalin (2001), and Barajas, Philipsen, and Brooks-Gunn (2007) have argued that the theories of child development are found within two main approximations: the Human Capital Investment approach and the Good Parenting approach. The Human Capital Investment (HCI) approach asserts that child well-being is the result of tangible and intangible investments in the child. Following Becker´s (1981) argumentation, the HCI approach states that child well-being could be understood as the result of nutritional, educative, and time investments. According to this perspective, resources provided to children affect their future life chances. Following this line, when resources are limited, children find scarce opportunities to flourish physically, intellectually, and socially. Numerous scholars (Aldaz-Carroll and Morán, 2001; Ceroni, 2001; Corcoran, 1995; Mayer and Lopoo, 2001; Minujin, Delamonica and Davidziuk, 2006) have rooted their investigations in examining the extent to which investments during childhood determine future well-being such as educative performance, employment status, income, or social mobility compared to parental status.

The Good Parenting approach states that child well-being largely depends on role models and caring styles and behaviours. This perspective stresses the importance of role models of parents and cares and takes into consideration parental practices and attitudes towards children, emotional support, and parental involvement in trying to explain child development. This perspective has partially been nurtured by the work of developmental psychologists like Jean Piaget (1947, 1973, 1977, 1978), John Bowlby (1958, 1979), and Jerome Kagan (1981, 1991 with Snidman). However,

the focus is on attitudes, behaviours, and practices of parents and carers and the ways in which these influence child outcomes.

While the Human Capital Investment and the Good Parenting approaches primarily focus on household-related elements, other frameworks have concentrated on external variables, particularly elements found in the neighbourhood. Duncan, Brooks-Gunn, and Klebanov[1] (1994) summarise the mechanisms through which neighbourhoods influence child development. One first mechanism, named "neighbourhood resource" is based on the beneficial effects of public and private services. A second mechanism, known as "contagion theories", takes into account peer influences. A third mechanism, known as "collective socialisation", emphasises role models found in the community. A fourth mechanism is named "competition theory" and states that people compete for resources against others. Finally, a mechanism named "relative deprivation" implies that children evaluate their own situation according to the situation of those who surround them.

Other theoretical frameworks for understanding the elements that shape child development have taken into consideration variables at various levels. For example, the Ecological Systems Theory was developed by Uri Bronfenbrenner, who stated that "human development is a product of interaction between the growing human organism and its environment" (1979, p. 16). Under this perspective, a child is embedded in various layers of systems: microsystem, mesosystem, exosystem, and macrosystem. The microsystem refers to the immediate surroundings of the child: family members, friends, classmates, the household, the care institution, the school, and any group the child belongs to. The mesosystem refers to interactions between people involved in the microsystem, such as between parents and teachers or parents and nurses. The exosystem refers to the broader community in which the mesosystem is embedded: extended family and family friends, people that come to the neighbourhood, public services, and mass media. Finally, the macrosystem refers to cultural, economic, legal, institutional, and social elements of the place where the child lives.

Following this line, Ingrid Schoon (2006) proposed the Developmental-Contextual model for understanding the elements that shape child outcomes. This model incorporates the Life-Course approach (Elder, 1988) into the Ecological Systems Theory. Hence, the Developmental-Contextual model takes into account variables at the individual, family, neighbourhood, institutional, and socio-historical levels as well as interrelations between experiences over time and transitional events.

[1] Based on Crane, 1991; Mayer and Jencks, 1989; and Wilson, 1987, 1991.

Under this approach, child outcomes are understood as the result of dynamic processes where individual characteristics, human agency, bounded agency, biological dispositions, family influences, caregiver relationships, linked lives, neighbourhoods, institutions, and the wider socio-historical context interact with each other.

A similar approach has been proposed by Timothy Smeeding (1995), who has advocated for a framework that includes variables at various levels, all of which influence child development. This author has argued that "three sets of forces – context, family processes, and community processes – affect developmental outcomes" (1995, p. 294). This author proposes a model for disentangling the elements that shape child development. The model includes as contextual variables: family structure, family income, wealth, and consumption; neighbourhood and community characteristics, employment rates, and danger; social policy environment; and social attitudes of racism, and discrimination. As family processes, the model includes adult mental and physical health; parenting behaviour; parental expectations; interaction of other family members; and sharing of time, goods, and other resources. The model also includes variables related to community processes: medical care, day care, pre-school, job training, community activities, and public institutions. Finally, the model takes into account adult and child life events, such as births, deaths, divorce, parental absence, ownership, graduations, and employment changes. All of these sets of variables interact with each other and are used to explain child outcomes: genetic endowment, health status, self-image, resilience, vulnerability, academic functioning, cognitive achievement, and socio-emotional functioning.

The frameworks described above provide possible routes for understanding the elements that influence child development. Ideally, the researcher would have data for all of the elements that play a role in shaping child outcomes. However, data limitations are an inherent part of research and the operationalisation of concepts is often constrained by the availability of information. This situation leads to a trade-off between complex theoretical postulations and specific measurements. However, to disregard a theoretical base could be problematic; as Lister argues, "to move straight to definitions and measures without first considering the broader concepts can result in losing sight of wider meanings and their implications for definitions and measurements" (2004, p. 5). Therefore, this thesis acknowledges the importance of the theories presented above in unpacking the elements that are associated with child outcomes at pre-school age. Nevertheless, in a balancing act between theoretical concepts and available data, the analysis in this thesis makes use of the elements of these theories for which the ENCASEH/ENCEL provides data. The purpose of this thesis is not to test

whether these theories are sustained in the Mexican context or in this sample. Instead, elements from these theories are borrowed to illuminate on the results of the models and to provide a possible explanation for the coefficients that are statistically significant. Primarily, the elements extracted from these theories indicate household material circumstances as well as economic and socio-demographic characteristics of the members in the household. The Methodology Chapter provides a detailed description of the variables used throughout the thesis.

Ultimately, one would expect that findings from research contribute to enrich our knowledge about the relationship between poverty and child outcomes. Furthermore, one would expect that those findings contribute in a practical way through policymaking. Therefore, the next section reviews some of the arguments about why the study of early childhood is important.

The Importance of Early Childhood

During the last few decades, political discourse has emphasised the need for reducing child poverty and safeguarding child well-being. Eliminating child poverty has been the core of public action in the global arena and in various countries. At the international level, UNICEF has campaigned in favour of children since the 1940s and especially after the creation of the Convention of the Rights of the Child in 1989. Also, numerous non-governmental organisations have been created world-wide to promote child well-being. At the national level, for example, former Prime Minister Blair provided a discourse in 1999 that set a milestone for governmental action with the aim of eradicating childhood poverty in the United Kingdom (Hirsch, 2006; Waldman *et al*, 2009). In the United States, President Obama signalled that adressing child poverty was a priority during his election campaign (Obama and Biden, NA). In Mexico, providing children with better nutritional, health, and educational opportunities has been the core of social policy since the creation of PROGRESA-Oportunidades in 1997. Similar efforts have been developed in other countries.

Public action has often benefited from academic and medical research to support its claims about the relevance of tackling childhood poverty. Three lines of argumentation about the importance of the early years are identified here. Even though they are rooted in different disciplines, these three reasoning positions are complementary. These are described next.

The Importance of Early Childhood: Medical Perspectives

The first line of argumentation about the importance of early childhood is found within medical and psychological disciplines. Paediatric research has found that the first five years of life are a critical stage when children develop crucial physical, cognitive, and socio-emotional skills (Illig, 1998; Grantham-McGregor *et al*, 1999; Moore 2006; Shonkoff and Phillips, 2000; UNICEF, 2011). It is during the first five years when a person experiences changes at the most rapid rate of his or her life (Bundy, 1997; Young, 1997). Physically, infants experience important height and weight growth and gain physical strength (Bogin, 1999). Also, it is during the first couple of years of life when the immunological and nervous systems mature, reaching around 30% and 40% of their total capacity, respectively (Lipsitt and Reese, 1979).

Early childhood is also important in mental development. Intellectually, it is during the first five years in life when most cognitive capacities are developed. During the first three years in life "the rates of formation of brain cell connections (synapses) increases dramatically in response to environmental stimuli and sensory experiences absorbed by the infant" (Illig, 1998, p. 8). Additionally, it is during the first five years when language acquisition and refinement of sensorial abilities take place (Shelov, 2006). By the age of 8 years, a person has developed around 90% of his or her total brain capacity (Woodhead, 2006).

Early childhood is also an important period for the acquisition of motor co-ordination abilities. Several skills have consistently been recorded to develop progressively during the pre-school period (Cole and Cole, 2001), from lifting head to jumping on one foot, from eye movement to basic drawing, from crawling to running. Also, it is during this period when children develop self-awareness and start defining their temperament and establishing social relations with their immediate world (Berk, 2007).

Medical and psychological findings have stressed the importance of early childhood in the physiological, cognitive, and socio-emotional development of a person. Given the major developmental transformations that a person undergoes during the early years, poverty suffered during early childhood could have lingering effects.

The Importance of Early Childhood: Economic Perspectives

The second line of argumentation about the importance of the early years is based on economic and social theories. Childhood has often been regarded as a period when a person acquires several skills that are the basis for future functioning. With the acknowledgement that "early environments play a large role in shaping later outcomes" (Heckman and Masterov, 2004, p.3), early childhood has been related to indicators of social success and adult well-being such as school completion, occupational status, and adult earnings. The perception that child well-being predicts adolescent and adult well-being has stressed the urgency for ensuring nurturing conditions for children. Frequently, childhood has been depicted as a period in life when people acquire the necessary tools to live a good, successful life in the future. Thus, children are often portrayed as "a nation´s future (because) healthy, well educated children are crucial for the economic, social and political development of all of our countries" (Blackman and Litchfield, 2001, p.1.). These ideas have dominated the discourse in some policymaking settings.

In policymaking, the argument about the importance of the early years in a person´s life has been the cornerstone of Early Childhood Interventions (Deutsch, 1998; Valencia, 2008). Some governments have engaged in promoting child development initiatives "because of the vicious cycle whereby poverty in childhood is the fore-runner of poor health, education and other key outcomes in adulthood" (Fabian Society, 2005, p. 11). For example, Head Start, since its introduction in 1965 in the United States, has provided grants to public or private entities that deliver services that aim to enhance the physical and health conditions and the cognitive, emotional, and social abilities of children. Similarly, Sure Start in the United Kingdom also promotes childhood support through a combination of universal and targeted assistance in the areas of education, health, and childcare. Analogous experiences of early childhood intervention are found in Latin America: *PROGRESA-Oportunidades* in Mexico, *Bono Solidario* in Ecuador, *Superémonos* in Costa Rica, *Red de Oportunidades* in Nicaragua, *Juntos* in Perú, *Programa de Asignación Familiar* in Honduras, and *Bolsa Familia* in Brazil are some examples. These are conditional cash programmes directed at promoting children's educative, nutritional, health, and social development with the ultimate purpose of helping children to overcome poverty.

These programmes are some examples about the "desire to see that children are not condemned to a lifetime of poverty just because they were born to poor parents" (Ludwig and Mayer, 2006, p. 176). These schemes function on the assumption that the educational, nutritional,

and social assets that people encounter in their early years determine the range of opportunities for succeeding and later in their lives.

The Importance of Early Childhood: Human Rights Perspectives

The third line of argumentation about the importance of childhood stems from a Human Rights perspective. Children are regarded as a vulnerable group who have specific needs and require special attention. Children, particularly during infancy and toddlerhood, are more vulnerable than adults because they are dependent on their parents and carers (Campbell, 2007). Also, children are more likely to suffer from economic difficulty, food scarcity, lack of access to nutrition and health services (Addison, Hulme, and Kanbur, 2008), or other manifestations of deprivation. Given that children are considered a particularly vulnerable group, some voices in academic, policy, and advocacy circles have considered that "children are truly dependent, they cannot be berated for causing their own problems, they are ´victims´ who cannot in any sense be blamed" (Edgar, D., 1989, p. xiv).

Related to this, some have argued that there is a need "to nurture, protect, and ensure the health and well-being of all young children as an important objective in its own right, regardless of whether measurable returns can be documented in the future" (Shonkoff and Philipps, 2000, p.3). In academic works, however, the measurement of child well-being has been more challenging. Often, the well-being of children is understood and operationalised through the socio-economic indicators of the household in which they live and their immediate surroundings (Bradshaw, 2008; Bradshaw, Hoelscher, and Richardson, 2006a, 2006b; Edgar, Keane, and McDonald, 1985; Roelen, Gassmann, and de Neubourg, 2009; Gershoff *et al*, 2007). Similarly, policies related to children have generally been drafted under the umbrella of family policies (Bennett, 2006). Furthermore, it seems that children have been given an instrumental role in society and the conception of childhood as a period of life with inherent value has been lost in the discourse that favours adult indicators of well-being. As Tomlinson, Walker, and Williams have stated, the examination of how poverty during childhood is associated with later outcomes:

> ... has distracted attention from literature relating to child poverty in the here and now and its immediate impact on the life and environment of the child. It is almost as if the adult that a child becomes is more important than the child itself, and that the potential future costs to society are accorded more weight than the costs borne by the child today (2008, p.1).

Perceiving childhood as a period of life with intrinsic value is an issue that several scholars have voiced (Ben-Arieh, 2002; Biggeri and Mehrotra, 2008; Camfield, Streuli, and Woodhead, 2009; Micklewright, 2003; Minujin, Delamonica and Davidziuk, 2006). There is evidence about the correlation between material well-being and the quality of health, education, and emotional support received while growing up and outcomes later in life (see Literature Review Chapter). However, a vast amount of research tends to "neglect the importance of child well-being in the here and now" (Tomlinson, Walker, and Williams, 2008, p.3).

Childhood has slowly gained a place as an important period of life in the academic discourse, in public action, and in the advocacy efforts of international organisations and non-governmental organisations. There is a growing interest in examining the current life experiences of children, even though "this perspective is relatively new and not easily adopted, given [that there are] ideas that are reinforced everywhere in society and that portray children as potential, rather than actual, members of society" (Ben-Arieh, 2006, p. 5). The understanding of child well-being has started to shift from an instrumental perspective, which links childhood with future well-being, to its acknowledgement as a period in life with inherent value.

The importance of the early years has been related to the acquisition of physiological, cognitive, and socio-emotional abilities. Childhood has also been associated with life chances and future outcomes. Finally, the recognition of the importance of early childhood has fostered the promotion of the rights of the child. Understanding the various reasons why the first five years in life are important leads to the task of ensuring children´s well-being and safeguarding child development. Embedded in this, there is the need to assess the relationship between poverty and child well-being. Before setting the research questions that drive this thesis, it is necessary to review the contextual setting of the study. The next section depicts the situation of child poverty in the country where the examination in this thesis is based, Mexico.

Child Poverty in Mexico

In order to understand the evolution of child poverty in Mexico, it is necessary to review the economic history of the country. Mexico is considered a middle-income country; it is part of the OECD as well as the G-20 Group. On the one hand, macro-economic and social indicators are relatively sound. For example, GNI per capita has increased from 6,000 USD in 2002 to 9,330 USD in

2010, life expectancy is more than 75 years, and adult literacy rate is 93% (World Bank, 2011). These figures are similar to the ones in Brazil, Chile, Romania, or Turkey (UNICEF, 2011). On the other hand, Mexico is one of the most unequal countries in the world (Esquivel, 2008; López-Calva and Lustig, 2009; Poole, Gauthier, and Mizrahi, 2007; Popli, 2006). In fact, Latin America has been identified as the region where socio-economic disparities are the largest (De Ferranti *et al*, 2003; Lloyd-Sherlock, 2008; Lustig, 2001; O´Donnell, 1996; Gasparini, 2003; Shixue, 2005).

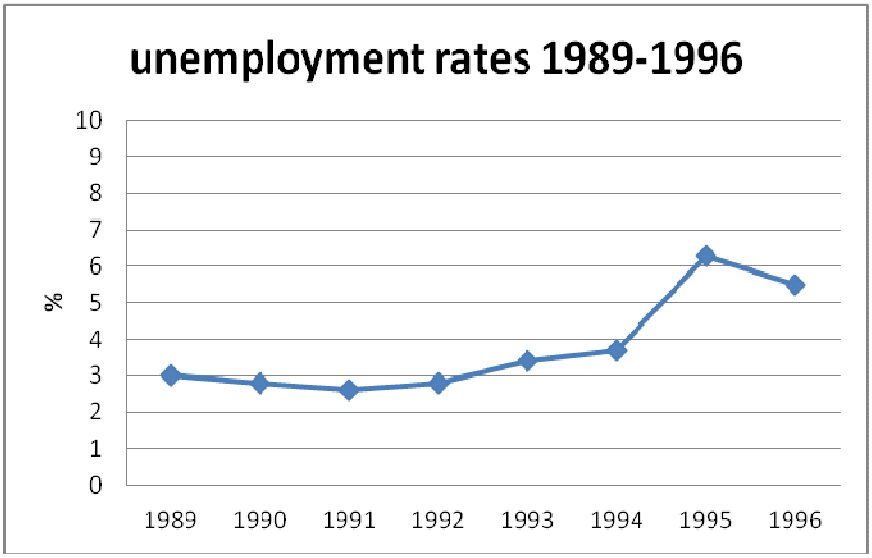
Furthermore, during the last three decades Mexico has been entrenched in a dynamic of permanent levels of poverty and inequality. Although Mexico's economic performance has achieved relatively stable conditions and even modest growth since the early XXI Century, virtually half of the Mexican population still lives in conditions of poverty (CONEVAL, 2011). The 1980s have been identified as `the lost decade´ as a result of the debt crisis that Mexico suffered in 1982[2]. During these years, there was "an acute and generalised fall in its basic economic indicators" (Cordera and González, 2001, p. 19) that inserted in the country persistent levels of poverty and inequality.

The neo-liberal reforms carried on during the 1990s, including privatisations and the signature of NAFTA with the United States and Canada, presented a promise for improving macroeconomic and social indicators. However, instability derived from political assassinations and the rise of the Zapatista movement in 1994 caused speculation. Many investors sold governmental bonds, which -like the Mexican peso- were practically pegged to the US dollar. Given that the Mexican peso had been over-valuated (Sachs, Tornell, and Velasco, 1996), capital flight resulted in a drastic reduction in Mexican reserves. The first thing that President Zedillo did after taking Office in December 1994 was to declare the Mexican peso to free-float against the US dollar and to devaluate the national currency. As a result, in December 1994 the country faced a financial crisis[3].

The "Tequila crisis" of 1994-1995 had a tremendous social impact. As Graph 1.1 shows, unemployment immediately doubled: it raised from 3.7% in 1994 to 6.3% in 1995 (Lustig and Székely, 1997). Also, between 1994 and 1997, mean income in the manufacturing sector suffered a reduction of 39%.

[2] Further details about the 1982 crisis are found in Alarcón, 2003; Lustig, 2001; Cordera and González, 2001; Selby, 1992; and Thorp, 1998.
[3] This topic will be also touched with detail in Chapter 7.

Graph 1.1. Unemployment in Mexico, 1989-1996



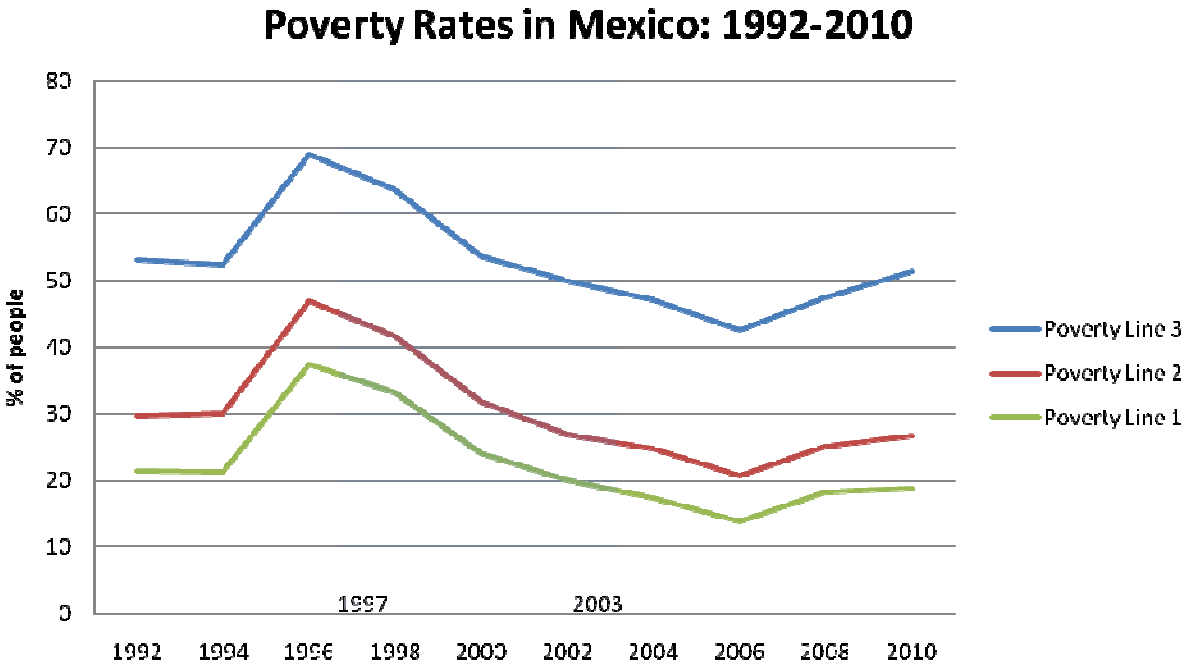
Source: own elaboration with data from Lustig and Székely (1997).

Furthermore, inflation increased from 8.4% in 1994 to more than 35% the year after, and aggregate figures of poverty levels went from 16% in 1994 to 29% two years later (Cortés and Hernández-Laos, 2003). These calculations for poverty rates are similar to the ones provided by CONEVAL[4]. According to their estimates, the proportion of people who did not have sufficient income to acquire food went from around 21% in 1994 to more than 37% in 1996. Then, there was a slight reduction until 20% of poverty rate was reached again in 2002. Poverty levels were at their lowest in 2006 (14%), but started to increase again afterwards (18.8% in 2010).

Understanding the macroeconomic context of the 1990s is important for this thesis given that the sample of children included in the analysis was born between 1997 and 1999. That is, in the period immediately after the financial crisis. Also, the well-being of children in this sample was assessed in 2003, when they were aged 4 to 6 years. The overall trend of poverty in the country and the time-frame studied in this thesis are represented in Graph 1.2.

[4] Cortés and Hernández-Laos (2003) definitions are: Poverty Line 1 = not having sufficient income for acquiring food. Poverty Line 2 = not having sufficient income for acquiring food, clothing, housing, health, education, and transportation. Poverty Line 3 = not having sufficient income for acquiring food, clothing, housing, health, education, transportation, energy, communications, personal care, and leisure. CONEVAL´s definitions are: Poverty Line 1 = not having sufficient income for acquiring food. Poverty Line 2 = not having sufficient income for acquiring food, health, and education. Poverty Line 3 = not having sufficient income for acquiring food, health, education, clothing, housing, and transportation.

Graph 1.2. Aggregate Poverty Rates in Mexico, 1992-2010



Source: own elaboration with data from CONEVAL (2009c) and CONEVAL (2011).

According to the 2010 Census, there are more than 112 million people living in Mexico, out of which around 11.6 million are aged 0 to 5 years (INEGI, 2011). Aggregate figures of child poverty mirror the overall experience of the country. During the mid-1990s, the country faced an increasing trend in the child poverty rates. According to Chen and Corak (2005), around 25% of Mexican children lived in poverty in the late 1980s and early 1990s and the proportion of children living in poverty increased to almost 33% a decade later.

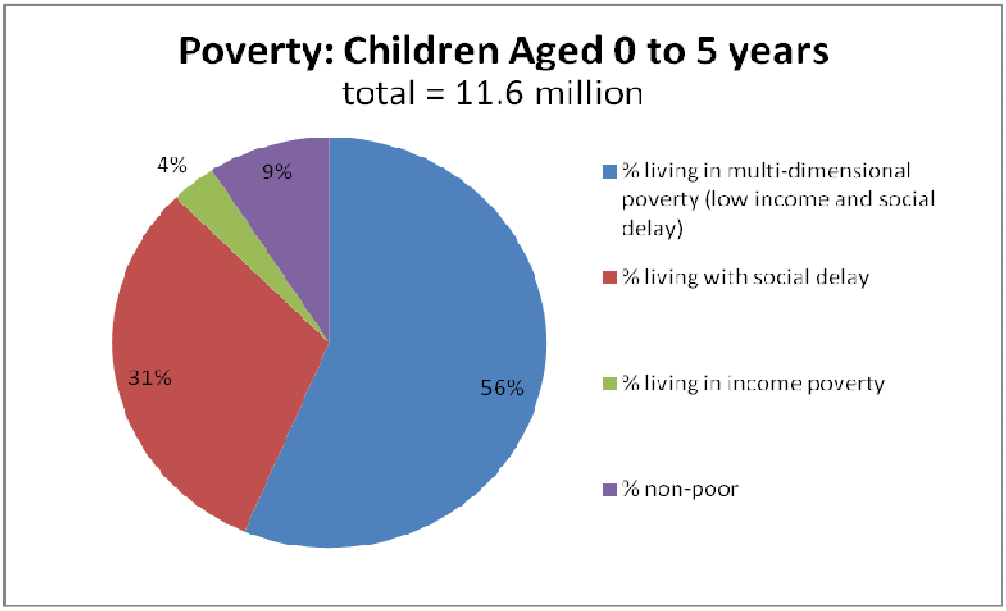
Most recent official figures estimate that almost 54% of the population below the age of 18 years in Mexico are considered to be poor in multiple dimensions (CONEVAL, 2011). That is, 21.4 million children and teenagers under the age of 18 years live in households that do not have sufficient income to acquire food, education, health, clothing, housing, and transportation. Also, these children suffer from at least one of the following: educational deficit, lack of access to health services, limited access to social security programmes, low quality of housing, and food scarcity[5]. In 2010, almost 10% of this age-group had not completed compulsory schooling and around 30% did

[5] This definition is based on the Alkire-Foster (2007) method. Further details about the items included in the basket and the methodology are found in http://www.coneval.gob.mx/cmsconeval/rw/resource/coneval/med_pobreza/Metodologia_final/Metodologia_para_la_Medicion_Multidimensional_de_la_Pobreza_en_Mexico.pdf?view=true

not have access to health services (compared to 11% and 41% in 2008, respectively). Among this age-range, 2.4 million children live in households that do not have sufficient income to acquire basic nutritional intake. Also, more than 1.1 million children aged 5 to 13 years work, primarily in farming (UNICEF, 2011).

With regard to the age group included in the analysis in this thesis (0 to 5 years), UNICEF (2011) estimates that more than 27% of children aged 0 to 5 years in Mexico live in households that do not have sufficient income to acquire food. A more specific analysis of income-poverty and deprivation is provided by Mexico´s National Council for Evaluation of Social Policy (abbreviated CONEVAL, for its name in Spanish). According to CONEVAL´s estimates, 56.4% of children aged up to 5 years are living in multi-dimensional poverty (2008 figures). In other words, around 6.6 million children under the age of 5 years live in households that are income-poor and that suffer from deprivation (officially named "social delay") in at least one of the following: education, health services, social security, housing, public services, and nutrition (CONEVAL, 2011). Also, 31% of children aged 5 or younger suffer from at least one of these dimensions of deprivation but have sufficient income to acquire the basic basket of goods (have some sort of "social delay" but are not income-poor). In addition, around 4% live in households that are income-poor but do not suffer from "social delay". That is, their income falls between the poverty line but have access to education, health services, social security, housing, public services, and good nutrition. Only 9% of children under the age of 5 are not income poor and not socially deprived. This is summarised in Graph 1.3.

Graph 1.3. Children Aged 0-5 Years Who are Living in Poverty in Mexico



Source: own elaboration using data from CONEVAL (2011).

As the paragraphs above show, the proportion of children living in poverty has increased during recent decades. Counter-intuitively, the living conditions of children have generally improved. According to UNICEF (2011), under 5-years mortality rate fell from 45% in 1990 to 17% in 2009; and school enrolment for girls increased from 61% in 1970 to almost 94% in 2005. Also, World Bank (2011) calculations show that the proportion of children under 5 years who had a low weight-for-age fell from around 13% in 1988 to 5% in 2006; and those who were stunted (low height-for-age) went from 29% in 1988 to 16% in 2006. Table 1.1 summarises some of the indicators described above, related to the macro-economic performance of Mexico during the last few decades and to child poverty.

Table 1.1. Macro-Economic and Social Indicators in Mexico, 1970-2010

	1970	**1980**	**1990**	**2000**	**2010**
Total population (million people)	48.2	66.8	81.2	97.5	112.3
GNI per capita (US Dollars, PPP)	-	$4,400 (1981)	$5,980	$8,960	$15,010
Inequality: Gini Coefficient	-	-	.543 (1992)	.552	.530 (2008)
Infant mortality (per 1,000)	110	73	45	26	19
School enrolment (%)	61	98 (1985)	98	98	98
Wasting under the age of 5 (%)	-	-	14 (1988)	8	5
Stunting under the age of 5 (%)	-	-	29 (1988)	18	16
Children under the age of 5 years (total)	9.6 million[+]	12.6 million[+]	11.6 million[+]	12.8 million[+]	11.6 million
Children aged 0-4 years living in poverty (%)	-	-	75 (1996)	62	61 (2008)
Children aged 5-12 years living in poverty (%)	-	-	80 (1996)	68	62 (2008)

Specific year marked in brackets, otherwise corresponds to year of column.
- data is not available.
Poverty = not having sufficient income for acquiring food, clothing, education, health, housing, and transportation.
[+] Own estimates using data from INEGI (2011).

Source: own elaboration using data from CONEVAL (2009a), INEGI (2011), SEDESOL (2010), World Bank (2011).

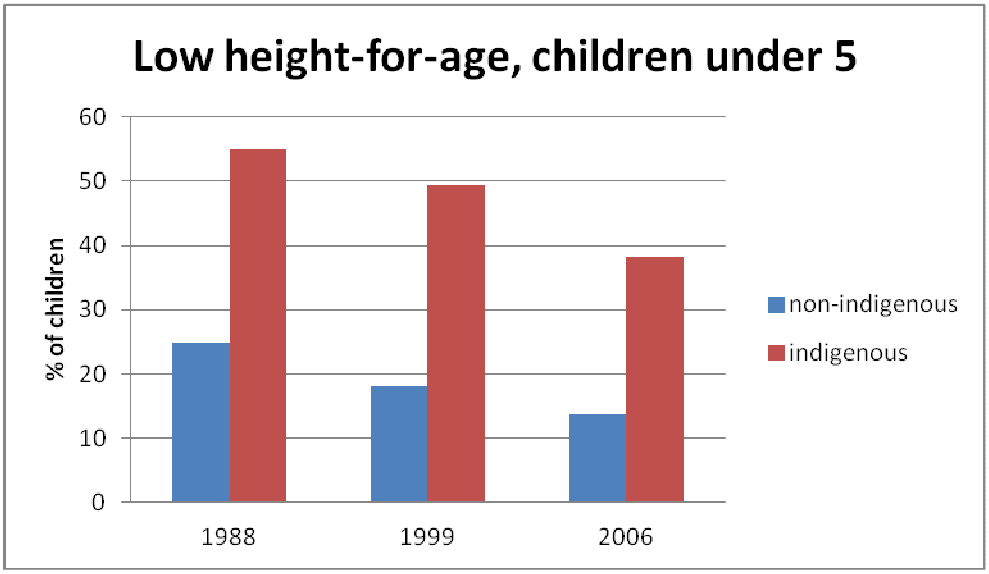
Location is an important factor for child poverty. As in many other regions in the world, rural-urban disparities are evident in various dimensions of well-being. In Mexico, around 22% of the population live in rural areas (CONAPO, 2011). However, more than 60% of households identified as extremely poor are located in rural communities (World Bank, 2005). Also, improvements in health and educational opportunities are slower in rural areas than in urban areas (Damián and Boltvinik,

2003). Similar to disparities seen in other socio-economic indicators, under-nutrition among children under 5 years old is more prevalent in rural areas than in urban areas. While 37% of children living in rural areas suffer from stunting, 29% of those living in urban areas have a low height-for-age (Hernández *et al*, 2003).

Another crucial issue must be accounted for in the examination of childhood poverty in Mexico: ethnicity. Around 10% of the population in Mexico is considered of indigenous background and there are 62 officially recognised groups across the country. However, most indigenous groups are located in rural areas (Calvario and Granados, 2008). Even more, despite cultural and linguistic variations, indigenous groups share a common characteristic: socio-economic disadvantages. Extensive research (Atal, Ñopo, and Winder, 2009; Bello and Rangel, 2002; Hall and Patrinos, 2004; CDI, 2011) has found that indigenous groups tend to have lower income, higher unemployment rates, worse quality of housing, lower educational level, and less participation in the public sphere than non-indigenous population. Generalised conceptions attached to ethnicity often lead indigenous groups to be discriminated against in terms of educational, occupational, and socio-political opportunities. As Navarrete (2008) argues, indigenous is often regarded as a synonym for poverty, under-development, and ignorance.

Poole, Gauthier, and Mizrahi have further argued that "poverty and inequality in Latin America, as in other regions, are closely linked to another phenomenon, ethnicity" (2007, p. 316). A relationship between poverty and ethnicity is certainly the case for children in Mexico. For example, UNICEF estimates that the proportion of indigenous children aged 5 years or younger who suffer from stunting is more than double than the proportion of non-indigenous children. That is, 33.2% of indigenous pre-schoolers (compared to 16% of non-indigenous children) have a low height-for-age. A study conducted by CONEVAL shows that even though the nutritional gap between indigenous and non-indigenous children in Mexico has reduced during the last couple of decades, there are still important differences. According to their estimates, in 1988 around 25% of non-indigenous children and 55% of indigenous children were stunted. In 1999, 18% of non-indigenous children and 50% of indigenous children were stunted. In 2006, the proportion of non-indigenous children who were stunted was reduced to 14%, but the proportion of indigenous children who were stunted was almost 40% (CONEVAL, 2009b). This is represented in Graph 1.4.

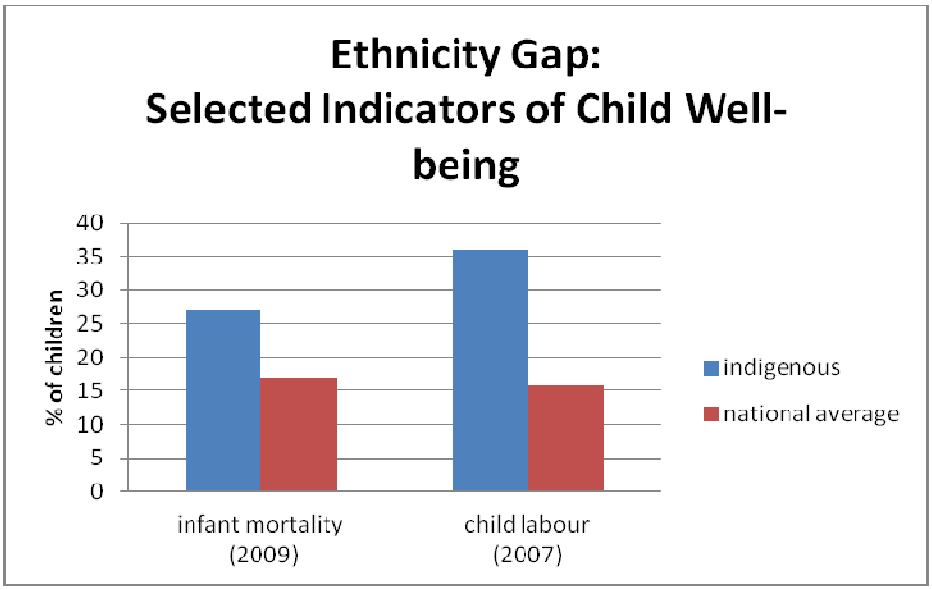
Graph 1.4. Evolution of Stunting in Mexico, Indigenous and Non-indigenous Children Under 5



Source: adaptation from CONEVAL (2009b).

Disparities in the well-being of indigenous and non-indigenous children are evident in other indicators. For example, infant mortality among indigenous populations is 1.6 times the rate among non-indigenous populations. Child labour is also more prevalent among indigenous populations than among non-indigenous populations; while 36% of indigenous children aged 6 to 14 are working, the national average of child labour for this age group is 15.7% (UNICEF, 2011). These differences are visually represented in Graph 1.5.

Graph 1.5. Indicators of Child Well-being in Mexico, Indigenous and National Average



Source: Own elaboration using data from UNICEF (2011).

Mexico faces important socio-economic challenges, especially the rural-urban and ethnic gaps. Governmental action has been beneficial for improving children´s lives. For example, PROGRESA-Oportunidades, governmental projects of subsidised milk and basic goods, and the expansion of childcare, educational and health facilities have reduced social inequalities. However, it is intriguing how despite these efforts and the improvement in well-being indicators during the last decades, there are still around 50% of children who are suffering from poverty.

The information presented in this section serves as a background for this research project. On the one hand, the shocking figures about childhood poverty in Mexico serve as a motivation for action. The ultimate spirit of this examination is that deeper knowledge could somehow help in addressing child poverty in Mexico. On the other hand, understanding the relationship between the macro-economic performance of the country, household material circumstances, and child well-being is intellectually challenging. Providing recommendations for policy would be beyond the objectives of this thesis. However, this research project aims at contributing to the academic understanding of the ways in which poverty affects child well-being at pre-school age. The next section introduces the research puzzle and describes the questions that drive this thesis.

Research Questions

The studies that look at the association between poverty and child well-being have multiplied due to an increased awareness of the importance of the early years, greater availability of datasets, and methodology of increasing sophistication. Theoretical refinement and larger accessibility of empirical data have made it possible for examinations (Aber *et al,* 1997; Gershoff *et al*, 2007; Guo and Harris, 2000; McDonough, Sacker, and Wiggins, 2005; Schoon *et al*, 2002; Strohschein, 2005) to propose a comprehensive perspective that takes into consideration material and non-material elements that influence the process of child development.

Important advances have been made in understanding the negative effects of poverty on children (see Literature Review chapter). However, there are some gaps in the literature. Firstly, the majority of research has been conducted in the United States, the United Kingdom, and other European countries. Evidence in other regions in the world, like Latin America, is scarce. Secondly, the assessment of child well-being has usually been conducted by looking separately at independent

indicators. Evaluations that include simultaneous dimensions of child well-being, are limited. Thirdly, most pieces of scholarly work have explored the effects of poverty on children by comparing their socio-economic well-being against children living in better-off conditions. It is still unclear the extent to which depth of poverty and differences at the household level matter for child development. Fourthly, there is inconclusive evidence related to whether the timing of poverty is associated with interruptions in the developmental processes of children. And finally, research has primarily been conducted in a cross-sectional way. Findings derived from cross-sectional studies are helpful in identifying the variables that mainly affect child development. However, longitudinal approaches could offer a more complete perspective of how various profiles of poverty over time are associated with child well-being (Dearing, McCartney, and Taylor, 2001; Korenman and Miller, 1997; Strohschein, 2005).

This thesis aims at contributing to the topic by examining a context that has not been thoroughly explored: Mexico. This requires us to consider whether existing indicators for measuring child well-being found in Anglo-speaking and European literature are replicable in the cultural and socio-economic setting of rural Mexico. Also, this thesis includes an examination of the effects of poverty on various dimensions of well-being. Thus, it is possible to evaluate the developmental processes that are most affected by poverty. Another contribution of this thesis is that the analysis maximises the differences within "the poor" by focusing on children living in poor and extremely poor communities in rural Mexico. Hence, it is possible to look at whether depth of poverty at the household level shapes child development. Finally, this thesis contributes to the knowledge on childhood poverty by using a novel approach. The evaluation through various types of longitudinal modelling helps to test hypotheses about the ways in which poverty affects children.

Aligned with the contributions described above, the research questions that drive the analysis are:

- How is child well-being conceptualised and measured?
- Is depth of poverty associated with differences in indicators of child well-being at age 4-6 years?
- Is timing of poverty associated with indicators of child well-being at age 4-6 years?
- Are overall household poverty trajectories associated with child developmental indicators at age 4-6 years?

Details about the analytic strategy for addressing each question are provided in the Methodology Chapter. However, the next section offers a summary of how each chapter engages with these key questions.

Summary of the Thesis

After this Introduction, Chapter 2, "Literature Review" presents an overview of original empirical research that has explored the effects of poverty on children in a quantitative way. This chapter includes a summary of each study, its methodology and findings. Also, it examines the theoretical background that could be of help for this thesis. Chapter 3, "Methodology and Data" describes the sample and presents the key variables included in the analysis. This chapter also introduces the methodology and the specific types of models that are used throughout the thesis.

Chapters 4 to 7 develop the empirical examination of the research questions. Chapter 4 "Bridging the Gap: Conceptual and Empirical Dimensions of Child Well-being", takes into account theoretical and empirical approximations of child well-being. This chapter looks at the question: How is child well-being conceptualised and measured? First, it reviews the role of public and private actors in shaping the notion of child well-being. Then, it develops a measurement model of child well-being that includes four domains: physical health, cognitive ability, motor co-ordination, and emotional competence. This model is used in the rest of the chapters as outcome measures.

Chapter 5, "Effects of Early Household Poverty and Infant Care on Child Well-Being at Age 4-6 Years", looks at the effects of household poverty and infant care around the time of birth on child well-being. This chapter addresses this research question: Is timing of poverty, particularly the first months of life, associated with indicators of child well-being at age 4-6 years?

Chapter 6, "When Poverty Happens: Timing of Income Fluctuations and Child Well-Being" also explores the question: is timing of poverty associated with indicators of child well-being at age 4-6 years? However, this chapter expands the analysis by including measurements of household poverty at other time-points in the child´s life that are assumed to be important in the developmental processes.

Chapter 7, “Growing Together: Overall Household Income Trajectories and Child Well-Being”, explores whether the overall household income trend is associated with the indicators of well-being. The research question addressed in this chapter is: Are overall household poverty trajectories associated with child developmental indicators at age 4-6 years? This chapter looks at whether change in household income is associated with indicators of child well-being at age 4-6 years.

Additionally to the specific research questions addressed in Chapters 5, 6, and 7, there is a question that is found throughout the thesis: Is depth of poverty associated with differences in indicators of child well-being at age 4-6 years?

Finally, Chapter 8, “Summary and Conclusions” offers a review of the results and reflections about the findings, the data, and the method. This chapter also includes an appraisal of this thesis as well as possible lines for future research.

CHAPTER 2

Effects of Poverty on Child Well-Being: A Bibliographic Journey[6]

During the last couple of decades, research about child poverty has proliferated. Numerous theoretical approaches, methodologies, contexts, and research questions are found within the literature on childhood poverty. While some studies concentrate on specific explanatory variables and specific outcomes, theoretical and methodological sophistication has driven research on child poverty towards a more comprehensive approach. Recent examinations about the effects of poverty on children propose a broader perspective that simultaneously combines several explanatory factors and various outcomes. These studies take into account the multiple relationships between household socio-economic characteristics and parenting practices that shape child development (Aber *et al,* 1997; Gershoff *et al*, 2007; Guo and Harris, 2000; Plewis *et al,* 2001; Spencer, 2000; Walker, 2003). This multi-dimensional approach takes into consideration medical and psychological work on child development as well as economic and sociological postulations.

However, it is not only the theoretical underpinnings of the effects of poverty on children that are varied (see Introductory chapter), but also their empirical approximation. Some studies have characterised profiles of children according to the duration and timing of their poverty experience (Ashworth, Hill, and Walker, 1994; Bradbury, Jenkins, and Micklewright, 2000; Delamonica and Minujin, 2007). Another set of investigations has explored the links between childhood poverty and outcomes at adolescent or adult years (Baydar, Brooks-Gunn, and Furstenberg, 1993; Duncan *et al*, 2009; Evans and Schamberg, 2008; Heckman and Masterov, 2004; Tomlinson, Walker, and Williams, 2008; Tomlinson and Walker, 2010). Also, while some pieces of research have looked at the effects of poverty on children in a cross-sectional way, others have used a longitudinal perspective.

Many studies have focused on understanding the pathways through which poverty affects well-being indicators during childhood. Amongst these, quantitative approaches comprise the vast majority of empirical evidence possibly due to two elements. Firstly, the expansion of longitudinal

[6] Part of this review was published in Valadez, L. (2008). What are the Pathways through which Poverty is Perpetuated across Generations? Unlocking Possible Evidence for the Mexican Case. *Indian Journal of Human Development.* Vol. 2. No. 2. pp. 303-323. Some of the narrative in this chapter is similar to the one in the aforementioned paper.

surveys has allowed researchers to follow the socio-economic dynamics of individuals throughout their lives. These first panel studies emerged in the United States in the mid-1960s and in the United Kingdom in the early 1990s. These longitudinal surveys have made it possible to trace the well-being of people from childhood and adolescence into adulthood. Secondly, inter-disciplinary investigations of child development have progressed towards conceptually-rich and methodologically-sound proposals. These two factors have fostered the production of studies about the effects of poverty on children, which combine evidence derived from the medical and psychological fields with socio-economic paradigms and methodologies.

In alignment with the questions and purposes that drive this thesis, which are explained in the Methodology chapter, this review concentrates on original empirical quantitative research[7] that examines the effects of household material deprivation on children. Specifically, it considers studies that look at indicators of health, cognitive ability, motor co-ordination, and emotional competence during childhood. Of particular interest is to revisit each study´s methodology, findings, and possible routes through which poverty affects children. The first section of this chapter looks at studies that have examined the effects of poverty on children in a cross-sectional way. The second section includes pieces of research that have developed a longitudinal perspective.

Cross-sectional Examinations

Cross-sectional examinations are the most numerous ones within the literature on childhood poverty, possibly because panel surveys and methodologies that can handle longitudinal data are relatively recent. They have set the foundations for exploring the relationship between household material circumstances and child well-being. This section reviews the studies that have looked at the effects of poverty on children in a cross-sectional way.

Effects of Poverty on Physical Health

A fair amount of studies have conducted cross-sectional examinations of the effects of poverty on health indicators. While some researchers have studied how poverty affects the general health state of children, others have focused on specific health indicators. Mare (1982) explored the

[7] Some of the recommended publications that provide exhaustive reviews on the topic but do not conduct original investigations are: Brooks-Gunn and Duncan (1997); Chen, Matthews, and Boyce (2002); Engle and Black (2008); McLoyd (1990); and Pollard and Lee (2002).

effects of socio-economic variables on child mortality rates in the United States. Using data for around 45,000 households included in the 1975 Current Population Survey, this author examined whether household income, maternal education, and ethnicity were associated with child death by infections, congenital causes, and accidents. Results showed that child death is more likely to happen in low income households and associated with low levels of maternal education. However, the author acknowledges that other variables may be playing a role: diet, housing, access to health care, and access to information about how to prevent or respond medical crises.

Gortmaker *et al* (1990) looked at the effects of chronic illness, household poverty, ethnicity, and other socio-demographic indicators on child behaviour. Their study utilises a sample of almost 12,000 children aged 4 to 7 years drawn from the Child Health Supplement of the National Health Survey in the United States. With the aid of logistic regressions, the authors found that low household income, low maternal education, and chronic illness are predictors of behavioural problems. Even though the primary focus of this study was the effects of chronic illness and not of poverty *per se*, the authors recognise the importance of incorporating poverty into the analysis given the possible interactions that may take place between household income and other explanatory variables. Gortmaker *et al* argue that household income and maternal education "were used rather than an occupational measure because of their clear theoretical relationship to the development of behavior [sic] problems in children" (1990, p. 270). Nevertheless, there is no further explanation about that theoretical relationship.

Chen, Martin, and Matthews addressed the question whether socio-economic status affects child health differently at different ages. Arguing that "socioeconomic status (SES) gradients may not be static across the lifespan, but instead may vary in strength across different life stages" (2005, p. 2161), their research used different cohorts from the National Health Interview Survey 1994 of the United States. These scholars found that low socio-economic status was associated with a global health indicator equally at all age groups. However, after examining specific health indicators, it was found that the relationship between socio-economic status and acute conditions (injuries and respiratory illness) was stronger for adolescents than for young children. The authors state that health status is associated with socio-economic status as well as with structural elements such as access to healthcare or beliefs about health. In fact, it seems that the authors try to capture the influence of material and non-material aspects on child health in their decision to use prestige and status as well as income and resources as indicators of socio-economic status. The theoretical

positioning of the paper touches on issues related to investments on children as well as on role models, particularly peer influence during adolescence.

Bauman, Silver, and Stein (2006) examined the extent to which poverty, ethnicity, parental education, and parental absence affect child health. The outcome indicator was a subjective measure of overall health, stating whether children had fair or poor health versus very good or excellent health. The analysis was conducted through logistic regressions and included more than 57,500 children under the age of 18 years in the United States, whose information was obtained from the 1994/95 National Health Interview Survey Disability Supplement. Results showed that worse health status was associated with the four risk factors –living under the poverty line, non-White ethnic background, low parental education, and parental absence. The authors argue that poverty affects children through poor nutrition, possible parental mental health problems, and higher likelihood of living in risky environments. Furthermore, they recognise the importance of structural elements by acknowledging that the explanatory power of ethnicity is mirroring its association with income.

Hatton and Martin examined the effects of household income per capita and family composition on the height-for-age and BMI of children born in the United Kingdom during the 1930s. Using the Boyd Orr cohort, the analysis was conducted through regressions. Their findings show that household income is positively associated with height but that birth order and family size have negative effects on this indicator. However, none of the predicting variables appeared to be significantly associated with BMI. With regard to the explanation of their findings, Hatton and Martin argue, "the two key channels through which the number of children in a family affects the health status of children is directly through the reduction on food intake and more indirectly through the effect of crowding via the level of hygiene on the incidence of disease" (2010, p. 182).

Among the authors that have focused on specific health indicators, Halfon and Newacheck (1993) examined the relationship between poverty and asthma. This study extracted data for children aged 17 years and younger from the 1988 National Health Interview Survey on Child Health. The analysis was conducted by separating children by ethnicity and poverty status (based on the US poverty line) and looking at mean differences of prevalence of asthma. Results show that poor children are more likely to suffer from asthma than non-poor children. Also, this difference is more evident in children younger than 6 years. These authors acknowledge that the higher prevalence of asthma in the United States could partially be derived from better diagnosis, increased awareness of

the problem, higher tendency to ask for help, or the natural progression of the disease (1993, p. 56). However, they argue that poverty affects child health through poor environments.

Effects of Poverty on Cognitive Ability

Another domain of well-being that has been found to be affected by poverty is cognitive ability. Whitehurst and Fischel (2000) examined the effects of socio-economic background on vocabulary acquisition in a group of 338 low-income children aged 4 and 5 years in New York state. Particularly, these authors aimed at exploring whether the reasons behind cognitive problems among children living in poverty were similar to those of middle-class children. The authors used the Peabody Picture Vocabulary Test, the Expressive One-Word Picture Vocabulary Test, and the Developing Skills Checklist to evaluate the children´s receptive vocabulary, expressive vocabulary, memory, auditory, print concepts, and writing skills. With the aid of structural equation modelling, the authors evaluated the effects of socio-economic status (measured through ethnicity, IQ of the main carer, and cognitive stimulation in the house) on children´s performance in the tests. Even though their analysis is longitudinal in the sense that it included three annual assessments of children´s vocabulary, the measure for socio-economic status was fixed at a single time-point. Results showed that there was a strong link between language and literacy skills during pre-school years but that it weakens during formal school. The authors argue that this process is the same for low-income children than for middle-class children.

McCulloch and Joshi (2002) examined the effects of family income, maternal education, and child rearing on language acquisition of children in Britain. These authors included the results for children between the ages of 6 and 17 and who were born from the mothers of the National Child Development Study, 1958 Birth Cohort Study. The indicator for language development was based on the results of the Peabody Picture Vocabulary Test and the predictors were family income, household resources, and parenting practices. With regard to the income measurement, despite the fact that the authors acknowledge the problems associated with it, they use the result of adding up the income of the cohort member and their partner. Household resources included maternal education, quality of housing, access to a vehicle, participation in holiday activities, and receipt of state benefits. The impact of parenting practices was operationalised through the amount of time that the family spend together, the provision of cognitive stimulation, and parental emotional support. Results showed that current income was not sufficient to explain deficiencies in the test scores but that sustained poverty showed a stronger effect. The authors also stated that family

income, putting the deficiencies in its measurement aside, was weakly associated with parenting practices but that maternal educative level contributes to the test scores of their children.

Farah, Noble, and Hurt conducted three studies among a group of sixty African-American children living in Philadelphia, half considered to be poor and half identified as middle class. Their research included five cognitive abilities: executive, language, memory, and spatial and visual abilities. They acknowledge that "not surprisingly, in view of the literature on SES [socio-economic status] and standardized cognitive tests, the middle SES children performed better than the low SES children on the battery of tasks as a whole" (2005, p. 7). The possible pathways that the authors use to understand the effects of poverty in the cognitive development of the children are inadequate nutrition, maternal substance abuse during pregnancy, lead exposure, and less cognitive stimulating environments.

Maternal employment has also been used in understanding differences in the intellectual development of children as it serves as a proxy for income and socio-economic status. Desai, Chase-Landsdale, and Michael examined the effects of maternal employment in the cognitive ability of a sample of children in the USA. These authors devoted a whole section of their paper to discuss the theoretical underpinning of their analysis, which is based on the Economic (or Human Capital Investment) Model. The main assumption of their examination is that higher investments on children would be associated with better cognitive development. Nevertheless, these authors recognise that the relationship between parental investments, maternal education, and other socio-demographic indicators is complex. Furthermore, they state that "there is no well-articulated conceptualization [sic] in demography of the mechanisms through which resources devoted to the child have their influence on the child´s cognitive, social, emotional, and physical development, although developmental psychology provides many insights about these mechanisms" (1989, p. 546). Using the information provided for year 1986 of the National Longitudinal Survey of Youth, the authors assessed the intellectual development of children aged 4 years through the results of the Peabody Picture Vocabulary Test. The analysis was based on Multiple Regressions that included ethnicity, maternal education and employment history, family income, maternal marital history, and birth order as predictors. Results showed that there was no relationship between maternal age or marital status in predicting child test scores and that "the overall effect of maternal employment on the child´s test score appears to be negligible" (1989, p. 557).

Effects of Poverty on Emotional Competence

Socio-emotional development has also been found to be affected by poverty. The scarring impacts of material deprivation on socio-emotional indicators sometimes have been associated with the influence of the socio-emotional problems of their parents and caregivers. Mistry *et al* looked at the effects of household income and perceived economic stress, mediated through parental responsiveness and disciplinary action, on psychological and behavioural outcomes. The sample consisted of 419 children aged 5 to 12 years and who were living in low-income households in a sample in Wisconsin, USA. Using structural equation models, the authors found that parental attitudes are affected by economic hardship. Even though this study did not explore the direct effects of household income and perceived economic problems on the indicators of child well-being, it looks at how material hardship indirectly –through their parents- affects child outcome. The authors argue, "less than optimal parenting predicted lower teacher ratings of children´s positive social behavior [sic] and higher ratings of behavior [sic] problems" (2002, p. 935).

Some scholars have looked at more direct effects of material deprivation on the emotional well-being of children. Evans, Saltzman, and Cooperman examined whether the quality of housing has an impact in child socio-emotional development. These authors used the Children´s Behaviour Questionnaire to assess the socio-emotional well-being of 277 children in the state of New York. Quality of housing was measured as a scale that included the physical infrastructure, cleanness, and accessibility of toys. Using regression analyses, their study showed that housing quality is significantly associated with the results of the test and that "as housing quality improves, children manifest higher levels of persistence on the unsolvable puzzle" (2001, p.393). The explanation given by these authors about the relationship between quality of housing and psychological well-being is related to motivation issues. In their words, "the belief that one´s actions have little effect on the environment appears to be a central tenet of learned helplessness" (*Ibid*, p. 395).

Effects of Poverty on Various Dimensions of Well-Being

While some studies have concentrated on how child well-being is affected by specific areas of material conditions such as household income, socio-economic status, or quality of housing, others have looked at a broader set of elements that affect child well-being. Hanson, McLanahan, and Thomson used the National Survey of Families and Households to assess the effects of material deprivation on around 2,800 children aged 5 to 18 years in the United States. The theoretical setting that these authors used is a combination of the Investment and Good Parent Models. On the one

hand, they argue that poverty "may reduce parents´ ability to supply adequate food and materials necessary for a child´s healthy development; reduce a family´s access to important community resources such as safe neighborhoods [sic], good schools, adequate recreational facilities, and health services; and undermine effective socialization [sic] practices that foster cognitive and social development in children" (1997, p. 190). On the other hand, these scholars argue that poverty, loss of income, and unemployment affect parental attitudes towards children, parental responsiveness and affection, and is associated with harsh disciplinary actions (*Ibid*, p. 191). Their study was conducted by regression models that included as outcomes indicators related to academic achievement, behavioural and psychological well-being, and a measure for overall well-being. The predicting variables were income-to-needs ratio and household debt, as well as variables related to parenting practices, household composition, ethnicity, and parental age and level of education. Results showed that higher income is generally associated with better well-being indicators and that income loss is associated with worse indicators of well-being. Furthermore, parenting practices were associated with income differently for different cases. Firstly, more affectionate and supportive parenting reduces to some extent the negative effects of low income in two-parent households. Secondly, parenting practices were more beneficial for non-poor children than for poor children in single-parent households.

In a study in the United Kingdom, Sacker, Schoon, and Bartley (2002) examined whether the effects of social inequality on children are similar as they grow older. The authors extracted data from the National Child Development Study for a sample of around 15,500 children at ages 7, 11, and 16 years. Even though this piece of work includes outcomes at various ages, the analysis is conducted cross-sectionally in separate models for each point in time. With the aid of Structural Equation Modelling, the analysis compares results from two models, named class inequalities model and contextual-systems model. In the former, the explanatory variable for social inequality is class; in the latter, the explanatory variables are social class, material deprivation, parental aspirations, parental involvement, and school composition. In both cases, outcome variables are educational achievement and psychosocial adjustment. Results of the first type of modelling indicate that the effects of social inequalities increased from age 7 to age 11 and remained stable at age 16 years. Results of the second type of modelling show that the effects of inequalities on children continue to increase up to the age of 16 years. Further, the effects of parental involvement seem to reduce and the effects of material conditions and school composition become more importantly associated with educational achievement and psychosocial adjustment.

Gershoff *et al* explored the effects of household income and material hardship on child cognitive and socio-emotional outcomes. This study was theoretically sustained by elements of both the Investment and Good Parent Models as their analysis framework includes parental time and money investments on children as well as parental behaviour. The authors recognise the importance of both material and non-material aspects in exploring child well-being, and argue that "family income is unlikely to have direct effects on children; after all, young children have few opportunities or responsibilities to spend money themselves. Instead, it is expected that the effects of family income on children are mediated through its effects on parents" (2007, p. 70). The sample was comprised of more than 21,000 children aged 6 years in the United States whose information was obtained from the Early Childhood Longitudinal Study, Kindergarten Class of 1998-99. The authors developed structural equation models that incorporated parental investments, stress, and behaviour as mediators of income and hardship. The models also controlled for ethnicity, family size, and parental level of education and employment status. Results showed that family income was positively associated with cognitive and emotional outcomes and that material hardship was correlated with worse child outcomes in both domains. Also, parental investment, stress, and behaviour generally mediated the effects of income and material hardship on children.

On a follow-up paper, Raver, Gershoff, and Aber (2007) tested whether these models and findings were equivalent for different ethnic groups in the USA. The authors pointed out that the models showed comparable results for all ethnic groups, with regard to the overall effects of income, material hardship, and parenting on children. However, there were some differences in the strength of some of the effects on cognitive achievement.

As the studies above reveal, most research has been conducted in the United Kingdom and the United States. Research conducted in Latin America is different from the one reviewed so far, both in magnitude and in substance. In other words, the studies about the effects of poverty on children are not only considerably scarcer in Latin American than in the United States and Europe but are also rooted in a different discourse. Most of the analyses in Latin America understand the scarring effects of poverty on children as a central issue in the reproduction of poverty from one generation to another (Aldaz-Carroll and Morán, 2001; Behrman, Gaviria, and Székely, 2001; Castañeda and Aldaz-Carroll, 1999; Silber and Deutsch, 2008; Zenteno and Solís, 2006). Consequently, little attention has been paid at the pathways through which poverty affects the well-being of children while young. Nevertheless, it is relevant to review the research that has been conducted in

the region in order to position this thesis in the existing literature of the region. This is offered in the next sub-section.

Evidence in Latin America

Gragnolati explored the effects of household material circumstances (measured through consumption), community public and economic infrastructure, and socio-economic and demographic characteristics on child height-for-age. The sample consisted of almost 3,000 children aged 5 years or younger whose data was extracted from the Guatemalan Survey of Family Health in 1995. Multi-level regressions showed that indigenous children and particularly those whose mothers do not speak Spanish were more likely to be stunted than non-indigenous children. The author argue that "the worse growth patterns of children of indigenous mothers are for the most part accounted for by the poorer household and community conditions in which they live and that the ability to speak Spanish provides Guatemalan mothers with means of improving their children´s health and nutritional status" (1999, p. 17).

Vargas-Mendoza *et al* (2006) examined the effects of poverty on cognitive development of children living in Oaxaca, one of the poorest states in Mexico. The authors conducted individual interviews with children; the younger cohort (aged 2 years) was evaluated in their knowledge of vocabulary and the older cohort (aged 8 years) was assessed by being asked to draw the human body. Children were divided into two groups, according to whether their households earned below or above a threshold of 10,000 Mexican Pesos (MXP) per month[8]. This study consists of a small sample (9 children in the younger cohort and 12 children in the older one) and the elaboration of the socio-economic characterisation is rough. However, results are consistent with larger studies found in other countries. As expected, children coming from lower socio-economic backgrounds performed worse than children living in more affluent households. The authors state that "extreme poverty imply [sic] hungry [sic] and ignorance" and mention low parental involvement with children due to the need to work and scarcity of resources in the region. These issues somehow suggest that

[8] Around £500 or $850 at 2011 exchange rates. The authors do not discuss the reason for choosing this amount as a threshold or if the amount is equivalised. As a matter of reference, before the adoption of Alkire and Foster´s (2007) method for measuring poverty in a multi-dimensional way, there were various official poverty lines in Mexico. These poverty lines were income-based and were set at three levels: not having sufficient income for acquiring food (Line 1); not having sufficient income for acquiring food, clothing, housing, health, and education (Line 2); and not having sufficient income for purchasing items on the previous lines plus energy, communications, transportation, and personal care (Line 3). In 2006, Line 3 was of around 1,600 MXP per capita per month in urban areas and around 1,000 MXP per capita per month in rural areas (CONEVAL, 2009). Thus, the decision made by these authors of using 10,000MXP per household could be considered as a safe (although arbitrary) cut-off point for defining households as middle-income or low-income.

the pathways through which poverty affects children are nutrition, education, parenting, and structural constraints but there is no further theoretical discussion.

Fernald *et al* (2005) examined whether the timing of PROGRESA-Oportunidades would have a differentiated effect on the physical and intellectual development of children. The study used the Bayley Scales of Infant Development, which includes indicators of memory, problem-solving abilities, learning, perception, and language development. The analysis also included anthropometric information for children along with the indicators examined in a psycho-social test. These authors deployed a questionnaire that included all households among a random sample of 131 semi-urban programme-eligible communities in the country. The analysis, conducted through Multiple Regression models, showed that although the scores of children were close to the normed mean, older children scored lower than expected. Perhaps the most relevant finding was that "none of the parental or socio-economic factors that (were) included in the analyses contributed significantly to MDI or HAZ[9]" (2005, p. 182). The authors acknowledge that this may be the result of using a sample that came from very similar socio-economic backgrounds and that little variation was found in the predicting poverty-related variables.

Results of Fernald *et al* (2005) differ from the ones in a study conducted by Fernald and Neufeld (2007). In the latter, the authors examined the relationship between nutritional status and socio-economic background in a sample of children living in low-income families in rural Mexico. This study could be comparable to this thesis because both used the same dataset. However, the aforementioned study differs from this thesis mainly because the examination is conducted cross-sectionally and not longitudinally. Consequently, it includes children in a broader age range[10]; the sample consists of more than 7,500 children aged 2 to 6 years. The authors conducted logistic regression analysis to look at the factors associated with the probabilities of being stunted, over-weight, and concurrently stunted and over-weight. As predicting variables, the models included socio-economic status (measured through household assets and housing quality); ethnicity; household composition; maternal age, BMI, and height; maternal score in the PPVT; maternal education level; perceived social status; and parental marital status. Results show that socio-economic status; maternal age, height, level of education, and PPVT score; perceived social status; and household size were correlated in a statistically significant way the health status of children. The explanation about the relationship between poverty and nutritional status is founded in the fact

[9] Mental Development Index and Height-for-Age.

[10] The survey was not implemented in 2001 and 2002. Therefore, children aged 2 and 3 years in 2003 (when well-being was assessed) had to be excluded from the analysis in this thesis because there is no historical information in the panel for these age groups. Further details are found in the Methodology chapter.

that Mexico is a transition economy. According to these authors, the economic uncertainty leads people to over-eat when food is available and to have a diet that is rich in energy but low in nutrients. Also, the authors argue that indigenous background *per se* does not imply lower nutritional status but that poorness associated with indigenous ethnicity is structural (2007, p. 629). Finally, they point towards other elements not included in their study that could explain child nutritional status: parenting, time spent watching television, food insufficiency (*Ibid*, p. 630).

Paxson and Schady examined the role of wealth, health, and parenting in the cognitive development of children in Ecuador. These scholars argue that "the way in which low socioeconomic status interacts with poor health and inadequate parenting behavior [sic] in determining child cognitive development in poor countries is not well understood" (2005, p.2) and contributed towards this task. The study included information for more than 3,000 children between 36 and 71 months old who came predominantly from low-income families. This study used the Peabody Picture Vocabulary Test to evaluate the cognitive development of children and included as explanatory variables measures for health and nutrition of the child, household wealth, parental education, parenting practices, and number of siblings. The authors used ordinary least squares regressions and results for the Peabody Scores are consistent to the ones presented by Fernald *et al* (2005), where older children performed worse than the normed median and that the dispersion of scores is higher in older than in younger children. Also consistent with the literature, household wealth and parental education were significantly associated with higher scores in a positive way. Even more, "the associations of test scores with wealth and maternal education are larger for older children, suggesting that these factors have cumulative effects on cognitive ability" (2005, p.ii).

Desai used data from Bolivia, Brazil, Colombia, the Dominican Republic, Guatemala, and Trinidad in Tobago, along with other African and Asian countries to explore the effects of household wealth and family composition on children. The empirical work is set up to contest the idea that larger families are detrimental to child well-being. Three assumptions are clearly stated, "(1) Parents, rather than the state or extended kinship groups, provide the bulk of economic and non-economic resources available to children; (2) Parental resources, rather than external social institutions, are important determinants of children´s well-being; (3) The resources available for consumption by children within the family are fixed, and do not depend on the total number of children" (1995, p. 196). Data was obtained from the Demographic and Health Surveys from 1986 to 1990, which included reproductive histories and socio-economic background of women. Household material circumstances were measured through a wealth index that included quality of housing and

possession of consumer durables. Child well-being was measured by height-for-age and weight-for-age ratios; all children between the ages of 6 and 36 months were included. The analysis was conducted through regression analyses that controlled for the educative level of the mother and her partner, urban residence, marital status of the mother, and number of siblings. Results showed that maternal education, living in urban areas, and household wealth were positively associated with the child´s chances of not being stunted. However, the author argues that child physical growth could also be related to other non-family variables; "environmental factors rather than parental resources dominate the variation in child growth" (1995, p. 206). The author also discusses the difficulties of assessing parental motivation and its relation with the allocation of resources.

The main focus of cross-sectional studies has been placed in comparing child outcomes of children living in poverty against those living in better-off conditions. Nevertheless, cross-sectional examinations have enriched our knowledge on the topic with three main contributions. Firstly, they have helped to define child well-being and the indicators to measure it. Secondly, they have provided methods to evaluate the effects of material and non-material aspects on children. And thirdly, findings about the explanatory power of household income, of demographic and socio-economic characteristics, and of parental input on children have helped in the construction of theory. However, more recent studies have emphasised the need for a longitudinal approach; these studies are reviewed next.

Longitudinal Examinations

Under the argument that measurements of poverty at a single point in time do not capture a child´s poverty life-time experience, and with greater availability of panel databases, the volume of longitudinal research has increased. These studies have used the knowledge gained from cross-sectional approximations to explore issues related to whether duration and timing of poverty are associated with child outcomes. Furthermore, longitudinal studies have offered an attempt to explore causation in the relationship between poverty and child well-being.

Effects of Poverty on Physical Health

Korenman and Miller examined the long term effects of poverty on stunting and wasting; meaning low height-for-age and low weight-for-age ratios, respectively. They focus on these two anthropometric indicators because, according to them, "one reason deficits in nutritional status in

early childhood might be greater based on long-term rather than single-year [current] poverty measures is that poverty during the prenatal period or early childhood is particularly detrimental to health and development" (1997, pp. 70-71). The authors used the National Longitudinal Survey of Youth to obtain information provided for children born between 1979 and 1988 in the United States. The study included an examination of the nutritional status of children aged five to seven years and the motor and social developments of newborns to children aged two years. Results show that poverty poses a negative effect on these indicators during the early years on a general scale but that the effect varies across outcomes and sub-samples. Particularly, this study found that poverty had no significant effect on stunting among black children. These authors argue that "the relationship between lifetime poverty and stunting may reflect the ability of a long-term income measure to capture the effects of poverty in the prenatal year and at ages zero to three rather than the effect of long duration *per se*" (*Ibid*, p. 94). With regard to weight, the analysis showed that a condition of under- or over-weight was not significantly correlated with long-term poverty, but that poverty in the recent months was associated with a higher probability for being under-weight. The authors raise the need for understanding in a better way the relationship between poverty and child health and discuss nutrition as a key element.

In another piece of research developed in the United States by Malat, Oh, and Hamilton asked whether the duration of poverty has an impact on the health of children. These authors used the Panel Study of Income Dynamics and the Child Development Supplement of 1997 and considered parental assessment of their child´s condition as a health indicator. The parental assessment was correlated a dichotomous measure of poverty for each year of the child´s life to evaluate whether the length of poverty spells affect the health status of the child. Results showed that longer periods of poverty were associated with more health problems. After controlling for the carer´s educative level and household structure, their study also found that "African American children suffer poorer health compared to white children" (2005, p. 445). The researchers acknowledge the limitations of using ordinary least square regressions with no longitudinal data, given that "worse child health might result in lower family income" (*Ibid*, p. 446), meaning that the relationship between household poverty and child health could be bi-directional.

Séguin *et al* conducted a study among pre-school children in Canada, using the Quebec Longitudinal Study of Child Development and following the birth cohort of 1998. These authors included five indicators of child health: asthma attacks, any kind of infection, growth delay, a cumulative health-problems index, and maternal assessment of the child´s health. The definition of

family poverty was based on evaluating the frequency that the household had a household income the last year below the official poverty line, resulting in the categorisation of households as never poor, intermittently poor, and chronically poor. Results showed that more frequent asthma attacks, a higher probability of having two or more infections, and maternal negative opinion about the child´s health were correlated with poverty. Part of the explanation given by Séguin *et al* is that "poor mothers have more children, and they are breastfed less often or, if so, during a shorter period than mothers with sufficient income. They are more likely to be young, have limited education, be heading single-parent families, be non-European immigrants, be of a shorter height, and be smokers. They receive less social support from their network and more often report having been subjected to physical violence" (2007, p. 1065). Their research also found that, despite contesting evidence from previous literature, infections were not associated with chronic poverty among the children included in this study. According to them, this is probably related to the fact that children living in poverty are less likely to attend nurseries or child care centres, which are the main source of infections.

Effects of Poverty on Cognitive Ability

Guo (1998) explored whether duration and timing of poverty are correlated with child and adolescent outcomes in a sample in the United States. Using the National Longitudinal Survey of Youth, the author conducted mixed linear models that included various measures of household poverty, parental characteristics, household composition, and ethnicity as predictors. Outcome variables of cognitive achievement were measured by the Memory for Digit Span Assessment and four examinations of the Peabody Test family: reading recognition, reading comprehension, Mathematics, and Picture Vocabulary. Longitudinal poverty was measured through proportion of years spent under the poverty line, average income-to-ratio in the year prior to well-being assessment, and average yearly household income. Results showed that poverty suffered during early childhood was associated with cognitive ability and poverty experienced during the adolescent years was significant for cognitive achievement. With regard to the controls, maternal cognitive achievement and schooling level is a significant explanatory variable for all tests. Ethnicity, location, and household composition are significant for some of the tests. The analysis is rooted on theory of child development, emphasising the stages of learning and life experiences.

Guo and Harris explored the effects of poverty on the intellectual development of children in the USA, using data from the National Longitudinal Survey of Youth. This dataset provides the results obtained in 1986, 1988, 1990, and 1992 of four cognitive tests for the children of women

aged 14 to 21 in the original sample of 1979. The four tools are included in the Peabody compound of tests: the Reading Recognition Assessment, which measures word recognition and pronunciation; the Reading Comprehension Assessment, which measures the ability to understand the meaning of sentences; the Mathematics Assessment, which measures mathematical abilities; and the Picture Vocabulary, which measures the child's receptive vocabulary. These scholars base their study in the assumption that both material and non-material factors mediate the effect of poverty on the cognitive development of children. They developed four structural equation models, one for the test results of each year, which included five latent factors: cognitive stimulation, parenting style, physical environment, health at birth, and health during childhood. Guo and Harris found that "the influence of family poverty on children´s intellectual development is mediated completely by the mechanisms measured by the latent factors" (2000, p. 442). This means that parental involvement in the cognitive stimulation of their children plays an important role in the intellectual development of children despite the material constraints. However, their study also found that the mediating factors are in fact affected by lack of income, which limits the opportunities at reach of parents to promote the cognitive development of their children.

Dearing, McCartney, and Taylor (2001) used data from the National Institute of Child Health and Human Development Study of Early Child Care to explore the extent to which household income dynamics would help to explain indicators of cognitive ability at 3 years of age. The analysis was conducted through growth curve models to look at changes in household income-to-needs ratio from around the time the child was born to age 36 months. Cognitive ability was measured through the Bayley Scales of Infant Development and the Bracken Basic Concept Scale. Results showed that improvements in household income were associated with better cognitive outcomes and declines in household income were associated with worse outcomes.

Yeung, Linver, and Brooks-Gunn examined the effects of income and family processes on the cognitive development of pre-school children in a sample in the USA. These authors argue that "there is a substantial gap in the literature linking income and children´s outcomes in understanding the processes by which childhood economic conditions affect children; that is the pathways that mediate the association between income and child well-being. This gap limits our ability to explain why income matters, when income matters, and why it has a stronger effect on children´s cognitive achievement than on behavior [sic]" (2002, pp. 1861-1862). With the purpose of filling this gap, the authors used the Panel Study of Income Dynamics and the Child Development Supplement to develop a structural equation model that would evaluate the effect of household income, cognitive

stimulation and environment in the house, and parental stress and behaviours on the cognitive development of 753 children between the ages of 3 and 5 years in 1997. The tests that were used to assess the intellectual development of children were the Woodcock-Johnson Achievement Test and the Behaviour Problem Index. The former includes vocabulary and problem-solving abilities; the latter includes several items related to externalisation of behaviour traits. Long-term income was measured through average total pre-tax household income from the child´s birth to the year before well-being was evaluated. The models also included an indicator for income instability, captured by the proportion of years in which the household experienced at least a 30% income decline. Results showed that for the applied problem component of the Woodcock-Johnson Test, "the direct effect of income on a child´s achievement was reduced by more than half and became nonsignificant when the investment mediators were added to the baseline model" (2002, p. 1870). For the letter-word score, however, the effect of income was reduced by the mediating factors but it still proved to be significant.

Schoon *et al* (2002) explored the effects of long-term poverty on academic achievement. Using the National Child Development Survey 1958 cohort (NCDS) and the British Cohort Study 1970 (BCS70), the analysis was conducted through Structural Equation Modelling. The explanatory variables were parental social class and household material conditions. The strategy included measures of both predictors and outcomes at ages 5/7, 10/11, and 16 years of each. For the age-group of interest of this thesis, outcome variables at ages 5/7 years were measured by the Human Figure Drawing Test. Results showed that sustained poverty was an important predictor for cognitive outcomes for both samples. Also, the effects of poverty at age 5/7 years was stronger for the NCDS sample (age 11) and smaller but anyway significant for the BCS70 (age 10 years). The explanation provided by the authors is named "developmental-contextual systems model" (2002, p. 1486), which includes parenting according to the historical needs and expectations, differences in the macro-economic circumstances in each cohort, and the argument that risks are not evenly distributed across populations.

Griffore and Phenice conducted Multiple Regression analysis to look at the effect of cognitive stimulation, total number of years in poverty, maternal educative level, and neighbourhood problems on PPVT scores. Data was extracted for around 1,800 cases from the USA National Longitudinal Survey of Youth. These authors conclude that "a large proportion of the PPVT variance in the four regression analysis presented here is explained by one variable: HOME [Home Observation for Measurement of the Environment standard score]. Some additional variance is

explained by perception of neighborhood [sic] problems. Very little additional variance is explained by adding the demographic or social residence variables" (2008, p. 51). Results show that the number of years in poverty was associated with worse PPVT scores, but no further theoretical discussion was provided.

Effects of Poverty on Emotional Competence

McLeod and Shanahan (1996) evaluated the relationship between household poverty history and child mental health. The study utilised information from the USA National Longitudinal Survey of Youth and was conducted by linking the proportion of years spent in poverty with emotional well-being trajectories measured by Latent Growth Models. Child depression and anti-social behaviour were measured with indicators obtained from the Achenbach Child Behaviour Checklist. Trajectories for these two dimensions of mental health were obtained through Growth Models from ages 6-7 years to 8-9 years. Household poverty was measured as current total annual family income relative to the official poverty line; and through proportion of years a child spent in poverty. Results showed that current household income was significantly associated with anti-social behaviour. Also, the proportion of years spent in poverty is associated with anti-social behaviour, so that children who permanently lived in poverty showed the worst outcomes. These authors consider life-course theory as well as parenting and family interactions in exploring the effects of poverty on child mental health.

Strohschein (2005) analysed the effects of household income trajectories on child mental health trajectories. The analysis was conducted through Growth Curve Models that include the effects of initial household income and income rate of change on child depression and anti-social behaviour. The study followed children from age 4 to 14 years using data contained in the Child Supplement of the National Longitudinal Study of Youth. Child mental health was assessed through a version of the Achenbach Child Behaviour Checklist. Household poverty was measured through total maternal, and if applicable spouse or partner, income for each year in the panel. Results show that initial household income level is positively associated with better indicators of child well-being; lower income is correlated with higher levels of depression and anti-social behaviour. Also, results indicate that improvements in household income are associated with improvements in child mental health. This study touches on the influence of home environment on child mental health, but the analysis is primarily based on the Investment Model.

Effects of Poverty on Various Dimensions of Well-Being

Duncan, Brooks-Gunn, and Klebanov (1994) examine the effects of long-term poverty on child cognitive and emotional development. Specifically, these authors investigate whether duration and timing of household poverty are associated with child well-being at ages 4 to 6 years in a sample of children in the USA. The study was based on the information provided at the household and at the neighbourhood level in the Panel Study of Income Dynamics and in the Infant Health and Development Program. The indicators for measuring child outcome were the Wechsler Preschool and Primary Scale of Intelligence and the Revised Child Behaviour Profile. The authors developed Multiple Regression models and included as predictive variables neighbourhood conditions, level of poverty of the household, maternal educative level and marital status, birth weight and gender of the child, and learning and stimulating environment in the house. Household poverty was measured by calculating income-to-needs ratio for each of the years of the study, where a ratio of 1 indicates that household income is equal to the poverty line. Then, duration of poverty was captured by stating whether households had an income-to-needs ratio of less than one in some, all, or none of the time-points. Timing of poverty was assessed by stating whether children suffered from early and late poverty; early but not late poverty; or late but not early poverty. Results showed that income is correlated with the results from both the cognitive and the socio-emotional areas but that the effect is greater in the variance of the IQ than in the variance of the behavioural traits. With regard to non-income variables, maternal educative level proved to be positively associated with the cognitive achievement of children and living in deprived neighbourhoods appeared to increase the incidence of behaviour problems. Finally, these authors argue that duration of poverty is significantly associated with cognitive and behavioural well-being. However, timing of poverty during early childhood is not significant as poverty was equally detrimental for children regardless of when it happened. These authors review possible explanatory discourses, including: community resources and public services available; peer influences; collective socialisation; competition for resources; and relative evaluations of material circumstances (1994, p. 298). However, their own analysis emphasises human capital investments in children.

Duncan *et al* used USA Panel Study of Income Dynamics to explore whether poverty suffered at different periods of childhood and adolescence is correlated with school completion and non-marital childbearing. Poverty was measured by average household pre-tax income in three periods of time: from birth to age 5 years; from 6 to 10 years, and from 11 to 15 years of age. Timing of poverty was explored by comparing outcomes for siblings within same households, who experienced poverty at different points in their lives. The analysis was conducted through regressions that

included various versions of the income variables as well as ethnicity; child gender; household composition; maternal age, education level, and employment status; and location. Results show that household income was related to school completion and to a lesser extent to non-marital childbearing. Also, the effect of household income on school completion is higher for low-income children than for children living in better-off families. Finally, findings point out that household income during early childhood is a stronger predictor on school completion than household income during mid-childhood. The authors conclude that "taken as a whole, our data are consistent with the hypothesis that raising the incomes of poor families will enhance the abilities and attainments of their children" (1998, p. 421). The analysis of this paper reveals a theoretical underpinning based on the Human Capital Investment model, where family income plays an important role in securing child well-being.

Blau studied the effect of longitudinal parental income on the cognitive, social, and emotional well-being of children in the USA. Data was extracted from the National Longitudinal Survey of Youth. Outcome indicators included results of the Peabody Picture Vocabulary Test, the Peabody Individual Achievement Tests of Mathematics and Reading Recognition, the Verbal Memory Test, the Behaviour Problems Index, and the Motor and Social Development. Material deprivation was measured by total household income in the year prior to well-being assessment; maternal employment and non-employment income; and average household income between 1979 and 1991. With the aid of ordinary least square models, the author found that current income is not as strongly correlated to child outcome as permanent (average) income. Also, results showed that household characteristics such as ethnicity and maternal educative level are important predictors of child outcome. Findings suggest that child development is more related to family characteristics and ethnicity than to household income, leading the author to conclude that "policies that affect family income will have little direct impact on child development unless they result in very large and permanent changes in income" (1999, p. 261). With regard to theoretical foundations of their findings, authors discuss the role of genetic and environmental factors as well as parental investments in children.

The NICHD (2005) conducted a study to evaluate whether duration and timing of poverty are correlated with cognitive and behavioural outcomes by 9 years of age in a sample of children in the USA. Mental ability was measured through the Bayley Scales of Infant Development, the Bracken scale of Basic Concepts, the Reynell Developmental Language Scales, and the Woodcock-Johnson Psycho-Educational Battery. Behavioural problems were measured through the Achenbach Child

Behaviour Checklist. Poverty was measured by calculating income-to-needs ratio based on total household income. Children were classified according to whether they lived in poverty only during their first three years in life, only between ages 4 and 9 years, or throughout their entire lives. The analysis was conducted by Growth Curve Models that included the poverty classification variables as well as ethnicity, child age and gender, maternal education level, household composition, maternal emotional well-being, and home environment as predictors. Results showed that situations of early, late, or consistent poverty were associated with worse indicators of child well-being than a situation of no poverty. Furthermore, those who experienced later poverty manifested worse well-being indicators than those who suffered from early poverty. This study uses elements of the Investment Model to help to understand why children who were living in poverty manifest worse conditions than those who were not living in poverty. However, this piece of work also includes elements of the Good Parent Model, such as quality of care, time investments, parental depression, and family arrangements.

The study of Wagmiller *et al* (2006) looked at the relationship between poverty trajectories during childhood and outcomes in early adulthood in a sample in the United States. Even though the outcome variables assessed schooling and employment indicators at age 25, an important contribution of this study is the classification of poverty histories throughout the childhood years. Using the Panel Study of Income Dynamics, the authors conducted Latent Class Models to classify children according to their household longitudinal income pattern over 12 years. The study follows around 1,000 children from age 0-3 years to age 11-14 years. Poverty is defined as a situation in which a household total annual income is below the official US poverty line. Using this information, four types of income pattern were identified: never poor, falling into poverty, getting out of poverty, and permanently poor. Given that income patterns may be associated with socio-economic characteristics, some controls were included in the class identification: ethnicity, gender, education level; and employment status of household head; number of children in the household; and child´s gender. Results showed that children who lived in poverty are the ones with the least high school completion and employment rates. On the contrary, children who were never poor are the ones with the highest high school and employment rates. Those who experienced early poverty (a getting out of poverty pattern) have lower graduation rates than the never-poor, but those who experienced late poverty (a moving into poverty pattern) are as likely to complete high school as the never-poor. With regard to employment status, however, neither of the getting into poverty or the moving into poverty groups were significantly different from the never-poor. Based on the argumentation developed and the controls used, the theoretical foundation of this paper is based on

the Investment Model. Particularly, ethnicity and parental human capital were argued and empirically found to be associated with poverty patterns.

In her PhD dissertation, Campbell (2007) explored the relationship between parental wealth and child development in the USA, using the National Longitudinal Survey of Youth. Regression analysis included parental wealth, household income, family composition, parental occupation, home environment, and ethnicity as predictors. Parental wealth was measured as average value of assets and debts from the child´s birth to age 3 years, at age 6-7 years, and at 10-11 years; as current wealth at the time of well-being assessment; and as average wealth from the child´s birth to the time of assessment. Household income was measured as family total net income received during the year previous to the well-being examination. Child outcome included cognitive, behavioural, and motor development which was measured through the Peabody Individual Achievement Test, the Bayley Scales of Infant Development, the Gesell Scale, and the Behaviour Problem Index. Results show that parental wealth is positively correlated with home environment. Also, parental wealth is associated with child performance in Maths and reading, although it stops being significant once parental and household characteristics are controlled for. Finally, parental wealth remains significantly correlated with child behaviour even after controlling for the rest of the variables. In the theoretical section of her thesis, the author reviews possible explanatory routes through which poverty affects children: sequencing of life events, aspiration and motivation, social capital, cultural capital, and parental investments. Her own argumentation is based on a combination of material investments, parenting influences, and life-cycle events.

Violato *et al* (2010) looked at the effects of household income and socio-demographic characteristics on cognitive ability and behavioural indicators at ages 3 and 5 years in a sample of children in the United Kingdom. The study utilised data from the Millenium Cohort and was developed through regression analyses. Results showed that lower levels of income were associated in a significant way with lower cognitive and behavioural outcomes.

It is relevant to mention that other studies have concentrated on non-material elements that influence child development. For example, some have explored the effects of child care arrangements (Burchinal, Lee, and Ramey, 1989; Rubio-Codina, 2007); home environment and caregiver influence (Ackerman *et al*, 1999; Baydar and Brooks-Gunn, 1991; Evans and English, 2002); family composition and parental qualities (Brody and Flor, 1998) on child well-being. Others have explored whether intervention programmes are beneficial for children (Gertler and Fernald, 2004)

on children. Findings from these studies have been incorporated into the analysis in this thesis. However, the main focus is on material aspects.

As the review above shows, most of the studies that explore the effects of poverty on children have been conducted in a cross-sectional way. The scarcity of longitudinal research on child poverty is especially evident in Latin America. Findings from the cross-sectional and longitudinal studies provide rich evidence about the relationship between household income and material circumstances, parenting, and socio-demographic controls and child well-being. Furthermore, a longitudinal perspective of poverty is important in trying to explain causality in the associations between poverty and child development. The following tables concentrate the studies reviewed above (chronologically ordered). Table 2.1 includes studies that have looked at health outcomes; Table 2.2 includes the ones that have examined cognitive outcomes; Table 2.3 contains studies that have explored social or emotional outcomes; and Table 2.4 summarises the studies that have looked at various outcomes of child well-being.

Table 2.1. Studies that Have Looked at Health Outcomes

Author(s) and year	Place	Database	Explanatory variables	Outcomes of Well-being	Age Range of Subjects	Method	Approach
Mare (1982)	United States	1975 Current Population Survey	Household income, maternal education, ethnicity, child´s gender.	Mortality	0 to 20 years	Logistic regression	Cross-sectional
Gortmaker *et al* (1990)	United States	Child Supplement of the National Health Survey	Chronic illness, household income, ethnicity, maternal education and age, family structure, child´s age and gender.	Behavioural problems	4 to 7 years	Logistic regression, T Test, Chi-Square Test.	Cross-sectional
Halfon and Newacheck (1993)	United States	National Health Interview Survey	Poverty status	Asthma	0 to 17 years	Chi-Square Test	Cross-sectional
Desai (1995)	Bolivia, Brazil, Colombia, Dominican Republic, Guatemala, Trinidad and Tobago, and other countries	Demographic and Health Surveys	Household wealth index (quality of housing and consumer durables), parental education level, location, maternal marital status, number of siblings	Height-for-age, weight-for-age	6 to 36 months	OLS regressions and Heckman´s selection model	Cross-sectional
Gragnolati (1999)	Guatemala	Guatemalan Survey of Family Health	Household consumption, community infrastructure, demographic controls	Height-for-age	0 to 5 years	Multi-level regressions	Cross-sectional

Table 2.1. Studies that Have Looked at Health Outcomes (continued)

Chen, Martin, and Matthews (2005)	United States	National Health Interview Survey	Family income, parental education, poverty status, welfare recipiency, and child´s age, gender, and ethnicity.	Self-rated health, injuries, respiratory illnesses	0 to 18 years	Logistic regression	Cross-sectional
Malat, Oh, and Hamilton (2005)	United States	Panel Study of Income Dynamics	Duration of poverty, carer´s educational level, household structure	Overall health (parental assessment)	0 to 12 years	OLS regressions	Longitudinal
Bauman, Silver, and Stein (2006)	United States	National Health Interview Survey	Household poverty, parental education, parental absence, ethnicity	Self-rated health	0 to 18 years	Logistic regression	Cross-sectional
Séguin *et al* (2007)	Canada	Quebec Longitudinal Study of Child Development	Duration of poverty, maternal education, social support, physical violence	Asthma, infections, growth delay, health problems index, and maternal assessment of health	3.5 years	Logistic regressions	Longitudinal
Fernald and Neufeld (2007)	Mexico	ENCASEH/ ENCEL	Household assets; quality of housing; ethnicity; household composition; maternal age, BMI, height, score in the PPVT, and level of education; perceived social status	Height-for-age and weight-for-age	2 to 6 years	Logistic regressions	Cross-sectional
Hatton and Martin (2010)	United Kingdom	Boyd Orr Cohort	Household income, birth order, and family size	Height-for-age and BMI	2 to 14 years	OLS Regression	Cross-sectional

Table 2.2. Studies that Have Looked at Cognitive Outcomes

Author(s) and year	**Place**	**Database**	**Explanatory variables**	**Outcomes of Well-being**	**Age Range of Subjects**	**Method**	**Approach**
Desai, Chase-Landsdale and Michael (1989)	United States	National Longitudinal Survey of Youth	Maternal employment and education level, maternal marital history, family income, ethnicity, child´s birth order	PPVT	4 years	Linear regression	Cross-sectional
Guo (1998)	United States	National Longitudinal Survey of Youth	Household poverty, parental characteristics, household composition, ethnicity, location	PPVT, Memory Digit Span Assessment	3 to 8 and 9 to 14	Mixed linear regressions	Longitudinal
Whitehurst and Fischel (2000)	United States	Own database	Socio-economic status, ethnicity, cognitive stimulation in the house, IQ of carer	PPVT, Expressive One-Word Picture Vocabulary Test, Developing Skills Checklist	4 and 5 years	SEM	Cross-sectional

Table 2.2. Studies that Have Looked at Cognitive Outcomes (continued)							
Guo and Harris (2000)	United States	National Longitudinal Survey of Youth	Cognitive stimulation, parenting, physical environment, health at birth, health during childhood	PPVT, Reading Recognition Assessment, Reading Comprehension Assessment, Mathematics	3 to 9 years	SEM	Longitudinal
Dearing, McCartney and Taylor (2001)	United States	NICHD Study of Early Child Care	Household income	Bayley Scales of Infant Development, Bracken Basic Concepts Scale	0 to 3 years	Growth Models	Longitudinal
Schoon *et al* (2002)	United Kingdom	National Child Development Survey 1958 and British Cohort Study 1970	Parental social class and household material conditions	Human Figure Drawing Test	5 and 7 years	SEM	Longitudinal
McCulloch and Joshi (2002)	United Kingdom	National Child Development Study, 1958 Birth Cohort Study	Family income, household resources, parenting	PPVT	6 to 17 years	Hierarchical Linear Models	Cross-sectional
Farah, Noble, and Hurt (2005)	United States	Own database	Socio-economic status	executive, language, memory, spatial, and visual skills	4 and 8 years	Linear regression	Cross-sectional
Paxson and Schady (2005)	Ecuador	Survey for evaluating the *Bono de Desarrollo Humano*	Household wealth, parental education, parenting practices, number of siblings, child health	PPVT	3 to 6 years	OLS regressions	Cross-sectional
Vargas-Mendoza *et al* (2006)	Mexico	Own database	Household income	vocabulary and knowledge of parts of human body	2 and 8 years	Descriptive statistics	Cross-sectional
Griffore and Phenice (2008)	United States	National Longitudinal Survey of Youth	Cognitive stimulation, duration of poverty, maternal education level	PPVT	6 o 10 years	Multiple regressions	Longitudinal

Table 2.3. Studies that Have Looked at Emotional Outcomes

Author(s) and year	**Place**	**Database**	**Explanatory variables**	**Outcomes of Well-being**	**Age Range of Subjects**	**Method**	**Approach**
McLeod and Shanahan (1996)	United States	National Longitudinal Survey of Youth	Household poverty history	Mental health: Achenbach Child Behaviour Checklist	6 to 9 years	Growth Models	Longitudinal
Evans, Saltzman, and Cooperman (2001)	United States	Children´s Behaviour Questionnaire	Quality of housing	Socio-emotional indicators	8 to 10 years	Linear regression	Cross-sectional
Misty *et al* (2002)	United States	Own database	Household income and perceived financial stress	Psychological and behavioural outcomes	5 to 12 years	SEM	Cross-sectional
Strohschein (2005)	United States	National Longitudinal Survey of Youth	Household income, family structure, maternal education level, ethnicity	Achenbach Child Behaviour Checklist	4 to 14 years	Growth Models	Longitudinal

Table 2.4. Studies that Have Looked at Outcomes in Various Dimensions of Well-being

Author(s) and year	Place	Database	Explanatory variables	Outcomes of Well-being	Age Range of Subjects	Method	Approach
Duncan, Brooks-Gunn, and Klebanov (1994)	United States	Panel Study of Income Dynamics	Household poverty, community characteristics, maternal education level and marital status, child birth-weight, and cognitive stimulation in the household	Cognitive: Wechsler Preschool and Primary Scale. Emotional: Revised Child Behaviour Profile	4 to 6 years	Multiple regressions	Longitudinal
Hanson, McLanahan, and Thomson (1997)	United States	National Survey of Families and Households	Household income, socio-economic status, quality of housing	Academic achievement, behavioural problems, subjective well-being	5 to 18 years	Linear and logistic regressions	Cross-sectional
Korenman and Miller (1997)	United States	National Longitudinal Survey of Youth	Duration of poverty, family structure, child gender, ethnicity, family structure	Height-for-age, weight-for-age Motor and social indicators	5 to 7 years 0 to 2 years	OLS and logistic regressions	Longitudinal
Duncan *et al* (1998)	United States	Panel Study of Income Dynamics	Household poverty; ethnicity; maternal, occupation, and education level; household composition; location	School completion and adolescent childbearing	11 to 15 years	Multiple regressions	Longitudinal
Blau (1999)	United States	National Longitudinal Survey of Youth	Total household income in year prior to assessment, maternal income, average household in 12 years.	PPVT, Peabody Individual Achievement Tests of Mathematics and Reading Recognition, Verbal Memory Test, Behaviour Problems Index, and Motor and Social Development	2 to 10 years	OLS regressions	Longitudinal
Sacker, Schoon, and Bartley (2002)	United Kingdom	National Child Development Study	Parental social class, parental education, material deprivation (overcrowding, use of facilities, housing tenure, type of accommodation, benefit claiming), school composition, parental involvement and aspirations	Educational achievement: Reading and Mathematics. Psychosocial adjustment: Bristol Social Adjustment Guide and a modified version of the Rutter `A´ Scale.	7, 11, and 16 years	SEM	Cross-sectional
Yeung, Linver, and Brooks-Gunn (2002)	United States	Panel Study of Income Dynamics	Household income, cognitive stimulation, parental stress	Woodcock-Johnson Test and Behaviour Problem Index*	3 and 5 years	SEM	Longitudinal
NICHD (2005)	United States	Own database	Household poverty, ethnicity, household composition, maternal education level and emotional well-being, home environment	Bayley Scales of Infant Development, Bracken Scale of Basic Concepts, Reynell Developmental Language Scales, Woodcock-Johnson Test, Achenbach Child Behaviour Checklist	9 years	Growth Curve Models	Longitudinal

Table 2.4. Studies that Have Looked at Outcomes in Various Dimensions of Well-being (continued)

Fernald *et al* (2005)	Mexico	Own database	Parental age, education, employment status; ethnicity; household consumption; household size; and involvement in the community	Mental Development Index of the Bayley Scales of Infant Development, height-for-age, weight-for-height.	1 to 2 years	Logistic and linear regressions	Cross-sectional
Wagmiller *et al* (2006)	United States	Panel Study of Income Dynamics	Duration of poverty, ethnicity, employment status of head of household, number of children in the household	High school completion and employment status at age 25	0 to 14 years	Latent Class Models	Longitudinal
Campbell (2007)	United States	National Longitudinal Survey of Youth	Parental wealth, household income, family composition, parental occupation, home environment, ethnicity	PPVT, Bayley Scales of Infant Development, Gesell Scale, and Behaviour Problems Index	3 to 11 years	Multiple regressions	Longitudinal
Gershoff *et al* (2007)	United States	Early Childhood Longitudinal Study	Household income, material hardship, ethnicity, family size, parental education and occupational status	Cognitive and socio-emotional outcomes*	6 years	SEM	Cross-sectional
Raver, Gershoff, and Aber (2007)	United Staes	Early Childhood Longitudinal Study	Household income, material hardship, ethnicity, family size, parental education and occupational status	Cognitive and socio-emotional outcomes*	6 years	SEM	Cross-sectional
Violato *et al* (2010)	United Kingdom	Millenium Cohort	Household income, child characteristics, parental education and occupation, maternal age, parenting practices, home environment, childcare, health practices	Cognitive and socio-emotional outcomes	3 and 5 years	Multiple regressions	Longitudinal

* include various indicators simultaneously

As the tables above summarise, most of the research on the topic has been conducted in the United States and the United Kingdom. Also, the effects of poverty on children have been explored mainly on independent indicators and not on a multi-dimensional perspective of well-being. Basically, only the studies that have utilised SEM have been able to take into account various dimensions of well-being simultaneously. On the contrary, multiple regressions can rarely handle various outcome variables at the same time.

This review shows that the conceptual and methodological approaches are varied. Furthermore, evidence about the effects of timing and the duration of poverty on children is still

inconclusive. Nevertheless, the literature shows points of coincidence. The next section looks at the issues that are consistent across the pieces of research reviewed here as well as possible lines for future investigations.

Areas of Coincidence and Future Lines of Research

The evidence about the negative effects of poverty on children shows relatively consistent results. Generally, poverty is associated with worse physiological, cognitive, and emotional well-being. Interestingly, poverty seems to be detrimental for children regardless of how poverty was measured. The material side of poverty, which includes elements such as income, quality of housing, or household durables, has been found to be significantly associated with child well-being. Likewise, non-material aspects such as socio-economic status and parental education level and occupation have also proved to be associated with child outcome. Even more, elements that relate to structural differences such as ethnicity or location have been found to be important predictors of child well-being.

Explanations about the routes through which poverty affects children include access to nutrition and a healthy lifestyle, cognitive stimulation at home, safe environments, and quality of care. Findings from existing research suggest that both the quantity and quality of resources available to invest in children as well as parental input are associated with indicators of child well-being. Thus, there is empirical evidence to support both the Human Capital Investment approach and the Good Parent approach. Nevertheless, it has also been recognised that the resources available in the household are embedded in a set of structural opportunities. Particularly, ethnicity has been found to play an important role in shaping the material and non-material factors that shape child development.

After presenting this literature review, however, some caveats are notable. First, the vast majority of the research has been developed in the United States, mainly due to availability of data that follows the socio-economic characteristics of households, and that includes indicators of child well-being, for several years. On the contrary, research about the effects of poverty on child well-being -and particularly that with a longitudinal approach- in Latin America is scarce. Secondly, most of the studies concentrate on single outcomes or a combination of independent indicators of well-being. Also, aspects of well-being included in the global agenda such as security, participation, or

happiness are not included in the majority of analyses. Only a few pieces of research have explored the effects of poverty on a comprehensive conceptualisation of child well-being. Finally, research with a longitudinal perspective is virtually non-existent in Latin America. Particularly, little is known about how timing and duration of poverty and how changes in the material circumstances of households influence child well-being. Evidence not only comes from similar settings (and even uses the same databases) but sometimes indicates contrasting or inconclusive results.

This thesis aims at filling these gaps. It provides evidence in a country that has not been thoroughly researched: poor rural communities in Mexico. Also, it takes into account various domains of child well-being. And finally, this thesis develops various approximations in the study of the effects of poverty on children through different types of modelling and testing various hypotheses. The next chapter provides details about the data, methods, and models.

CHAPTER 3

Methodology and Data

The previous chapter reviewed the studies that are of most relevance to this thesis. However, research on child poverty has a broader scope. The effects of poverty on children could be, and certainly have been, explored through various ways. On the one hand, qualitative approximations have illuminated in children´s perspectives of poverty (Crowley and Vulliamy, 2003). On the other hand, quantitative examinations have identified profiles of child poverty and have evaluated the ways in which household deprivation affects child development (Aber *et al*, 1997; Blau, 1999; Brooks-Gunn and Duncan, 1997; Duncan *et al,* 1998; McLeod and Shanahan, 1993; Smith, Brooks-Gunn, and Klebanov, 1997). While the former are helpful in understanding children´s experiences, thoughts, and feelings about what it feels like living in poverty, the latter are useful in measuring the consequences that poverty poses on objective indicators of well-being. As the previous chapter showed, even within quantitative approaches the methods and strategies differ. The purpose of this chapter is to describe the methodology and data used in the analysis.

This chapter is divided in the following way. The first section introduces the research questions and hypotheses that guide the analysis. The second section provides the conceptual setting of the study. The third section describes the method that is used throughout the thesis. The last section describes the data and offers variable definitions.

Research Questions and Hypotheses

This thesis explores whether different poverty experiences affect the physiological, cognitive, motor, and emotional well-being of preschool children living in poor rural communities in Mexico. The research questions and hypotheses that sustain the study are:

1. How is child well-being conceptualised and measured?

   This question helps to define the outcome variables. There are no hypotheses to test as it is an exploratory matter. However, addressing this question requires taking into consideration the multiple voices and disciplines that shape the definition of child well-being.

2. Is depth of poverty associated with differences in indicators of child well-being at age 4-6 years?

   This question explores the extent to which severity (degree) of poverty helps to understand differences in indicators of child well-being. Assuming that household poverty is not a dichotomous state (where a household is either poor or not poor) but a continuum, the hypotheses related to this question are:

   - Deeper household material poverty is associated with worse indicators of child well-being at pre-school age; higher levels of household material circumstances are associated with better indicators of child well-being at pre-school age.
   - Even after controlling for non-material and socio-demographic aspects, material aspects of poverty remain significantly associated with child well-being at pre-school age.

3. Is timing of poverty associated with indicators of child well-being at age 4-6 years?

   This question examines the effect of household poverty at different points in time on children. It takes into account two issues of developmental theories: One, that most of child development takes place during the first years in life. And two, that processes of physiological, cognitive, and emotional systems take place at different moments and at different rates. Thus, this question deals with the following hypothesis:

   - Early poverty is more detrimental for children than later poverty.

4. Are overall household poverty trajectories associated with child outcomes at age 4-6 years?

   This question looks at the effects of general household poverty trends over time on indicators of child well-being at pre-school age. It takes into account the overall household material experience, and particularly intensity and direction of change, over the child´s life in helping to understand child outcomes at age 4-6 years. Hence, this sub-question is explored through two hypotheses:

   - The level of poverty in which a child is born is associated with indicators of well-being regardless of the pattern of change of household poverty over time.
   - An improving condition of household material circumstances is associated with better childhood outcomes and a worsening situation of household material circumstances is associated with worse outcomes for children.

In sum, the effects of poverty on children are examined by utilising the same outcomes of child well-being and testing hypotheses related to three different but complementary approaches. The first one concentrates on the effects of household material circumstances around the time of birth. The second one evaluates the effects of household material conditions at various time-points. The last one looks at the global trend of household material circumstances over time.

Conceptual Setting

Child poverty, children growing up in poverty, child welfare, child well-being, child outcomes, and child development are concepts that permeate contemporary public and academic discourse. These terms have often been used indiscriminately in the political, advocacy, and media dialogues when in fact they emerge from different disciplines. Therefore, it is important to establish the conceptual boundaries that frame the examinations conducted in this thesis. This section conveys a general description of two of the foundational concepts of this thesis: early childhood and household poverty.

Early Childhood[11]

This thesis focuses on the pre-school years, which are comprised by the ages 0 to 6 years. Until recently, the study of childhood comprised a disaggregated set of approaches and the examination of indicators to measure child well-being varied from one discipline to another. According to Shonkoff and Phillips, "the systematic study of infant behavior [sic] can be traced back to the early mid-19th century, when research hers in both embryology and evolution raised fundamental questions about the origins and course of human development across the life span" (2000, p. 19). Since then, childhood has been a matter of Paediatrics, Psychoanalysis, Neuroscience, Education, Sociology, Economics, and Public Policy.

The variety of disciplinary approaches in the study of childhood has sometimes meant that child well-being has been understood differently depending on the field of knowledge. Smeeding (1995) identifies two trends. On the one hand, Economists, Sociologists, and Public Policy Analysts have understood child well-being through the well-being of their parents or their households with

[11] A detailed theoretical and empirical examination of the working definition of child well-being used in this thesis is presented in Chapter 4.

indicators of household income, consumption, social standing, or basic needs such as housing, clothing, or food. On the other hand, Developmental Psychologists, Educators, and Paediatricians traditionally have understood child well-being through specific and direct measures of cognitive, social, emotional, or physical development.

For the last few decades, however, child development has started to be understood "within a complex system of relationships affected by multiple levels of the surrounding environment" (Berk, 2007, p. 24). Following Bronfenbrenner´s Ecological Systems Theory (1979), many scholars have taken into consideration biological, sociological, and economic variables in the study of child development. Recent examinations of the elements that shape child development have included variables at the individual, household, and community levels (see Literature Review Chapter). Some scholars have provided a name for their approaches. For example, Schoon (2006) has proposed for a Developmental-Contextual Approach that includes information at various levels: individual, family, neighbourhood, institutions, and the socio-historical context. Shonkoff and Phillips (2000) have not defined a specific model but have compiled articles about some of the various factors that influence child development, which are reflected in the title of their book, *From Neurons to Neighborhoods*. In the introduction, these authors recognise that "human development is shaped by a dynamic and continuous interaction between biology and experience" (2000, p. 23). Other scholars have developed models with data that reflect interactions between these various levels, even if they have not provided a name for their approach. For example, Gershoff *et al* (2007) developed a model to explore the influences of parenting, family income, deprivation, and demographic characteristics on child cognitive and socio-emotional outcomes.

Despite variations in the specific ways of including data and the emphasis that could be given to certain variables, a crucial issue is that conceptual sophistication has gone hand-in-hand with advances in data collection and in methodological tools. Larger availability of panel studies and increasing number of software packages that can produce calculations in short time have allowed researchers to consolidate a comprehensive perspective of childhood.

This thesis borrows from various disciplines and builds on existing knowledge by utilising concepts and variables that have empirically been found to be associated with child well-being. Also, given the design of the panel survey (described later in this chapter), the analysis maximises information at the household level. The argument is developed through a combination of theories based on the economic, sociological, and developmental sciences. Therefore, the terms *child*

outcomes, *child well-being*, and *child development* could be interpreted as synonyms throughout the thesis.

Household Poverty

Poverty is probably one of the most widely debated and far from settled concepts; definitions of poverty have included concrete indicators as well as broad areas of life, material and non-material aspects, and objective and subjective approximations. Among the numerous approaches for conceptualising and measuring poverty[12], the most common ones are the poverty line, the basic needs approach, and multi-dimensional perspectives. The poverty line defines a threshold against which households or individuals are assessed to be poor or not poor. It is usually established by looking at the amount of income that would be necessary to acquire a basic set of goods and services. The basic needs approach looks at whether households or individuals possess, utilise, or consume goods and services such as food, clothing, housing, and transportation. Authors like Ringen (1988) argue that the difference between the poverty line and the basic needs approach is that the former is an indirect way and the latter is a direct way to assess the well-being of a person or a household. Multi-dimensional perspectives somehow combine the last two as they include numerous material and non-material dimensions to assess well-being. In these perspectives, income and financial aspects are often included as one of these dimensions.

The conceptualisation of household poverty used throughout this thesis is based on Ringen´s (1988) work. According to Ringen´s perspective, welfare can be measured directly through material goods and indirectly through means that help to obtain them. In his words, "direct concepts define welfare in terms of intrinsic goods, such as consumption or quality of life. Indirect concepts define welfare in terms of resources, such as disposable income" (1988, p. 355). According to this perspective, household poverty is a situation of deficiency in material goods and in means to acquire them.

The definition of household poverty in this thesis looks to emphasise the elements within the household that shape child development; it is seen as a situation where some or all of the following take place: low income, bad quality of housing, low levels of durables, low levels of agricultural means, and low levels of employment. Following Ringen´s classification of direct and indirect measures, household material circumstances (or a situation of non-poverty) are measured through

[12] An exhaustive analysis about the conceptualisation of poverty lies beyond the scope of this thesis. For a comprehensive discussion, these are some helpful sources: Alcock (1993), Lister (2004), and Ruggeri, Saith, and Stewart (2003).

material goods and through means that households have to achieve them. The realm of material goods includes agricultural stock, household durables, and quality of housing. The realm of the means for acquiring goods includes income and occupation[13]. Hence, households could have different combinations and levels of goods and means. This understanding regards poverty as a gradient and not as a dichotomous situation in which households are either poor or not poor. By allowing household poverty to be a continuum, it is possible to evaluate whether depth of poverty is associated with child outcomes at age 4-6 years. Also, by including various dimensions, it is possible to analyse how different manifestations of poverty affect children differently.

An approach that includes both material and non-material aspects seems appealing as a way for capturing the different areas of well-being that a person´s life encompasses. However, it poses some challenges. Alkire (2007) has identified some difficulties that multi-dimensional poverty measurements may present: to define what dimensions are relevant, what indicators to take into consideration for each dimension, how to take into account the interaction between indicators and between dimensions, how to weight the relative importance of each indicator and each dimension, how to aggregate to make comparisons across groups comparable, how to aggregate across dimensions, and how to incorporate agency. This perspective is shared by Amarante, Arim, and Vigorito, who have pointed out, "in the process of measuring multidimensional poverty, important decisions have to be taken about many aspects: the selections [sic] of the dimensions to be considered and the indicators that reflect these dimensions, the weighting scheme attached to the selected dimensions, the setting of a threshold to identify deprived population, and the way of aggregating the results in each dimension" (2008, p. 4). The method chosen for the analysis in this thesis is assumed to be the best to deal with these issues; this is explained in the next section.

Defining the Method: Some Alternatives

During the early years, a person develops numerous crucial physiological, cognitive, and socio-emotional abilities (Bogin, 1999; Shonkoff and Philipps, 2000). Consequently, child development during the first five years in life is very sensitive to the surrounding environment and to changes in the elements that influence it. Therefore, it is necessary to elaborate a meticulous examination of the investments in children. This conveys the need for conducting a quantitative study that includes detailed longitudinal information about the aspects that shape child development. A longitudinal

[13] The operationalisation of these variables is explained later in this chapter.

quantitative approach facilitates the measurement of the effects of the surrounding environment on children over time. Also, child development is the result of a complex network of interactions between household and parental socio-economic characteristics (Berk, 2007; Shonkoff and Philipps, 2000). A quantitative analysis helps to understand these relationships and test hypotheses about the effects of poverty on children in a statistical way.

Finding a method that captures the elements that shape child development and the possible ways in which material poverty may affect this process is nevertheless no easy task. On the one hand, grasping household material and non-material circumstances presents challenges in itself. On the other hand, the evaluation of how these elements shape child well-being in pre-school age is rooted on various explanatory discourses. To add difficulty, it is necessary to take into consideration that both household material and non-material circumstances and child development are dynamic phenomena that change over time. Fortunately, even though appropriate statistical models that allow researchers to conduct longitudinal studies have been developed "only since the 1980s" (Singer and Willett, 2003, p. 3), fast progress has been achieved since then. What Smeeding (1995) was calling for in the mid-1990s -"a marriage" between macro and micro perspectives – started to emerge only a few years later. Since then, various statistical techniques have been used to measure the effects of poverty on children. A review of some of them is helpful for defining the method that best suits the analysis in this thesis:

Ordinary Least Squares (OLS) Regression: This technique allows the examination of a single indicator in terms of a set of independent variables. For example, Malat *et al* (2005) used OLS regressions to look at how proportion of childhood spent in poverty, ethnicity, child sex and age, parental education, and household composition are associated with child health. This tool has the main advantages of evaluating the relative effects of independent variables on the selected outcome variable and to account for interactions between the independent variables. However, it is not possible to look simultaneously at various outcome variables and therefore this kind of analysis requires looking at each outcome indicator independently.

Fuzzy Set Theory: This tool is based on the assumption that conceptual categories allow partial degrees of memberships so that a subject may be part of several groups at the same time in a gradual way. For example, Bastos and Machado (2009) apply the fuzzy set methodology to examine child poverty through family characteristics, housing, health, education, and social integration. The main advantage of this technique is the ability to assess an individual´s well-being according to

various dimensions. However, an important disadvantage is that the method focuses on the outcome indicators and not on what variables could be driving or explaining them.

Index: This is another common strategy for measuring well-being in a multi-dimensional way. For example, the Index of Human Development developed by the UNDP (2011) capture several dimensions of well-being into a single unit, ranging from 0 to 1, that allows the ranking of subjects according to the established parameters. The main advantage of an Index is that it provides a richer assessment of well-being than measurements based on a single indicator, usually taking into account indicators of health, education, income, housing, and empowerment. Their main disadvantage, however, is that indices usually give the same weight to the components and therefore overlook the relative importance that one indicator may have over others as well as possible interactions between indicators.

Principal Component Analysis (PCA) and Factor Analysis (FA): These techniques reduce long lists of indicators into fewer dimensions. These two methods are closely related as they group variables into components or factors according to an underlying structure. PCA and FA have been regarded (Roche, 2008) as some of the most accurate methods for assessing well-being as a composite of various dimensions. Their main contribution is that data is aggregated into main components or factors so that large sets of variables become easier to handle. However, they also have disadvantages. Firstly, given that the dimensions are aggregated based on the available information, comparisons along time may be difficult if the data is not consistent across the collection points. Secondly, even though these methods provide a rich description of the state of an individual´s well-being, they concentrate on outcome variables and not on processes that may be associated with them.

Structural Equation Modelling (SEM): This method allows the measurement of unobserved concepts through observed variables (similarly to factor analysis) and the examination of multiple relationships between observed and unobserved variables (similarly to OLS regression). SEM accepts high degrees of complexity by allowing simultaneous relationships of numerous independent variables and outcome variables. Therefore, SEM is helpful in testing theories about causality, in a cross-sectional as well as in a longitudinal way. Similarly to PCA and FA, SEM faces the disadvantage that comparisons across time or between samples of unobserved concepts could be problematic if the observed indicators are not consistent. However, SEM has a crucial difference with PCA and FA: the researcher, based on theory, indicates which indicators load onto which

unobserved variable. "This avoids the problems of instability and rotated solutions prevalent in factor analysis" (Tomlinson, Walker, and Williams, 2008, p. 602). Furthermore, SEM allows the researcher to establish assumed relationships between variables.

All of these methods have inherent advantages and disadvantages. However, the questions posed in this thesis require (a) an multi-dimensional view of child well-being so that the analysis mirrors the developmental process in a more solid way than using a sole indicator; (b) to allow for the simultaneous inclusion of multiple variables in exploring outcomes so that the material and non-material elements that shape child development are considered; (c) to account for possible interactions between the elements that shape child development; (d) to include various levels of data so child development is understood in a systemic way where individual and household-level elements take part; and (e) to permit the incorporation of the time-dimension through a longitudinal perspective of the elements that influence child development. Table 3.1 summarises the points that each of the methods reviewed satisfies:

Table 3.1. Quantitative Methods and their Qualities

	Qualities Needed				
	Child well-being is an multi-dimensional outcome	Various variables that shape child well-being	Allows for interactions between explanatory variables	Various levels of data	Longitudinal perspective
OLS regression		✔	✔	✔	✔
Fuzzy Set Analysis	✔	✔ (descriptive)		✔	
Index	✔	✔ (descriptive)		✔	
Principal Component / Factor Analysis	✔	✔ (descriptive)		✔	
Structural Equation Modelling	✔	✔	✔	✔	✔

OLS regression looks at the explanatory power of independent variables on an outcome, allows for interactions between explanatory variables, can handle various levels as well as longitudinal data, but cannot handle at the same time numerous dimensions for that outcome.

Indices, Fuzzy Set Analysis, PCA, and FA include multiple dimensions and could handle various levels of data. Therefore, child well-being can therefore be measured in a comprehensive way. However, these methods concentrate on measuring outcomes but cannot link them with variables that are supposed to explain them. Thus, they can provide an assessment of child well-being, child poverty, or household poverty but cannot establish statistical relationships between them. Among the methods reviewed, SEM is the technique that fulfils all of the requirements for this research project. SEM can assess child well-being in a multi-dimensional way, can include various explanatory variables as well as possible interactions between them, can handle multi-level data, and can develop a longitudinal approach.

Methodological sophistication during the last couple of decades, such as the one offered by SEM, has made it possible to explore the intricate interactions that shape child development: material and non-material surroundings of the child and individual and household aspects. Methodologies like SEM are enriched with the theoretical and empirical support of various academic disciplines and take into account the longitudinal dimension and flexibility of the developmental process. Given that SEM meets the requirements to address the research questions that drive this thesis, it is the method that is used throughout the analysis. The next section describes SEM[14], its interpretation, and the models that are used in this study.

Structural Equation Modelling: a Strong Option

SEM seems a sound alternative as it allows the inclusion of various theoretical approaches and the analysis of complex data in a sophisticated way. Some of the SEM techniques, like Latent Growth Modelling, have been considered to be the state of the art in statistical analysis. In fact, "it has been suggested that the development of the latent variable modeling [sic] framework is perhaps the most important and influential statistical revolution to have occurred recently in the social and behavioral [sic] sciences (Cliff, 1983)" (Duncan and Duncan, 2004, p. 334). SEM has the capacity to incorporate various types of models; it could be seen as an umbrella-method that encompasses various types of econometric models, such as Linear Regression, Factor Analysis, Auto-Regressive Models, and Latent Growth Models. This research project aims to uncover some of the interactions

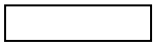
[14] Recommended readings for comprehensive descriptions of SEM are: Bollen (1989); Byrne (2001); Duncan and Duncan (2004); Fox (2002); Kline (2005), McAllum and Austin (2000); and Muthén and Muthén (2007, 2011).

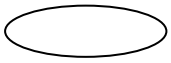
between household and parental socio-economic characteristics and child well-being; SEM is helpful in testing hypotheses related to these.

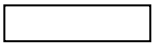
SEM is largely driven by theory and therefore the models test hypothesised relationships in a statistical way. In Kline´s words, "based on knowledge of the theory, empirical research, or both, [the researcher] postulates relations between observed measures and the underlying factors a priori and then tests this hypothesized structure statistically" (2005, p. 6). Due to the confirmatory nature of SEM, the models are based on theory and existing evidence about the effects of poverty on child development. The theoretical and empirical support for each model is explained in detail in each chapter.

SEM: Basic Components

The basic components of SEM, and their visual representation, are:

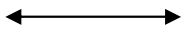
- Observed indicators: These are variables that have been measured and are visually presented by rectangles  . Observed indicators are also known as factors that load onto latent or unobserved variables. The coefficients of factor loadings are represented with single-headed arrows  , which go from latent variables to observed indicators. For example, in this thesis, some observed variables are height-for-age, weight-for-age, and haemoglobin concentration.

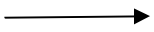
- Latent variables: These are unobserved concepts that are measured as a function of observed variables. For example, in this thesis, the latent variable of physical health is measured by height-for-age, weight-for-age, and haemoglobin concentration. Latent variables are visually represented with ovals: 

- Covariates: These are independent observed variables that are used as controls. For example, physical health is controlled for child age, gender, and indigenous background.
  Covariates, as well as any observed variable, are represented with rectangles: 

- Measurement model: This is the basic model of SEM as it measures latent variables through observed indicators as well as the correlations between latent variables. It is also known as Confirmatory Factor Analysis because observed indicators load onto latent variables. A measurement model is "designed to test the multidimensionality of a theoretical construct" (Byrne,

2001, p. 57). In a measurement model, latent variables are represented by ovals; observed variables are represented by rectangles; and correlations are visualised by double-headed arrows.

 Double-headed arrows mean observed covariance between two variables if they are un-standardised estimates and they mean correlation between two variables if they are standardised estimates. For example, in this thesis, the measurement model of child well-being includes four latent variables that are correlated with each other: physical health, cognitive ability, motor co-ordination, and emotional competence.

- Direct Effects: This relates to the relationship between variables that "are meant to represent causal relationships among the variables in the model" (Fox, 2002, p.1). It is possible to evaluate the statistical significance and the strength of the measured effects of independent observed and unobserved variables on dependent variables. Effect coefficients are represented with single-headed arrows  , which go from any variable that is assumed to be the cause to another that is assumed to be affected by it. For example, this thesis makes reference to a model that includes the following effects: household income on the four dimensions of child well-being.

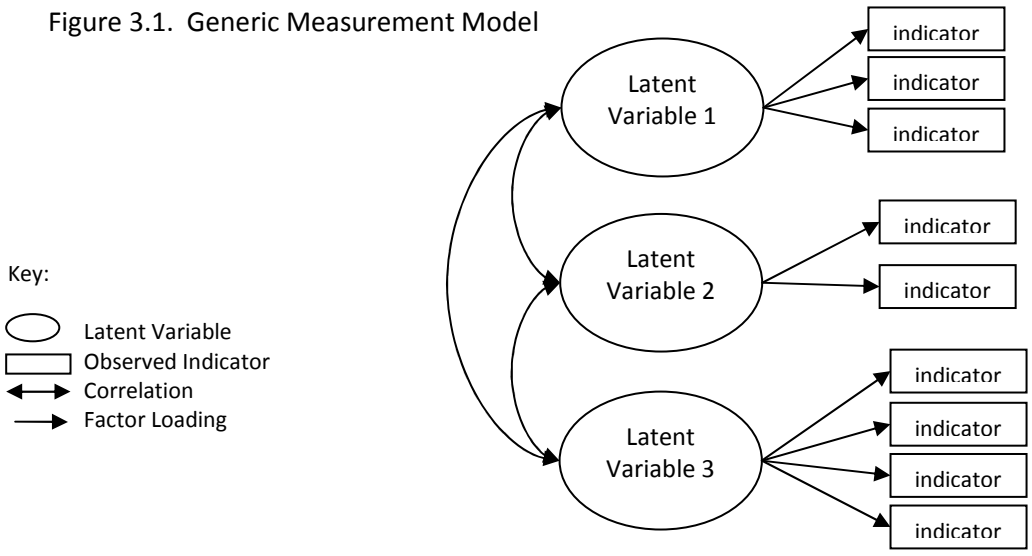
- Structural Model: The combination of all of the above is known as a Structural Model, where multiple associations between unobserved and observed variables are examined. Also, Structural Models allows the inclusion of various types of econometric models such as Auto-Regressive Models or Growth Models. The various types of models used in this thesis are detailed in the next section.

SEM: Models Used in this Thesis

The study develops various types of models within the SEM framework, using MPlus version 5.21. The models are described in more detail in each chapter, according to the specific research questions that they address. However, a summary and the visual representation of each type of modelling are presented here:

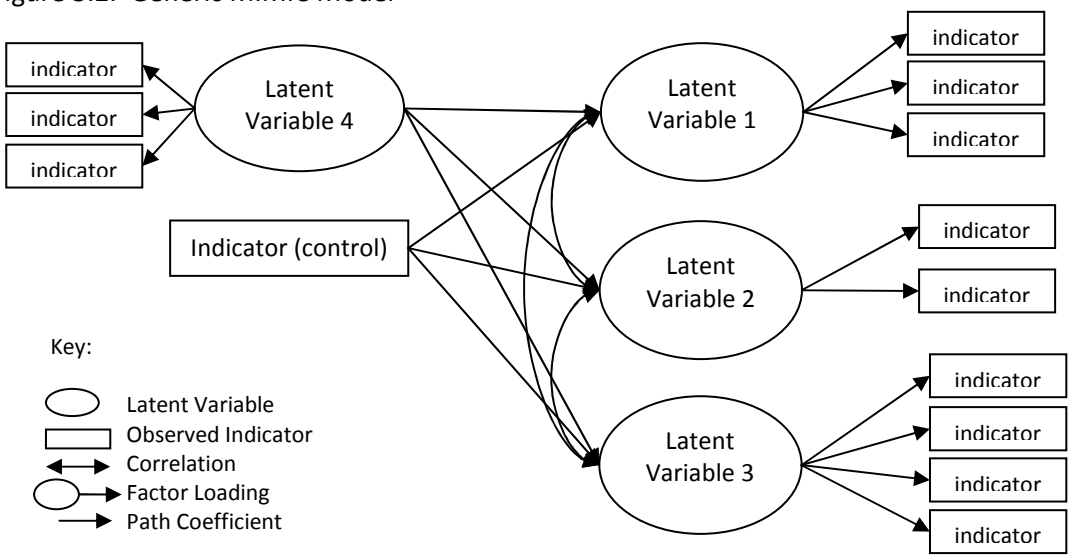
Measurement Model or Confirmatory Factor Analysis (CFA): Child well-being is measured throughout the thesis with CFA (Figure 3.1). The measurement model tests pre-established assumptions about the dimensions that compose child well-being. Also, multi-dimensional poverty is measured through four areas of household material circumstances: household durables, agricultural means, non-agricultural means, and quality of housing. Factor loadings of the observed indicators onto the latent variables were corroborated with preliminary exploratory factor analysis.

Figure 3.1. Generic Measurement Model



Multiple Indicator Multiple Cause (MIMIC) Model: As the name suggests, this kind of model estimates the effects of multiple causes and multiple indicators on outcome variables (Figure 3.2). Chapter 5, "Effects of Early Household Poverty and Infant Care on Child Well-Being at Age 4-6 Years", develops a MIMIC model. It includes the effects of a measurement model of household material poverty around the time of birth, a latent variable of early care, a latent variable of current household durables, and of socio-economic controls on the measurement model of child well-being.

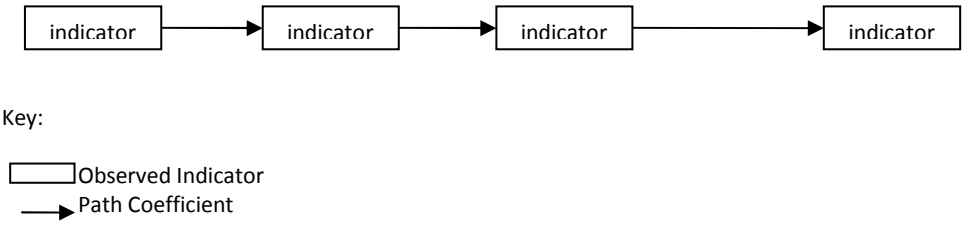
Figure 3.2. Generic MIMIC Model



Auto-Regressive (AR) Model: This kind of model helps to understand an indicator in a longitudinal way; it understands an indicator in a time-point by regressing it on the same indicator in

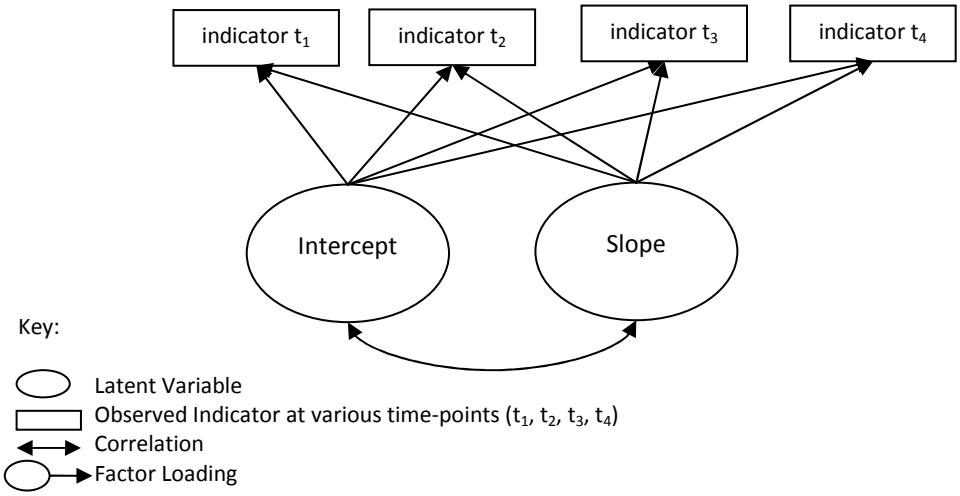
the previous time-point (Figure 3.3). Chapter 6, "When Poverty Happens: Timing of Income Fluctuations and Child Well-being", includes an auto-regressive model of household income.

Figure 3.3. Generic Auto-Regressive Model



Growth Model (GM): This model looks at the underlying pattern of a variable over time; it establishes a starting point (intercept) and rate of change over time (slope) of an indicator (Figure 3.4). Chapter 7, "Growing Together: Overall Household Income Trajectories and Child Well-being", includes growth models of household income.

Figure 3.4. Generic Growth Model



SEM: Interpretation of Results

An important issue to take into account in the interpretation of results is the robustness of the model, which refers to the extent to which a model represents a situation in the most comprehensive and yet parsimonious way. Model strength is important so that results could be extrapolated from a sample to a general context and juxtaposed to other research. The strength of the model is evaluated through goodness-of-fit tests. According to Byrne (2001), typical values that

indicate a strong model for the three most widely used tests are: CFI = .90 or higher; TLI = .90 or higher; RMSEA = .05 or lower; and a relatively low Chi-Square[15]. Furthermore, while assessing the robustness of a model, one should be cautious of correlations that are higher than 1.00, negative variances, or standard errors that are extremely high or extremely low (Byrne, 2001). Common practice is to evaluate the strength of a model by looking at these tests conjointly (Kline, 2005).

Factor loadings represent the contribution of each indicator towards the unobserved concept. They could be provided in un-standardised and standardised versions. Un-standardised estimates represent factor loadings that are based on the original scale of the indicators, except for one indicator that needs to be defined as constant (with a loading of 1) to set the scale of the latent variable. The interpretation of factor loadings is the following: Un-standardised estimates are regression coefficients that manifest direct effects of the factors on the indicators. For each point that the factor increases, un-standardised estimates mean the expected change of the indicator in its original metric. In the un-standardised solution, factor loadings "are interpreted as unstandardized [sic] regression coefficients that estimate the direct effects of the factors on the indicators" (Kline, 2005, p. 176). Specifically, "probit regressions are estimated for the categorical factor indicators, and linear regressions are estimated for the continuous factor indicators" (Muthén and Muthén, 2007, p. 56).

Standardised estimates are also regression coefficients, although the variances of the variables have been all set to 1. In this solution, the coefficient of one variable is set to 1 to establish the scale for the rest of the indicators within the same latent variable. Given that all of the indicators have been set to the same metric, standardised coefficients mean the expected difference on the factor in standard deviation units. Standardised estimates provide a solution where the variances of all the indicators have been adjusted to 1 and are therefore comparable against each other in a fixed scale.

It is relevant to mention that models tend to have better fit if latent variables include three or more observed indicators; "models with factors that have only two indicators are more prone to estimation problems, especially when the sample is small. [...] a minimum of three indicators per factor is recommended" (Kline, 2005, p. 172).

[15] There does not seem to be a strict guideline for what values of Chi-Square would be adequate. Common practice indicates that "the lower the better". Nevertheless, values of Chi-Square should be read conjointly with the other tests while assessing the robustness of a model.

Path effects are read as multiple regression coefficients, where all the other variables included in the model have been controlled for. With regard to the strength of the coefficients of path effects, there is some consensus among scholars about useful ranges. Usually, "standardized path coefficients with absolute values less than .10 may indicate a ´small´ effect; values around .30 a ´typical´ or ´medium´ effect; and ´large´ effects may be indicated by coefficients with absolute values ≥ .50" (Kline, 2005, p. 122).

SEM: Appraisal

Some of the characteristics of SEM that are beneficial for this thesis are:

- It allows the measurement of unobserved variables through observed indicators. Therefore, it is possible to test relationships between theoretical concepts and to establish an analytic discourse based on broader concepts instead of specific indicators. As Francis argues, using latent variables allows "more direct translation of substantive theory into statistical practice" (1988, p. 636).

- It handles multiple simultaneous correlations between explanatory variables and their effects on outcomes. Thus, it is possible to handle complex theoretical models in a statistical way.

- It offers the possibility of testing possible causal associations between variables because (a) models have solid theoretical support, and (b) "although originally devised for cross-sectional data, we can manipulate the model so that it can be used to represent change over time" (Singer and Willett, 2003, p. 267).

- It takes into consideration the relative importance of observed indicators in measuring a concept. Loadings of observed indicators onto latent variables help to evaluate what variables are empirically driving a theoretical concept, therefore solving the problem of weighting the importance of items that Alkire (2007) discussed.

- It allows correlations between measuring errors. In other words, it takes into account that two or more variables may have similar sources for their unexplained variances. For example, error derived from the instrument, from conceptual problems, or user-related mistakes.

- Even though there is no definite threshold for sample size, SEM works with samples of around 100 cases or more (Byrne, 2001; Kline, 2005; Lei and Wu, 2007). The sample included in this study is comprised of around 2,000 children; therefore, models could be estimated even if the sample is broken into cohorts.

SEM also presents some limitations:

- It is a method that intrinsically requires strong theoretical foundations. Therefore, challenges arise when results do not match any previous theory or evidence, which lead to the need of making strong assumptions in their interpretation.

- Some data-related problems may emerge as the typical way of conducting SEM "goes through the steps of model specification, data collection, model estimation, model evaluation, and (possibly) model modification" (Lei and Wu, 2007, pp. 34-35). On the one hand, the need for having numerous indicators for each latent variable could be challenging, expensive and time-consuming as it requires large numbers of variables that hint towards a smaller number of concepts. On the other hand, the use of secondary data could be difficult if the information does not contain sufficient indicators for each theoretical construct.

- Its capacity to handle complex data and sophisticated models could also be a negative aspect if the theoretical model does not converge. The adaptation of models to achieve computation and strong fit statistics without theoretical justification could result in "a tendency to let the statistics guide the question rather than vice versa. This tendency can lead the unwary to considerable frustration and confusion and ultimately to meaningless results" (Francis, 1988, p. 636).

- It has been pointed out that SEM programming is time consuming and requires learning computational language (Francis, 1988). However, as time passes, software packages that handle SEM are becoming easier to use and more efficient, and provide technical support.

Data and Overview of the Sample

The study makes use of secondary data: a panel that includes socio-economic data for around 2,000 children from around the time of birth to age 4 to 6 years. This section provides some background for the data used and provides variable definitions[16].

Nature of Data

The study extracts information from the Survey of Socio-Economic Characteristics of the Households and the Household Evaluation Surveys (ENCASEH/ENCEL, from their names in Spanish). These databases are a panel that includes information about food consumption, health practices, material well-being, access to services, education, employment, income, and expenditures. The baseline consists of two questionnaires, one conducted in October 1997 and another one in March 1998. The panel contains 6 waves of information: in October 1998, March 1999, November 1999, and March 2000, October 2000, and August in 2003[17].

The objective of this survey was to identify eligible households for PROGRESA and to serve as a tool for evaluating the impact of the programme. PROGRESA, which changed its name to Oportunidades in 2000, is a conditional cash transfer programme that started in 1998 in some of the poorest rural communities in Mexico. This programme started with a provision of a monetary aid to each child in school age living in recipient households. In order to receive the benefit, all members of the household are required to take part in regular medical checkups and children enrolled in elementary school need to meet certain attendance standards. PROGRESA-Oportunidades has experienced several changes during the last ten years: The main one was in 2003 when the programme was expanded to urban areas and to include teenagers attending high school. In 2008, a monetary benefit for the elderly and a cash transfer for helping the household to meet the costs of public services were also included.

Sampling

The sampling is intimately linked with the targeting process for the programme[18], which started as a pilot in eight states: Campeche, Coahuila, Guanajuato, Hidalgo, Puebla, Querétaro, San

[16] Please refer to Annex 1 for the descriptive statistics.
[17] A new wave was conducted in 2007. However, it does not contain information that would serve the purposes of this thesis.
[18] Technical documents that explain the targeting process are found in: http://evaluacion.oportunidades.gob.mx:8010/en/index.php

Luis Potosí, and Veracruz. The definition of the sample was conducted in three stages. First, localities that would be part of PROGRESA in 1998 were identified using the official Marginality Index[19]. The Marginality Index includes schooling and literacy rates; housing conditions and access to water, sewage, and electricity; residents per household; income, and unemployment rates. Communities ranked as poor or extremely poor according to the Marginality Index within the selected states were selected to be part of the panel. Two other conditions for establishing the eligibility of the communities were set: that educative and health institutions would be available to allow the operation of the programme and that the communities would have a population between 50 and 2,500 inhabitants[20]. This resulted in a sample of 506 communities, from which 320 were randomly assigned as treatment and 186 as control. The communities designed as control group were allocated in a waiting list to be included in the programme in 2000.

The second stage was to select the households that would receive the cash transfer. This was done through the assessment of household socio-economic status provided by the ENCASEH. One final check was included to decide whether a household would be receiving the cash transfer: a verification process through community assemblies where people had a voice in possible errors of inclusion or exclusion of households in PROGRESA. Given that the purpose of the panel was to evaluate the results of PROGRESA-Oportunidades, the ENCASEH and the subsequent waves (called ENCEL from 1998 onwards) were applied to all households in the 506 communities. As a result, the ENCASEH/ENCEL 1997-2000 provides information for around 25,000 households or 140,000 individuals in each wave.

The third stage in building the panel includes the inclusion of a new control group in 2003. The new control group was added to evaluate the medium term effects of the programme on the households that started to receive the benefits in 2000 (original control group). The communities were selected under the same guidelines, assuming that they would have had the same probability of being included in the first round. The new database is composed by around 34,000 households or 205,000 individuals. This round of the panel expanded the questionnaire to include biometric information and tests for cognitive development, motor co-ordination, and socio-emotional wellness for children aged 2-6 years, their mothers, and teenagers. Also, parallel questionnaires were applied in 2003 in the communities to assess prices of goods and services, quality of public infrastructure, economic activities, existence of non-governmental organisations, and quality of educative services.

[19] Details about this are found in www.conapo.gob.mx.
[20] This is the governmental threshold for distinguishing rural and urban communities.

Once treatment and control communities were defined, eligible households residing in treatment communities started to receive the cash transfer in 1998. Among the households living in the original control communities, those who were eligible started to receive the cash transfer in 2000. In 2003, more than 16,000 households from the original treatment group and almost 11,000 households from the original control group (late treatment) were receiving PROGRESA-Oportunidades. This is summarised in Table 3.2:

Table 3.2. Sample: Treatment and Original Control Groups

Group	**Intervention**	**No Intervention**
	Number of households	
Original Treatment	16,441	210
Original Control (Late Treatment)	10,680	154

Data Collection

Once intervention and control communities were identified, all households within those communities were surveyed "independently if they were classified as poor or not" (Levy and Rodríguez, 2005, p. 206). Taking into account that the selection of the sample was based on characteristics at the community level using the Marginality Index, communities –but not households- could be considered as somewhat similar. Therefore, the socio-economic level of households shows some variation within poor and extremely poor communities. For instance, the analysis in this thesis looks at the possible effects that differences at the household level may have on children.

According to PROGRESA-Oportunidades´ Rules of Operation (2003), the National Co-ordination of PROGRESA and the National Institute of Public Health were responsible for co-ordinating and administering the survey. Scholars from the International Food Policy Research Institute (IFPRI) helped in the design of the questionnaire, although they were not involved in training the interviewers (Skoufias, 2006). Information was collected *in situ* through household questionnaires. It was a requirement that respondents were someone who normally resided in the household, to be of at least 15 years of age, and to know information about the other household members. Before starting the questionnaire, respondents were informed about the purposes of the survey and agreed to participate by signing consent forms. Respondents were asked to sign or print the survey at the end of the interview.

The survey was carried out in Spanish and administered by trained personnel who obtained socio-economic and demographic information of the households. For the socio-economic data, most of the respondents were the children´s mothers (84.22%). For the cognitive and motor co-ordination tests, children were assessed in the Peabody Test, the Woodcock-Johnson Test, and the McCarthy Test directly by the interviewer. Questions of the Achenbach Child Behaviour Checklist were answered by the children´s mothers. Biometric information was obtained by nurses appointed by the National Institute of Public Health. In all cases, there was a supervisor and in some cases an *ad hoc* translator was needed to complete the questionnaire[21]. Data was captured electronically and assigned identification numbers that ensured confidentiality of information.

Subjects

This thesis extracts information from children who were born between January 1997 and November 1999. Thus, it is possible to follow the material and non-material characteristics of their household from around the time of birth to the moment when the indicators of child well-being are provided (2003). The delimitation of the age-groups is data-driven: One, even though the panel contains well-being information in 2003 for children aged 2 and 3 years, there is no past socio-economic background for these cohorts as the survey was not conducted in 2001 and 2002. Two, even though there is historical information for children aged 6 in 2003, the threshold for the well-being questionnaires was 6 years old. Therefore, the well-being assessment includes only those who just turned or were about to be 6 years when the household was surveyed. And three, this study only includes children from the original treatment and the original control groups, as there is no historical information for the control group that was added in 2003. As a result, there are around 2,300 children aged 4-6 years in 2003 for whose information of well-being is available and for whose socio-economic information is available throughout the panel.

Table 3.3. Distribution of the Sample by Age

Age in 2003	**Number of cases**
4 years	901
5 years	1,137
6 years	214
Total	2,252

[21] There are annotations about the need for a translator or problems in understanding Spanish for about 40 cases.

Profile of Households

In order to provide an idea of the living conditions of the children in the sample, this section summarises some characteristics of their households. As Table 3.4 shows, there is a slight tendency to increase the number of members and the number of generations in the household between 1997 and 2003. In 1997, the first wave of the panel, around 50% of the households of the 1,870 children included in this study was composed of 5 members or less. In the last wave of the panel (2003), only around 28% of households were composed of 5 members or less. In both years, the majority of households is composed by two generations (75% in 1997 and 65% in 2003), although there proportion of three- and four-generation households increased from 23% to 29% and from 1.5% to 6% respectively.

Also, even though most parents report to live in the household, the proportion of fathers who lived in the household decreased from 88% in 1997 to 85% in 2003. Maternal absence also increases; the proportion of mothers who reported to live in the household went from 98% in 1997 to 90% in 2003.

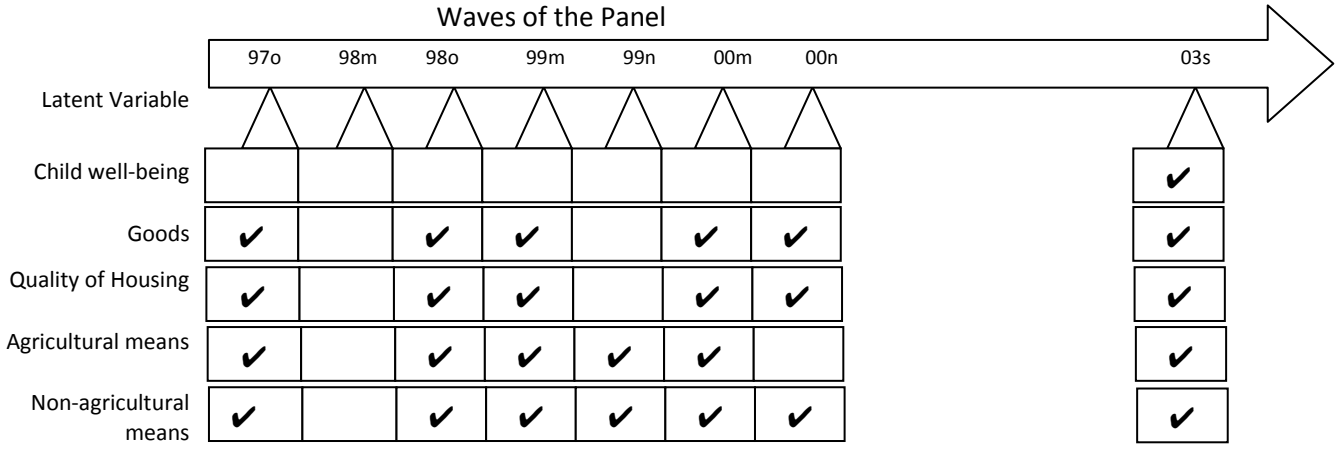
Table 3.4. Profile of Households

Variable	**1997**	**2003**
	N = 1870	
Number of members in the household	2 members = 5.1% 3 members = 11.9% 4 members = 15.9% 5 members = 15.8% 6 members = 14.9% 7 members = 10.7% 8 members = 9.7% 9 members = 6.8% 10 or more members = 7%	2 members = 0.9% 3 members = 2.6% 4 members = 9.7% 5 members = 14.1% 6 members = 18.8% 7 members = 14.5% 8 members = 12.4% 9 members = 9.3% 10 or more members = 11%
Number of generations in the household	2 = 75.3% 3 = 22.7% 4 = 1.5%	2 = 64.5% 3 = 29.1% 4 = 6.4%
Father lives in household	Yes = 88% No = 12%	Yes = 85.3% No = 14.7%
Mother lives in household	Yes = 98.3% No = 1.7%	Yes = 90% No = 10%
Children in school age (5 to 16 years) in the household	Yes = 81.4% No = 18.6%	Yes = 83.5% No = 16.5%
Source: own elaboration using ENCASEH 1997 and ENCEL 2003		

The ENCEL was used to build a person-level longitudinal database (Singer and Willett, 2003). In other words, the new data set contains information for each of the 2,252 children about the material and non-material characteristics of their households from around birth to their current age as well as indicators of physiological, cognitive, and socio-emotional well-being in 2003. The new dataset also contains information about the children´s mothers and household composition.

The ENCASEH/ENCEL provides detailed information about different sources of household income, expenditures, durables, quality of housing, agricultural possessions, food consumption, health practices, education, employment status, family life, migration, and gender roles. However, the availability of the information differs from one wave to the other. A summary of available data relevant for this thesis is presented in Figure 3.5:

Figure 3.5. Data Availability



Key: 97o = 1997 October; 98m = 1998 March; 98o = 1998 October; 99m = 1999 March; 99n = 1999 November; 00m = 2000 March; 00n = 2000 November; 03s = 2003 September

Variable Definitions

This section includes variable definitions for each latent variable. It describes the transformations made as well as treatment of missing data and outliers. All data was screened and transformed using SPSS version 16. Descriptive Statistics of each variable are found in Annex 1.

Physical Health

The latent variable of child well-being is measured by height-for-age and weight-for-age. The ENCEL 2003 includes raw measures of height and weight. These were first transformed into standard scores with the aid of AnthroPlus v1.0.2, a software package from the WHO that takes into account international growth norms. A second transformation was conducted to facilitate model convergence based on the distribution of the sample; variables were changed into dichotomous versions to signal healthy/unhealthy ranges. Thresholds for defining a healthy range are based on WHO recommendations: within 2 Standard Deviations of the reference group.

Cognitive Ability

This dimension was assessed through the Peabody Picture Vocabulary Test (PPVT) and the Woodcock-Johnson Test (WJ)[22]. The ENCEL used the Hispano-American version of the PPVT, which consists of 125 visual images that children have to identify. The test´s difficulty increases as the list of item progresses and the test is administered in sets of 8 questions until the child gets 6 or more erroneous answers in a single set. The highest set is called the Ceiling Set and the highest set in which the child committed one or no errors is the Base Set. Raw scores are calculated by deducting the total amount of errors in all sets from the number held by the highest item in the Ceiling Set. The ENCEL includes the Memory for Names, Memory for Phrases, and Visual Closure sections of the WJ Spanish version, named the Woodcock-Muñoz Batería III. This test includes 72 words that children have to memorise. It is conducted in three stages, where children advance from stage 1 to stage 2 if they score less than 7 mistakes out of 21 responses and progress onto stage 3 if they answer up to 45 questions with less than 20 mistakes.

Raw scores of the Peabody Picture Vocabulary Test (PPVT) and the Woodcock-Johnson Test (WJ) provided in the ENCEL were transformed to reflect age equivalents according to the norm provided by the technical manuals of the tests. Scores for the PPVT were computed manually using norm tables provided in the user manual. Scores for the WJ were transformed using the WJIII Compuscore and Profiles Program, the software for normalising scores of the WJ. For both families of tests, standard scores were modified into stanines to reflect the categorical ranking of the Mexican sample *vis-á-vis* the reference group. However, given that the distribution was skewed to

[22] An illustration of the Woodcock-Johnson and Peabody Picture Vocabulary Tests cannot be provided due to copyright. These are the versions that were used: Dunn, L., Padilla, E., Lugo, D., and Dunn, L. (1986). *Test de Vocabulario en Imágenes Peabody: TVIP: Adaptación Hispanoamericana*. United States: Pearson. Woodcock, R., Muñoz, A., McGrew, K., and Mather, N. (1996). *Batería III, Woodcock-Muñoz.* United States: Riverside Publishing.

the lower end and only a small proportion of the sample fell within the higher stanines, the upper 4 stanines were condensed into one category. With these transformations, results of each of the WJ test and PPVT have 6 ordered categories.

Motor Co-Ordination

The questions of the McCarthy test included in the ENCEL 2003 refer to children´s ability to: walk backwards, walk on tip-toes, walk in a straight line, skip, and stand on one foot. The staff who conveyed the survey assessed these co-ordination tasks and answers were coded as categorical: whether children were not able, partially able, or able to perform them. The same categories were maintained in the analysis.

Emotional Competence

The ENCEL 2003 includes a short version of the Achenbach Child Behaviour Checklist. It provides 26 questions out of the original 118 that examine social, emotional, and conduct problems according to parental assessment. Question #10 was excluded in this analysis because it enquired about behaviour at school, which is not relevant for these age-groups. The 25 remaining items were divided into four sub-categories that grasp underlying behavioural concepts related to the Mexican cultural context: misbehaviour, aggressiveness, self-esteem, and somatisation[23]. Responses are coded as dichotomous variables that state if the child presents or does not manifests each one of the behaviours; the same coding was used in the analysis.

Durables

The survey asked whether households possessed a list of items: blender, fridge, stove, heater, radio, CD player, television, VCR, washer, and a fan. Answers were coded as having or not having each of them, which were maintained in the analysis.

Housing

Questions about housing include categorical options about the materials of the roof, walls, and floor, as well as whether the household has access to water and sanitary services. The original list of possible materials of the roof and walls included 11 and 14 categories respectively and the original list of possible materials for the floor included 3 categories. Given that some categories had very few answers, the options were grouped into similar materials. The variable that refers to floor

[23] The division of indicators into factors was first conducted by Exploratory Factor Analysis, based on the rationale behind the Achenbach Child Behavior Checklist; Achenbach (1991). *Manual for the Child Behavior Check-list/ 4-18 and 1991 Profile.* United States: University of Vermont.

materials was changed into a dichotomous: dust or cement. The variables about the materials of the roof and walls were changed into: cardboard or similar, wood or similar, metal or similar, and cement, brick or similar.

Agricultural Means

The survey included questions about the number of livestock that households possessed: cows, goats, pigs, horses, chicken, rabbits, donkeys, and oxen. Raw answers were first equivalised using the OECD scale to reflect the wealth or productive benefit that the animals represent for the household according to its composition. However, a second transformation was needed because the distribution of answers showed evident peaks; variables were changed into categorical options: not having or having each of the animals.

Non-Agricultural Means

This latent variable includes income and occupation. The survey includes questions about income during the last six months by main payroll employment, gained in the informal labour market, pensions, interests, rent, and public transfers. These questions were asked to members of the household aged 8 years or older and were originally phrased as: how much and how often each source of income was earned. The first step was to make figures equivalent by changing them into daily amounts and to conduct some manual transformations for the cases where figures were obviously an input mistake[24]. Then, all sources of income in the household were added and equivalised using the OECD scale. Outliers were eliminated (top and bottom 1% of the sample[25]). Finally, figures were transformed into logarithm to normalise the distribution.

With regard to occupation, a question about type of main employment was asked for each member of the household aged 8 years or more. Original options were: agricultural worker, non-agricultural worker, self-employed, employer, worker in family business, worker in non-family business, member of co-operative, communal farmer, or other. The number of household members working in each kind of occupation was added, equivalised using the OECD scale, and transformed into logarithmic figures.

[24] For example, a couple of households reported receiving 60,000MXP for a particular kind of governmental transfer but the vast majority of households reported receiving 6,000. The former two were assumed to be a typo-error that added an extra 0.

[25] Other thresholds for eliminating outliers were tried (5% and 10%); given that the mean structure of the distribution was relatively similar, 1% was the threshold that allowed the analysis to maintain the maximum number of cases without outliers.

Time-based Data

Taking into account that this is a longitudinal survey and therefore children in the sample were born in different waves of the panel, it was necessary to link year-based information with time-points in the child´s life. Information around birth refers to indicators of the first wave in which the child appears in the panel. Given that the survey was conducted every six months, these indicators reflect household conditions around the first six months of the child´s life at most. Information at 12, 18, 24, 30, 36, and 42 months of the child´s life was calculated with the subsequent waves. Current household information is extracted from the 2003 survey, so it refers to the specific age of children in that wave.

Socio-demographic Controls

Various controls are used throughout the thesis. On the one hand, some controls are assumed to explain differences in the indicators of child well-being. On the other hand, other controls are assumed to explain differences in the material circumstances of households. This section offers variable definitions as well as the rationale for using them as controls.

Controls on Child Well-Being

The latent variables that measure child well-being are controlled for: child age, gender, and ethnicity (indigenous/non-indigenous background), proportion of children in the household, maternal age, and maternal education level. Child age was obtained through two variables included in the questionnaire: one for years and another one for months. Age was transformed into months and corroborated using date of birth and date in which the questionnaire was applied. It is relevant to mention that age in months was the variable used for calculating normed health-for-age, weight-for-age, BMI-for-age, and the Peabody Picture Vocabulary Tests. Child gender, coded as male or female, was directly obtained from the questionnaire. Child age and gender are included as controls to evaluate whether children are falling behind the respective norms for the indicators of well-being or whether there are differences in the well-being of boys and girls.

Indigenous background was obtained from a question that asked whether there was any indigenous language spoken in the household; speaking an indigenous language was recorded as being indigenous and not speaking an indigenous language was recorded as not indigenous. Even though language is the only question in the panel that refers to ethnicity, it is an accurate indicator: most of indigenous groups in Mexico speak their own language as well as Spanish but non-

indigenous population in Mexico rarely speak indigenous languages (INEGI, 2011). Ethnicity (a distinction between coming from an indigenous and non-indigenous background) is included to assess possible differences between indigenous and non-indigenous children with regard to socio-economic, language, and cultural aspects that may shape their performance in the well-being tests.

Household socio-demographic information was measured by proportion of children in the household aged 11 years or less. This age has been used (UNICEF Mexico, 2011) as a threshold for defining children based on two aspects. On social terms, it is the age in which the basic school years are usually completed. On developmental terms, it is the age when the pre-teen years start. Proportion of children in the household also reflects dependency ratio (child per adult) in the household. Proportion of children in the household is included as a control because household structure is understood as an important component in the developmental process of children. Evidence in Latin America has shown that parental education and number of children in the household, along with other household characteristics, are important predictors of child cognitive attainment (Aldaz-Carroll and Morán, 2001). The socio-demographic composition of the household in which a child grows affects the type, amount, and quality of resources available for them. These resources are not only material goods but also include non-material aspects such as caring time, emotional nurturing, and cognitive stimulation, which have been found to be correlated with indicators of physical, mental, and emotional well-being (Guo and Harris, 2000; Griffore and Phenice, 2008; Whitehurst and Fischel, 2000). This variable grasps not only household size but also the relative attention that a child receives from adults as well as the positive and negative effects of growing up with other children. Maternal socio-demographic profile is included because it has often been found to be a significant explanatory factor in child well-being (Desai, 1995; Gershoff *et al*, 2007; McCulloch and Joshi, 2002; Smith, Brooks-Gunn, and Klebanov, 1997).

Finally, maternal education and maternal age were obtained from the survey; the former refers to years completed of formal education and the latter refers to age in years. Maternal education level and maternal age are assumed to influence child development through healthcare practices, cognitive stimulation, and emotional adjustment. Higher education and older age imply readiness, maturity, and more effective practices towards child rearing and have been found to be positively associated with indicators of child well-being (Desai, 1995; Duncan, Brooks-Gunn, and Klebanov, 1994; Gortmaker *et al*, 1990; Mare, 1982).

Controls on Household Material Circumstances

The variables that measure household material circumstances are controlled for participation in PROGRESA-Oportunidades and indigenous background. Receiving PROGRESA-Oportunidades was obtained from the survey and coded as yes/no answers. Indigenous background, as explained above, was obtained from the question about speaking any indigenous language in the household.

PROGRESA-Oportunidades is included to control for possible changes in the material circumstances of households, provided that some households were part of the treatment group and some households were part of the control group. PROGRESA-Oportunidades not only accounts for extra cash that households receive, but also for implied socio-economic characteristics that were taken into consideration in the allocation of the benefit. Specifically, families were selected to receive the cash transfer according to education levels in the household, employment rates, income, access to governmental benefits and public services, quality of housing, and possession of assets[26].

Ethnicity (indigenous or non-indigenous background) is included as a control for household material circumstances to account for structural differences in access to resources that indigenous groups face in Mexico. The concept of ethnicity in Mexico basically refers to distinguishing between indigenous and non-indigenous groups. Official estimates indicate that indigenous groups represent around 10% of the population, and that the non-indigenous population represent almost 90% (CDI, 2011)[27]. This sample includes at least 20 of the more than 60 indigenous groups officially recognised in Mexico, which possess different cultural traits and speak different languages. However, most of the indigenous population share a common trait, one of poverty and social disadvantage. Indigenous background has consistently been found to be related with low socio-economic indicators (Hall and Patrinos, 2004; INEGI, 2011) and with social exclusion. Therefore, given the purposes of this thesis and taking into consideration the Mexican context, a variable that differentiates indigenous vs non-indigenous background is used as a control.

It is relevant to mention why some variables, such as maternal education, are used as controls for child well-being and not for household material circumstances. In many pieces of research, maternal education has been used as a proxy for socio-economic status (Christian, Morrison, and

[26] Detailed information about PROGRESA-Oportunidades could be found in the Programme´s Rules of Operation; Diario Oficial (2003).

[27] It was not until 1992 when the Mexican Constitution officially recognised indigenous groups. Before that, the Mexican nation was seen as an integrated one, without ethnic distinctions. National statistics account for indigenous and non-indigenous population but there are no official figures about other ethnic groups in the country; a rough estimate could be less than 5%. In any case, other ethnic groups share relatively similar socio-economic conditions to the non-indigenous population in the country.

Bryant, 1998) or as a predictor for income (Gershoff *et al*, 2007) given that it could be related to income or other indicators of household material circumstances. However, in this sample there is high correlation between maternal education and two other controls[28]: receiving PROGRESA-Oportunidades and indigenous background. With regard to the former, PROGRESA-Oportunidades was allocated in function of a poverty index developed by the government, which took into account education levels in the household and other socio-economic characteristics. With regard to the latter, the indigenous population in Mexico, and particularly indigenous women, have been found to be the ones with the lowest levels of education (Hall and Patrinos, 2004; Hallman *et al*, 2006). Therefore, including maternal education as a control alongside PROGRESA-Oportunidades and indigenous background as controls for household material circumstances would cause multi-colinearity problems. Nevertheless, maternal education is included as a control for the indicators of child well-being to account for non-material influences of mothers on children such as caring practices and language transmission.

Furthermore, it is relevant to mention why indigenous background is included as a control for both child well-being and household material circumstances. On the one hand, it controls for possible phenotype differences that could be shown particularly in height-for-age as well as for language differences that could be shown in the Peabody and Woodcock-Johnson Tests. On the other hand, indigenous background controls for socio-economic differences at the household level, which could be shown in income, occupation, possession of durables, or quality of housing.

All of the models in the thesis include these sets of controls. Table 3.5 summarises the use of variables as controls for household material circumstances and for child well-being.

Table 3.5. Controls

Controls on Child Well-Being	**Controls on Household Material Circumstances**
Child age Child gender Ethnicity (indigenous/non-indigenous) Proportion of children in the household Maternal age Maternal education level	Ethnicity (indigenous/non-indigenous) PROGRESA-Oportunidades recipiency

[28] Further details about correlations between controls are provided in Annex 3.

Attrition, Missing Values, and Outliers

Missing data is a challenge for any quantitative study, especially if missing data is systematic and not random. In other words, missing information may show a pattern related to a specific group. Furthermore, longitudinal datasets are generally more likely to have missing data than cross-sectional surveys due to attrition. Nevertheless, there are various ways of handling missing data and to investigate whether data is missing randomly of if it is causing bias. As Kline (2005) summarises, there are four ways to deal with missing observations: (1) to use the available cases, assuming that information loss is missing at random; (2) to rely on single imputation methods such as mean substitution or regression-based imputation; (3) to utilise model-based imputation methods; and (4) to use special multivariate estimation methods that groups cases according to patterns of missing data. MPlus, the statistical software used to conduct the analysis, utilises maximum-likelihood to estimate missing data for continuous, censored, binary, and categorical variables. However, control variables that are missing are not estimated; "missingness is not allowed for the observed covariates because they are not part of the model" (Muthén and Muthén, 2011).

Attrition in the ENCASEH/ENCEL was mainly derived from the fact that households that had left the treatment or control communities were not followed. However, the questionnaires include information about members of the household who had migrated temporarily or moved out of the household. Furthermore, "households were never dropped entirely from the interview roster. Thus, a household which was not interviewed in a given round because of temporary absence, say, might reappear in the next ENCEL round" (Parker, Ruvalcaba, and Teruel, 2008, pp. 3989-3990). According to Parker, Ruvalcaba, and Teruel (2008) estimates, out of the 24,077 households that were included in the first wave of the panel, only 14,495 have information for all the waves of the panel. Nonetheless, 20,067 households have information in the first (1997) and last (2003) waves of the panel.

Outliers also represent a challenge in quantitative examinations given that they may influence the mean structure of the sample. Also, it could be the case that outliers are erroneous measurements or mistakes at the moment of capturing data. Outliers were especially evident in

income variables, which were manually cleaned and top and bottom 1% of the sample were eliminated to minimise the effects of extreme cases[29].

For the variables that measure child well-being, list-wise deletion was applied. In other words, system-missing and user-missing cases as well as outliers that reflected evident imputation errors were deleted from the sample. Even though the elimination of cases with missing or outlying information is the decision that involves the most drastic reduction of the sample, list-wise deletion was preferred for three reasons. Firstly, this strategy is the one that eliminates assumptions behind data-imputation that may bias the results. Secondly, given that the analysis pursues a detailed examination of the elements that shape child well-being, it is necessary to have clean, error-free, and complete outcome variables. Thirdly, it prepares the database with unadulterated information for complex structural equation models. As a result, the sample reduced from 2,252 to 1,870 cases with untainted information for all variables that measure well-being.

Appropriate checks were conducted to verify that there is no bias derived from deleting the cases with missing information and outliers. As Table 3.6 shows, the demographic and socio-economic composition of the sample of 1,870 children that resulted from list-wise deletion is similar to the composition of the original sample of 2,252 children. Around half of the children are boys and half are girls; around 40% are aged 4 years, 51% are aged 5 years, and less than 10% are aged 6 years in 2003.

Table 3.6. General Characteristics of Entire Sample and Cleaned Sample

Variable	**Entire sample of children aged 4-6 years in 2003 (N = 2,252)**	**Sample of children aged 4-6 years in 2003 after list-wise deletion (N = 1,870)**
Gender	Male: 50.5% Female: 49.5%	Male: 50.3% Female: 49.7%
Age	4 years: 40% 5 years: 50.5% 6 years: 9.5%	4 years: 40% 5 years: 50% 6 years: 10%
Speaks indigenous language	Yes and also Spanish: 21% Yes but no Spanish: 7% No, only Spanish: 71%	Yes and also Spanish: 26% Yes but no Spanish: 6% No, only Spanish: 68%
Government classification of poverty of the household in 1997	Poor: 73% Non-poor: 27%	Poor: 74% Non-poor: 26%

[29] Thresholds of elimination of 10% and 5% were also tested; results showed that eliminating 1% did not alter the overall structure of the sample and kept the most number of cases.

Of particular interest is whether poverty level was associated with missing data. As Table 3.7 summarises, the mean poverty score assigned by the government is similar for the entire sample of 2,252 children and for sub-samples according to whether missing indicators of physical health, cognitive ability/motor co-ordination, and emotional competence were deleted. Therefore, it is possible to argue that data was missing randomly and there are no significant differences resulting from the list-wise deletion.

Table 3.7. Poverty Scores in 2003 for the Entire Sample and Sub-samples of Cleaned Data

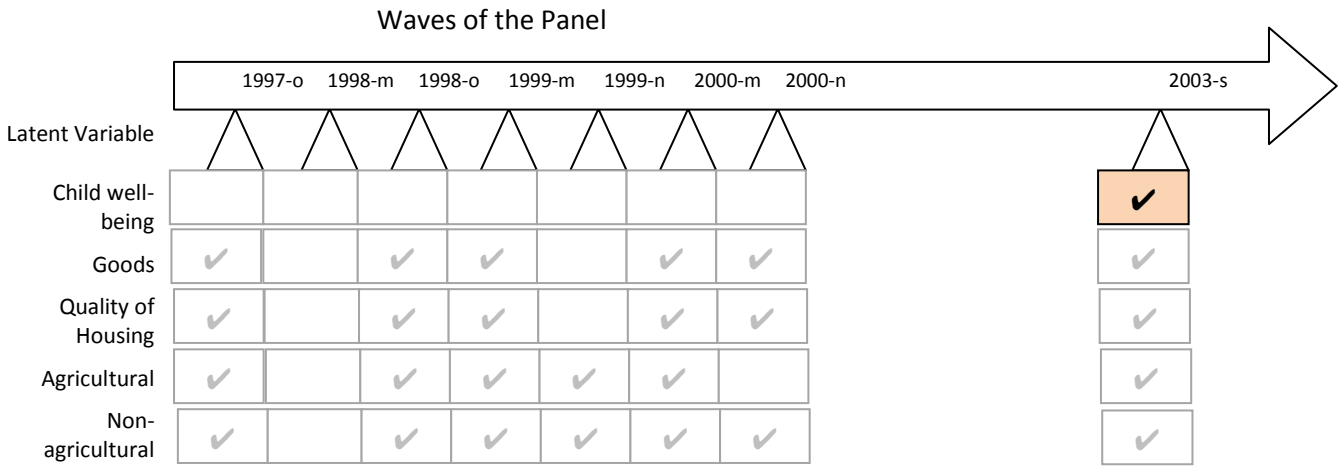
Database	**Mean Score**	**SD**	**Number of cases with an assigned poverty score**
Complete (N=2250)	2.85	1.240	2203
Cleaned Cognitive and Motor Co-ordination (N=1973)	2.81	1.242	1932
Cleaned Physiological (N=2177)	2.86	1.240	2133
Cleaned Emotional (N=2150)	2.85	1.246	2104

Taking into account the treatment of missing data and outliers, the models in this thesis have between 1,600 and 1,870 cases depending on the variables used.

Research Strategy

Taking into account the data available in the ENCASEH/ENCEL, the research was conducted in four steps. These are depicted next.

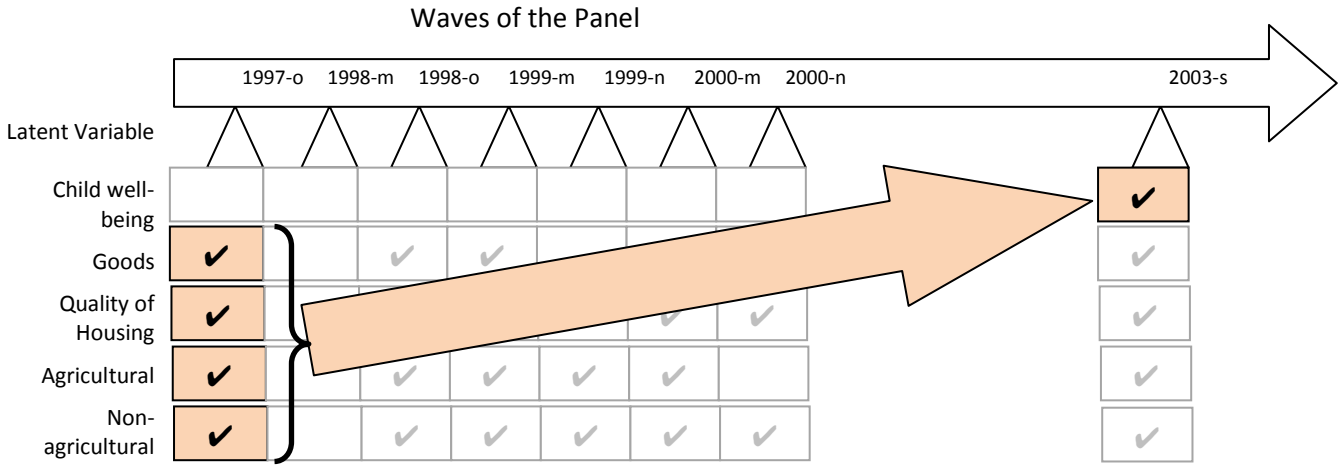
Figure 3.6. Step 1: To Measure Child Well-Being at Age 4-6 Years



Key: 97o = 1997 October; 98m = 1998 March; 98o = 1998 October; 99m = 1999 March; 99n = 1999 November; 00m = 2000 March; 00n = 2000 November; 03s = 2003 September

✔ data available

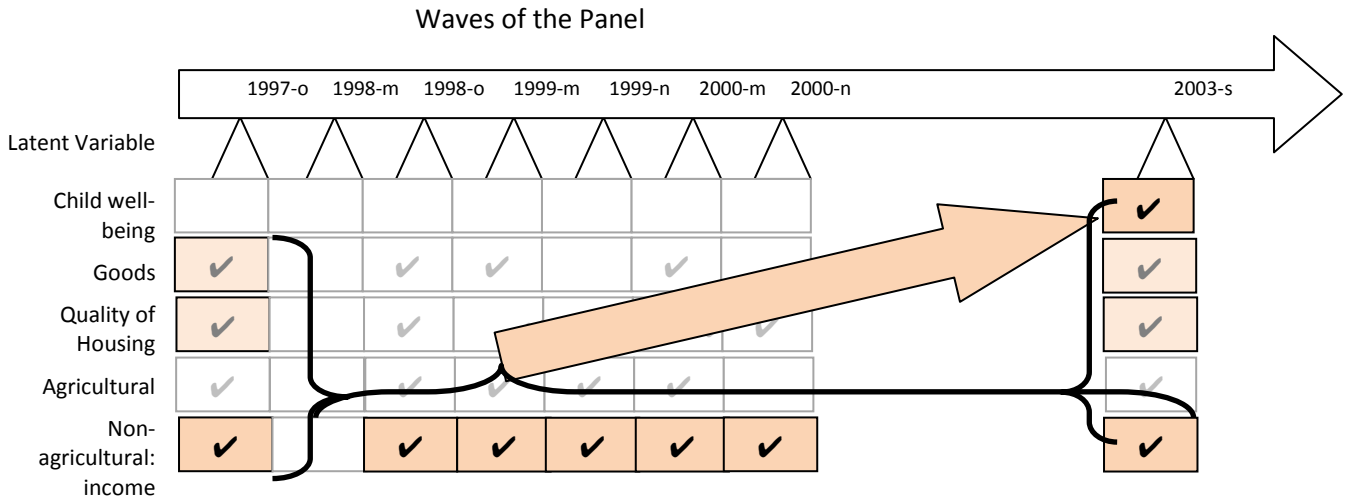
Figure 3.7. Step 2: To Measure the Effects of Early Household Poverty on Child Well-Being at Age 4-6 Years



Key: 97o = 1997 October; 98m = 1998 March; 98o = 1998 October; 99m = 1999 March; 99n = 1999 November; 00m = 2000 March; 00n = 2000 November; 03s = 2003 September

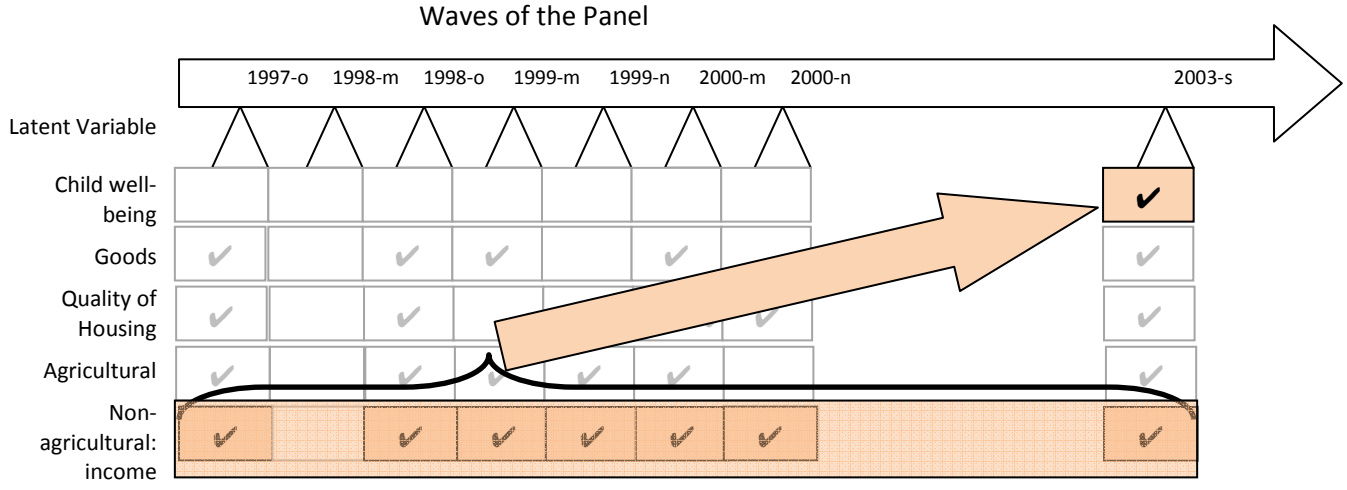
✔ data available

Figure 3.8. Step 3: To Measure the Effects of Household Poverty at Various Time-Points on Child Well-Being at Age 4-6 Years



Key: 97o = 1997 October; 98m = 1998 March; 98o = 1998 October; 99m = 1999 March; 99n = 1999 November; 00m = 2000 March; 00n = 2000 November; 03s = 2003 September
✔ data available

Figure 3.9. Step 4: To Measure the Effects of the Overall Household Poverty Trajectory Over Time on Child Well-Being at Age 4-6 Years



Key: 97o = 1997 October; 98m = 1998 March; 98o = 1998 October; 99m = 1999 March; 99n = 1999 November; 00m = 2000 March; 00n = 2000 November; 03s = 2003 September
✔ data available

Key Considerations for Analysis

The analysis conducted throughout the thesis is based on two crucial issues. Firstly, poverty is assumed to be a gradient and not a dichotomous state in which a household is either poor or not poor. That is, deeper levels of poverty are understood as lower levels of income and higher unemployment in the household, worse quality of housing, fewer durables, and fewer agricultural goods. Importantly, by only including in the examination households living in poor and extremely poor communities, it is possible to look at differences within "the poor". The examination in this thesis is rooted in exploring whether deeper levels of household poverty are associated with worse outcomes for children.

Secondly, the focus of analysis is set on material and socio-economic differences at the household level. This is partly derived from the data available. As mentioned earlier in this chapter, the sample was drawn using indicators at the community level out of a group of poor and extremely poor communities in rural Mexico. This implies that households face relatively similar conditions with regard to public services and the socio-economic characteristics in which they are embedded. In this thesis, it is recognised that many elements outside the household are important in the process of child development. Child development has been found to be influenced by many factors, some of which related to the individual and his or her household and some of which related to the immediate community and the broader historical and cultural context (Berk, 2007; Shonkoff and Phillips, 2000; UNICEF, 2011). For example, public services and institutions or the macro-economic performance of the country where a child lives determine to large extent the resources available for his or her physiological, cognitive, and emotional development.

Many theories in fact take into consideration factors at individual, household, community and macro-contextual levels in exploring the elements that influence child development (see Introductory Chapter). However, given that the sample shares relatively similar community-level and historical factors, the data used in this thesis inherently lead the analysis to concentrate at the household level. Therefore, the examination looks to maximise differences within the sample by focusing on household-related variables. Consequently, the analysis utilises those elements from the theories presented in the Introductory Chapter that relate to household and socio-demographic characteristics.

CHAPTER 4

Bridging the Gap: Conceptual and Empirical Dimensions of Child Well-Being in Mexico[30]

Introduction

Child well-being is a concept that has changed considerably and that continues to evolve. Around the first decades after the beginning of the Gregorian Calendar (I to XI Century A.D.), early Greek, and Arab manuscripts looked at childhood diseases (Shulman, 2004). Two thousand years later, current advocacy groups favour children´s rights and agency in society. Also, the concept of child well-being has been nurtured by various disciplines. Health professionals, developmental psychologists, governmental entities, non-governmental organisations, international institutions, and academics have played a part in defining child well-being. In fact, the conception of childhood itself has changed over time. As Colón and Colón argue,

> Childhood itself is arguably a modern concept. (...) In primitive, ancient, medieval, and emerging industrial societies, children´s value to the family was viewed from the perspective of survival. Among the wealthy, children were resources that contributed to dynastic economies. In impoverished families – the majority – children were commercial assets to be sold, indentured, and pressed into labor [sic] at what we now regard as sinfully young ages (1999, p. xiv).

The modern notion of childhood only emerged during the second half of the XX Century. Today, children are regarded as a vulnerable group who suffer the negative consequences of the adult world, especially conflict and economic harshness. Also, children are now considered to be agents within society and to have citizen rights that were non-existent a century ago. The 1989 UN Convention on the Rights of the Child has played a special role in raising awareness about the promotion of the rights of the child at the international level as a way for ensuring the well-being of children (see Office of the United Nations High Commission for Human Rights, 1959). Since then,

[30] Part of this chapter was presented at the University of Oxford Social Science Graduate Research in Progress Seminars (GRIPS), February 2010.

numerous voices have engaged in the venture of understanding the elements that affect the developmental processes and in a dialogue about the meaning of child well-being.

The increasing interest in conceptualising and defining parameters for measuring child well-being is reflected in public discourse and scholarly work, especially in the numerous international summits and academic conferences on child-related topics. However, it has been recognised that the conceptualisation of child well-being is truncated in its operationalisation. In other words, definitions are not entirely reflected in their measurement. Pollard and Lee (2002) argue that there is an inconsistent use of definitions, indicators, and measures of child well-being. According to these authors, this disassociation is mainly due to insufficiency of information given that few instruments have originally been intended to measure child well-being. Therefore, data deficiency leaves researchers to depend on surveys that account for measures of household well-being. In the best cases, research is based on separate instruments that measure specific indicators but not child well-being in a multi-dimensional way.

The purpose of this chapter is to explore conceptual and empirical approximations of child well-being. This chapter answers the first research question of this thesis: What is child well-being? First, the question is addressed theoretically by looking at Mexico in a comparative perspective with other OECD countries. Then, the question is explored empirically with the aid of SEM by conducting a measurement model of child well-being using data from Mexico´s ENCASEH/ENCEL.

Child Well-Being: Theoretical Drivers

In order to understand the evolution of the concept of child well-being, this section presents a historical overview of some of the main perspectives offered by child development professionals, public institutions, and Social Sciences scholars. These actors have played a key role in shaping the conceptualisation and measurement of child well-being. However, "much of this effort is rooted in Western culture in developed countries" (Ben-Arieh, 2006, p. 2). In fact, most of the literature on child well-being and the effects of poverty on children are primarily found in the United States, the United Kingdom, and other European countries[31]. However, Latin American based research on child well-being is scarce. Therefore, it is necessary to explore the conceptual foundations of child well-being found in Mexico *vis-à-vis* the main trends observed in some OECD countries.

[31] As described in the Literature Review Chapter.

An examination of child well-being, both theoretically and empirically, in Mexico in comparison to other OECD countries serves two purposes. On the one hand, existing conceptualisations of child well-being could be missing notions that are culturally bound or socially constructed. The Mexican case could contribute to the theoretical debate about the meaning of child well-being. On the other hand, even though Mexico is an upper-middle-income country and part of the G-20 group and the OECD, social inequality and poverty have been prevalent issues for several decades (CPRC, 2005). Therefore, empirical evidence about the effects of poverty on child well-being in Mexico may differ from research conducted in other contexts.

The Role of Child Development Professionals

Professionals in the areas of Medicine and Psychology have used centuries of scientific investigations to delineate norms about child development. Even though medical historians trace the interest in children´s health back to Aristotle´s studies about childhood diseases and the texts of Celsus in Rome around the year 50, Paediatrics is a relatively young medical specialty (Luecke, 2004; Mahnke, 2000). The emergence of Paediatrics in the late XIX Century is a fundamental moment in the search for indicators about child well-being. Abraham Jacobi, known as the father of the discipline, introduced the term Paediatrics to "unify the fields of childhood therapeutics, pathology, and physiology" (Mahnke, 2000, p. 710). Jacobi´s ideas about child well-being spread throughout Britain, France, Germany, and the United States. His main argument was that childhood is a period in life that requires distinctive attention and specialised medical knowledge.

The consolidation of Paediatrics was accompanied by the creation of hospitals that were especially devoted to children across the United Kingdom and other European countries (Hewitt, 2003). However, "most physicians focused only on the child when ill" (Mahnke, 2000, p. 711) and it was not until a few decades later when childhood started to be regarded in a more positive way. This change was partly driven by the emergence of Paediatric Associations like the American Paediatric Society, the American Academy of Paediatrics, the Society for Paediatric Research, and the American Board of Paediatrics in the United States and the British Paediatric Association in the United Kingdom. This, along with the dissemination of Paediatric organisations around the world during the 1950s and 1960s, fostered a conception of child well-being that was more comprehensive than childhood illnesses.

Broader conceptions of childhood brought interest in studying personality and emotional development. Several authors played an important role in the development of theoretical and empirical studies of child psychology during the XX Century. For example, Jean Piaget (1947, 1973, 1977, 1978) explained the phases of cognitive development; John Holt (1964, 1967) provided a description of the methods through which children learn; John Bowlby (1958, 1979) pioneered the development of the attachment theory and referred to the importance of the child-carer relationship in the formation of the child´s personality; and Jerome Kagan (1981) and Kagan and Snidman (1991) investigated the formation of a person´s temperament during childhood.

The history of Paediatrics in Mexico is relatively similar to its evolution in Europe and the United States. As Gallegos (2006) recounts, the country´s colonisation from Spain in the XVI Century brought conceptions of health and illness that blended superstitious beliefs and incipient scientific knowledge. The *Conquistadores* brought to the New World "the rational elements of scientific Medicine of the XVI Century, connected to medieval religious concepts" (2006, p. 149) as well as supernatural ideas which were endemic in Europe at that time. In some cases, Spanish ideas differed from indigenous ones. For example, while in Europe breastfeeding was a practice not socially accepted by the higher classes, "after invading the Americas, the Spanish were impressed that all Aztec, Maya and Inca infants were breast-fed, and that nursing, along with other foods, continued until four years of age [and that] even women of royal status nursed their own babies" (Bogin, 1999, p. 22). In other cases, the imported ideas merged with indigenous medical knowledge, which also showed both scientific practices and magical thinking. This led to "a different way to conduct those practices, which was no longer classical European nor purely indigenous" (*Ibid*). As a result, the wellness of children was understood as the result of a mixture of health practices and supra-natural forces that had been set upon the child. However, the notion of child well-being basically referred to child health.

The XIX Century brought to Mexico not only political independence from Spain, but also a shift to a modern scientific paradigm regarding medical knowledge in the area of childcare. Aligned with the European trend towards rational and empirically-based medical knowledge, Medicine commenced to be a modern science in Mexico in the mid-1800s (Frenk, 2008; HIMFG, 2009; Gallegos, 2006). Some episodes marked the beginning of this new stage. The creation of the Hospital for Maternity and Infancy in Mexico City in 1861 was a crucial step in crystallising the importance childhood within medical professions and public action. This hospital, which was started by a presidential decree, provided facilities for birth-giving and neonatal care. Also, research was

promoted in the topics of breastfeeding, foetal tachycardia, and prenatal conditions that increased the risk of a child to be stillborn (Morales, 2003). Understanding the health and illnesses of children was reinforced with the creation of the first professional career devoted to children in the country in 1877: a degree in Obstetrics was initiated in the city of San Luis Potosí. That was followed by the inauguration of a hospital specialised in attending newborns in that same city in 1893.

The solidification of childcare as an independent area of medical practice, however, was suspended with the Mexican Revolution (1910-1920), which looked to overthrow a President that had held power for over 30 years. More than 10 years of civil war disturbed political, economic, and social progress in the country (Knight, 1986; Hart, 1987). The country was affected by war and political instability in such way that any advances in medical or childcare studies were practically impossible. However, the main objectives of the Revolution were to establish a democratic system and to implement social changes based on social justice, land re-distribution, and equal access to social benefits for all groups of society. Hence, by the end of the armed struggle, "economic and social conditions improved in accordance with revolutionary policies, so that the new society took shape within a framework of official revolutionary institutions" (Womack, 1986, p. 79). The revolutionary goals translated into the healthcare system, including the proliferation of public hospitals dedicated to children. Several maternity houses were created during the 1920s and 1930s and Mexico´s Child Hospital was established in 1943 (HIMFG, 2009). Also, the inclusion of Paediatrics in the national curricula of the Medicine degree in 1925 marked phase for consolidating the notion of childhood as a period in life that requires special attention.

Similar to what had occurred in the United States and in Europe, the creation of hospitals went hand-in-hand with the creation of professional associations related to childcare. One of the earliest efforts was the creation of the Paediatrics section as a branch of the National Academy of Medicine in 1908. A few decades later, the Mexican Society of Paediatrics was founded in 1930. This organisation continues to serve as a platform for conducting and sharing scientific findings about child health and child care (Sociedad Mexicana de Pediatría, 2011). Similarly, the Mexican Academy of Paediatrics started in 1951 as a professional organisation. It aims to promote research and dissemination of information that would "help to solve all the medical problems of infants in Mexico" (Academia Mexicana de Pediatría, 2011). These two institutions define themselves as consultative bodies for public and private institutions in the country with regard to the promotion of child health. The knowledge distributed by professionals in these associations steers the conceptualisation of child well-being in Mexico to be centred in the health dimension.

The work of professionals in the areas of Medicine and Psychology leads to a perspective of child well-being that is –expectedly– concentrated on the health domain. However, their work could be considered one of the main building blocks for setting norms about child development as it has permeated public and private action towards the promotion of child well-being.

The Role of International Organisations and the Public Sphere

International organisations have helped to position child well-being as a goal for public action. The action of the United Nations in the promotion of the rights of the child has been crucial in setting the conceptual boundaries of child well-being, especially with the creation of the United Nations Children´s Fund (UNICEF) in 1946. UNICEF was created to provide food, healthcare and clothing to children who had suffered during the Second World War. Even though UNICEF was not a permanent part of the United Nations until 1953, and its actions were not legally binding to national governments, it was a key step in positioning child well-being as a policy priority on the international agenda.

The elaboration of the 1959 United Nations Declaration of the Rights of the Child and the 1989 UN Convention on the Rights of the Child[32] are two other crucial steps in shaping the definition of child well-being. The former stipulates that all children should be granted the environment to allow them "to develop physically, mentally, morally, spiritually and socially in a healthy and normal manner and in conditions of freedom and dignity" (Office of the United Nations High Commissioner for Human Rights, 1959). The latter specifies that children should have "the right to survival, to develop to the fullest, to protection from harmful influences, abuse and exploitation, and to participate fully in family, cultural and social life" (UNICEF, 2011). These legal instruments outline standards for national governments with regard to healthcare and education as well as to legal, civil, and social services. The approach used by the Declaration and the Convention "promotes a multi-dimensional view of the child, taking into account their health and nutrition as well as their spiritual, moral and social development" (Bradshaw, Hoelscher, and Richardson, 2006s, p. 6). Importantly, the legally binding nature of the Convention makes it the primary architect in establishing official norms for child development and indicators for assessing child well-being. Thus, the Convention has permeated public action by fostering policies devoted to promote child well-being. Also, it has moved the discourse about child well-being to a right-centred approach.

[32] It is relevant to mention that, at the moment of writing, all member states have signed and ratified the Convention, with the exception of the United States and Somalia, who have signed but not ratified it.

The guidelines established by UNICEF and the Convention have been adopted by national governments; these are reflected in programmes targeted to children as well as in surveys that aim at evaluating children´s living conditions. The United States and the United Kingdom are two countries that have shown evident progress in the matter. In the United States, the first effort to address the issue of child poverty was the Aid to Families with Dependent Children programme [AFCD]. This programme started in the mid 1930s and was administered for more than six decades as a monetary support devoted to children in households in need (Chase-Lansdale and Vinovskis, 1995). In the 1970s, the National Survey of Children was started as a longitudinal tool for assessing "the physical, social, and psychological well-being of American children, to develop a national profile of the way children in the United States live, [and] to permit analysis of the relationships between the conditions of children´s lives and measures of child development" (ICPSR, 2008). Public concern about children living in poverty increased in the beginnings of the 1990s with the establishment of the National Commission on Children (Chase-Lansdale and Brooks-Gunn, 1995). As evidence of the negative effects of poverty on children grew, public interest in the relationship between poverty, child care, and maternal employment was strengthened with the Family Support Act passed in 1988.

In the United Kingdom, children have been the focus of governmental attention during the last decades. This has been particularly evident since "1999, [when] Tony Blair announced the historic aim of ending child poverty within a generation" (Hirsch, 2006, p. 8). The main guidelines for governmental action with regard to the reduction of child poverty and the promotion of child well-being were set on the Children and Young Persons Act. This Act, introduced as a Bill in 2007, contemplated reforms to the care system, "to ensure that children and young people receive high quality care and support" (Parliament of the United Kingdom, 2011). Today, the Coalition Government´s proposal for alleviating child poverty recognises the importance of fostering well-being during the early years but links investments in children with social mobility (HM Government, 2011). Despite changes in discourse, concrete public action in favour of children in the United Kingdom has been conducted through various programmes.

Every Child Matters[33] is a governmental initiative for promoting children to "be healthy, stay safe, enjoy and achieve, make a positive contribution, [and] achieve economic well-being" (Every Child Matters, 2011). Furthermore, Britain´s actions related to child well-being also include research; several studies have been conducted with the aim of understanding children´s quality of life. Two of the most recent ones are the Children and Young People Survey and the survey named

[33] Formerly under the now non-existent Department of Children, Schools, and Family and currently under the Department of Education. Information originally available at DCSF (2009) http://www.dcsf.gov.uk/index.htm.

"How Are the Kids?" The former examines children´s opinion about their living conditions (Department of Health, 2009; Office for Standards in Education, 2011). The latter gathers information about families´ eating practices and activity habits for evaluating the health conditions of children in the country (NHS, 2011). Also, the United Kingdom´s government includes a Children´s Commissioner, who is "responsible for promoting awareness of children´s views, interests and other rights guaranteed by the Convention (on the Rights of the Child)" (DirectGov, 2009).

The efforts in the United States and in the United Kingdom converge with UNICEF´s conceptualisation of child well-being. However, these two legal instruments have permeated governmental and non-governmental action. Just to mention a few examples, the Christian Children´s Fund (2009), an organisation that came into existence in 1938, has identified areas of intervention to promote child well-being. This organisation, based in the United States, provides assistance to more than 15 million children in 32 countries in the areas of health and sanitation, nutrition, education, early childhood development, sustainable livelihoods, and emergency relief. Similarly, UK´s Save the Children co-ordinates projects in 52 countries in the areas of child demography, poverty and deprivation, health, lifestyle, mental health, time and space, maltreatment, care, crime and illegal drug use, education, and housing and neighbourhood (Save the Children, 2011). Also in the UK, the Child Poverty Action Group (CPAG) conducts campaigns and research in the aims of helping in the alleviation of child poverty and exclusion (CPAG, 2011). In Europe, EuroChild serves as an advocacy group that pursues discussion and action at the European level with regard to the rights of children. According to their own description, this network "is underpinned by the principles enshrined in the United Nations Convention on the Rights of the Child" (EuroChild, 2011).

Children have been included in the official discourse in the Mexican Constitution since its creation in 1917. The legal framework in Mexico includes maternity leave as an entitlement, a Law for Maternity and Maternity Services, and Official Norms that establish the criteria for prenatal and neonatal care. However, the creation of two governmental agencies placed child well-being as a priority of public action. The National Institute for the Protection of the Child (*Instituto Nacional de la Protección a la Infancia*, INPI) and the Mexican Institute for Child Assistance (*Instituto Mexicano de Asistancia a la Niñez,* IMAN) were created "by the Executive to deal with specific needs or campaigns and are usually headed by the president´s wife" (Ward, 1986, p. 111). The INPI was created in 1961 to supply school breakfasts and nutritional education to families. The IMAN was created in 1970 to provide care for abused or abandoned children. The actions of these

organisations focused on neglected, abandoned, or materially deprived children. The approach of these institutions has two implications. On the one hand, children started to be regarded as a vulnerable group. On the other hand, the operation of these institutions mirrored the conceptualisation of child well-being at the time, which was centred on health, education, and inclusion as members of a family.

A significant step in the construction of the concept of child well-being in Mexico is the transformation of the IMAN into the National Institute of Paediatrics, which operates under the Health Ministry at the federal level. The change entailed an expansion of public action towards children to include research about child health and professional training for Paediatric professionals. This was a parallel process to the unification of the INPI and the IMAN into the National System for Integral Development of the Family (*Sistema Nacional para el Desarrollo Integral de la Familia,* DIF). DIF was created in 1977 to promote the well-being of children and their families (DIF, 2011). Since then, DIF is the official entity responsible for implementing assistance for homeless children and teenagers in situation of vulnerability[34]. The merging of these two entities into DIF fortified the conceptualisation of child development as a process that includes physical health, cognitive, emotional, and social well-being. Also, this institution sustains the view that children fulfil their potential within families and within society.

A milestone in the conception of child well-being in Mexico is the creation of the *Programa Nacional de Solidaridad* (PRONASOL) in 1988. This programme operated several projects in three areas: (1) social welfare with programmes related to health, nutrition, education, and housing; (2) productive opportunities in the areas of mining, agriculture, and industry; and (3) regional planning and infrastructure (Gordon, 1996). One of the projects of PRONASOL was called "*Niños en Solidaridad*" (Children in Solidarity), which was especially directed to children living in poverty. *Niños en Solidaridad* provided monetary benefits, food supplies, and medical assistance to more than 181,000 children in the 17 states with the highest levels of school drop-out rates (Huerta, 1992). Under PRONASOL, the well-being of children was understood in relation to community development. In the words of President Carlos Salinas (1988-1994), main architect and faithful advocate of PRONASOL, this programme emphasised "the organised participation of beneficiaries and in place them as subjects and not objects of change" (Salinas, 2008). *Niños en Solidaridad* required the child who received the monetary benefit to be democratically elected in his or her community. The assumption was that children are active agents in society.

[34] This organisation provides numerous programmes for vulnerable groups, including physical rehabilitation to disabled people, nutritional education, and legal aid to deprived households.

PRONASOL continued into President Ernesto Zedillo´s administration (1994-2000). During this period, promoting child well-being became more explicit as a national priority and it was included in governmental poverty alleviation strategies. Following the United Nation´s World Summit for Children held in 1990, the federal government implemented numerous projects that aimed to promote child well-being. In 1995, the National Action Programme in Favour of Children was launched to improve the conditions of children in Mexico, especially those living in poverty (Zedillo, 1995). This Programme brought the establishment of three National Committees that pursued the promotion of breastfeeding, the reduction of perinatal and maternal death, and the support for neonatal care. Other projects included nutritional education, detection of hypothyroidism, provision of spectacles and hearing aids, scholarships, and grocery provisions, the expansion of school breakfasts, programmes for achieving universal inoculation, and projects for promoting reproductive health and child nutrition (Kumate, 1994).

The National Action Programme in Favour of Children highlights the official understanding of child development. In the Programme´s launching speech, President Zedillo stressed the importance of health, education, and nutrition in the development of children. These three areas were positioned as main domains of child well-being, a definition that was strengthened with the introduction of the *Programa de Educación, Salud y Alimentación*, better known as PROGRESA. This programme, which later changed its name to *Oportunidades* during President Vicente Fox´s administration (2000-2006), still represents the main poverty alleviation strategy in the country. PROGRESA-Oportunidades aims to breake the poverty cycle between parents and children by enriching the human capital of the latter. Specifically, the programme pursues to improve child health, education, and nutritional status. This is a conditional cash transfer programme that provides monetary aid to each child of school age living in a recipient household. In order to receive the benefit, all members of the household are required to take part in regular medical checkups and children enrolled in elementary school need to meet certain attendance standards.

After reviewing the evolution of the public discourse about childhood in the United States, the United Kingdom, and Mexico, it is possible to state that attention has primarily been placed on physical health. The emphasis that governments have provided to hospitals and medical associations has been a key factor in this process. However, the last two decades of the XX Century promoted a more comprehensive understanding of child well-being, by taking into account children´s position within their family and societies. This shift towards a multi-dimensional understanding of child well-being that encompasses physical, psychological, cognitive, subjective,

and social well-being has been steered by the Convention on the Rights on the Child, international agencies, and advocacy groups.

The Role of Social Sciences Scholars

The topic of child well-being has also been of interest to scholars in the Social Sciences: from Economics to Psychology and from Public Policy to International Law. Even though the approaches to exploring the factors affecting the well-being of the child have differed, the contributions of Social Scientists in the topic have converged in two ways: On the one hand, they have operationalised the definitions of child well-being into measurable indicators. On the other hand, they have pushed the theoretical boundaries of child well-being towards a comprehensive conceptualisation that reflects children´s needs and views.

Scholars have recognised that human development is the result of "nature" and "nurture" (Berk, 2007). That is, child development results from the interaction of genetic endowment and environmental influences (Young, 1997). Following this line, academics have explored what tangible and intangible elements shape child development and therefore helped to ground the medical and institutional understanding of child well-being into measurable indicators. The areas of child well-being that have been explored most widely are physical health, cognitive ability, motor co-ordination, and emotional competence.

Physical health is a key area of child development and extensive research has been conducted on the ways in which poverty affects it (Adler and Newman, 2002; Aligne *et al,* 2000; Bauman, Silver, and Stein, 2006; Bundy, 1997; Currie and Cole, 1993; Korenman and Miller, 1997; Liu, 2007; Malat, Oh, and Hamilton, 2005; Séguin *et al,* 2007). With regard to the specific indicators that have traditionally been considered as important are weight-for-age, BMI-for-age, height-for-age, and haemoglobin concentration. The first two indicators signal short or medium term nutritional status or recent changes in dietary intake. Height-for-age (or stunting) is a manifestation of inadequate nutritional ingestion and/or recurrent or prolonged illness during the first few years in life (Heltberg, 2008). Haemoglobin concentration indicates anaemia and signals medium-term health problems that could be related to nutritional status and/or parasitic infections (WHO, 2011). Social Sciences scholars have used the norms established by international consensus within the WHO and medical professionals with regard to healthy thresholds for these indicators based on an international reference group. While two Standard Deviations (SDs) have been established as the upper and lower limits of healthy ranges for weight-for-age, BMI-for-age, and height-for-age, haemoglobin

concentration for children aged 4 to 6 years should be equal or greater than 11g/dl. As the Methodology Chapter described, these indicators are used in this thesis.

Cognitive development has also been considered a domain of child well-being and various scholars have explored this (Burchinal, Lee, and Ramey, 1989; Griffore and Phenice, 2008; Guo and Harris, 2000; McCulloch and Joshi, 2002; Ramey *et al*, 1992; Raver *et al*, 2007; Whitehurst and Fischel, 2000). Some of the most common indicators used by researchers to assess the cognitive development of children are related to memory, vocabulary, general knowledge, mathematic ability, reading, and logic skills. Numerous instruments have been developed to assess these areas of cognitive development, which establish norms that serve as guidelines for evaluating individuals against what would be expected for certain age-group. The two tests that are used in this thesis have been taken into consideration by several authors to evaluate cognitive development of pre-school children: the Peabody Picture Vocabulary Test (PPVT) and the Woodcock-Johnson (WJ) Test.

The PPVT is one of the most frequently utilised tools for evaluating school readiness because it measures verbal ability and listening comprehension: the examinee is required to identify the visual presentation of a word that the examiner provides. Even though it could be administered to any age groups, the target group of this test is children between 2 and 6 years. The PPVT provides age-based standard scores that allow the evaluation of individual performance against the norm (Pearson, 2009b). The WJ Test evaluates general and specific abilities related to intellectual competency, language acquisition, and scholastic aptitude (Riverside Publishing, 2009). More specifically, this test assesses aptitudes, interest, and achievement in the areas of verbal development, reasoning, memory, reading, mathematics, written language (McGrew, 1993). This examination could be administered to any individual aged 2 years or more. The WJ Test is composed of twelve sub-tests that could be delivered individually or as a compound.

Another dimension of child well-being that has been operationalised in academic research is related to motor co-ordination skills. The McCarthy Test, which is used in this thesis, is found within existing pieces of research because it focuses on motor skills, sensorial abilities, orientation, and physical co-ordination. This test serves as an evaluation of mobility tasks of children aged 4 to 6.6 years, according to a norm. The ultimate goal of the McCarthy Test is to serve as a predictor “of a child's ability to cope with schoolwork in the early grades” (Pearson, 2009a). This thesis uses results from the McCarthy Test.

Emotional competence has also been widely explored by scholars as a dimension of child well-being (Brody and Flor, 1998; Dearing, 2008; Evans, Saltzman, and Cooperman 2001; McLoyd, 1998). Some of the indicators that have been more widely used are: social interaction, interpersonal abilities, self-regulation, emotional distress, self-esteem, internalisation of health problems, and externalisation of behaviour problems. Some of the tests that have been developed to assess the emotional health of children are the Achenbach Child Behaviour Checklist (ACBC) and the Bayley Scales of Infant Development. As described in the Methodology Chapter, this thesis uses a short version of the ACBC.

The majority of research on child well-being has been conducted separately in the areas of physical health, cognitive achievement, and emotional competence. However, the modern conception of childhood has compelled studies to include other indicators of well-being such as social standing and happiness. Also, as more instruments to evaluate simultaneously multiple domains of child well-being are available, research has been conducted with a richer empirical base. Recent studies (Baydar and Brooks-Gunn, 1991; Blau, 1999; Duncan, Brooks-Gunn, and Klebanov, 1994; Evans *et al*, 2005; Fernald *et al*, 2005; Gertler and Fernald 2004) have taken into consideration correlations between health, cognitive, and emotional well-being.

The conception of child well-being has evolved into a multi-dimensional perspective. Therefore, the need for creating instruments especially devoted to measure child well-being has been voiced. Several academics (Biggeri and Mehrotra, 2008; Roelen, Gassmann, and de Neubourg, 2009; White, Leavy, and Masters, 2002) have argued that child well-being cannot be analysed in the same way as adult well-being because children´s needs, aspirations, and life experiences differ from adults´. In fact, some scholars have pointed out that research on the effects of poverty on people have actually missed an assessment of children´s reality: "well-being research in resource-poor contexts has not been solely or even primarily about children" (Camfield, Streuli, and Woodhead, 2009, p. 68). Furthermore, there is a recent and increasing interest in repositioning childhood as an important period in itself, in favouring children´s *well-being* rather than their *well-becoming* (Ben-Arieh, 2002). As Schonkoff and Philipps have stated, there is a recent acknowledgment amongst policymakers and academics about the need "to nurture, protect, and ensure the health and well-being of all young children as an important objective in its own right, regardless of whether measurable returns can be documented in the future" (2000, p.3).

In Mexico, the academic world has also shaped the conceptualisation of child well-being in an important way. The earliest pieces of research published in the country were the Annals of the Hospital of San Luis Potosi, which started in 1896 (Franco, 1998). Since then, numerous medical publications that address child health have been produced. For example, the Mexican Magazine of Paediatrics started in 1998; Paediatric Allergies, Asthma, and Immunology started the following year; and the Paediatric Act of Mexico started in 2005 (Mediagraphic Literatura Biomédica, 2009). Also, several hospitals or health institutions produce their own publications, such as the Clinical Bulletin of the Child Hospital of Sonora. At the regional level, research about childhood illnesses is disseminated in publications like the Pan-American Magazine of Public Health. Even though these investigations, as would be expected, focus on diagnosis and findings from the paediatric practice and have an understanding of child well-being that concentrates on physical health, they set the ground for further research.

Mexican research about child well-being within the Social Sciences diverges somewhat from the research conducted in other OECD countries. Firstly, research in Mexico and other Latin American countries has concentrated on examining inter-generational transmission of poverty. Well-being indicators primarily reflect success during adulthood, such as educative achievement, employment status, or income (Aldaz-Carroll and Morán, 2001; Behrman, Gaviria, and Székely, 2001; Paxson and Schady, 2005; Silber and Deutsch, 2008; Solís and Cortés, 2008; Zenteno and Solís, 2006). By prioritising future (adult) indicators, this kind of research does not provide explicit conceptual boundaries of child well-being. Secondly, the studies that analyse the factors that shape child well-being have mainly focused on evaluating the impacts of social programmes on children. The largest bulk of literature that touches on the topic of child well-being in Mexico concentrates on evaluating the effects of PROGRESA-Oportunidades (Behrman and Hoddinott, 2005; Behrman and Skoufias, 2006; Behrman *et al,* 2005; Behrman, Parker, and Todd, 2004; Behrman, Sengupta, and Todd, 2005; Escobar and González de la Rocha, 2008; Gertler, 2000; Gertler and Boyce, 2001; Gertler and Fernald, 2004; Parker, Todd, and Wolpin, 2006; Rubio-Codina, 2007). In both cases, these investigations are relatively recent and the implied notion of child well-being tends to favour their *well-becoming* over their *well-being*. This kind of research provides some insight about the conceptualisation of child well-being, which concentrates on health, educative, and cognitive indicators.

As the literature review chapter described, only a handful of studies in the region have scrutinised the immediate effects of poverty on children. Fernald *et al* (2005) explored the effects of

poor sanitation, crowding, and malnutrition in a set of anthropometric indicators and mental development. The indicators used in the examination were height-for-age, weight-for-age, and scores for the Bayley Scales of Infant Development. Desai (1995) examines the relationship between family composition and child mortality, stunting, and wasting in some Latin American countries. This author presents evidence for Bolivia, Brazil, Colombia, Dominican Republic, and Trinidad y Tobago. A similar study is the one conducted by Paxson and Schady (2005), which explores the effects of household wealth, health, and parenting practices on the cognitive development of children in Ecuador. These authors used the Spanish version of the Peabody Picture Vocabulary Test.

As the last few paragraphs have shown, the concept of child well-being has been enriched through the cumulative work of medical and childcare professionals, international agencies, advocacy groups, and researchers. Even though the modern conception of childhood is relatively recent, important conceptual and empirical advancements have been achieved. As Moore has pointed out, "while indicators of child well-being do not yet compete with economic indicators as measures of society´s success (or as predictors of electoral success), great progress has been made" (1999, p. 14). This is evident in the blooming during the last couple of decades of studies that examine the effects of poverty on child well-being.

After reviewing the definitions of child well-being that have been used by medical professionals and developmental psychologists, by international institutions and non-governmental organisations, and by academics, it is possible to argue that there are areas of convergence in the conceptualisation of child well-being. The areas that have dominated the conceptualisation and measurement of child well-being are physical health, cognitive achievement, motor co-ordination skills, and socio-emotional competence. Academic work within the Social Sciences on the effects of poverty on child well-being in Mexico and in Latin America is conceptually aligned with the investigations conducted in other OECD countries. Even though the empirical findings in the region are not as advanced as the ones in the United States or Europe, the fact that academic and public discourse on child well-being in Mexico is aligned with the international context facilitates comparative research.

With the aid of SEM, the next section explores whether the empirical reality in Mexico fits this conceptualisation of child well-being. Specifically, a measurement model that utilises data from the ENCASEH-ENCEL is developed to test the conceptual understanding of child well-being.

Empirical Examination: Measuring Child Well-Being

This section provides empirical analysis of child well-being in Mexico using SEM. The measurement model of child well-being builds on the conceptualisation found in the perspectives of medical professionals, public agencies, and Social Sciences scholars.

Setting the Model

The measurement model of child well-being includes four unobserved concepts (latent variables): physical health, cognitive ability, motor co-ordination, and emotional competence measured at age 4-6 years. Each domain of child well-being is measured through observed indicators. Physical health is measured by height-for-age and weight-for-age. While the first indicator reflects long-term health status, the second indicator signals medium-term nutritional status of children. Cognitive ability is measured by three tests of the Woodcock-Johnson (WJ) Battery and by the Peabody Picture Vocabulary Test (PPVT). These indicators evaluate mental capabilities related to vocabulary identification, short term memory, and long-term memory and are evaluated against the norms for ages 48 to 72 months. Thus, the construct evaluates the supposed cognitive development of children at this age and also indicates school readiness. Motor co-ordination is measured by the McCarthy Scales of Children´s Abilities, which evaluate overall and fine motor abilities that are supposed to be mastered by pre-school children (Pearson Assessments, 2010). This domain is not only an approximation to physical-mental harmonisation capabilities but is also related to the kind of social interaction that children have via the games they play at this age. Finally, emotional competence is measured through a short version of the Achenbach Child Behaviour Checklist. This domain contains 25 of the 26 questions included in the ENCEL[35] (out of the 118 originally contained in this test), which examine social, emotional, and conduct problems according to parental assessment. With the aid of a preliminary exploratory factor analysis[36], the 25 items were divided into four sub-categories that grasp underlying behavioural concepts related to the Mexican cultural context: misbehaviour, aggressiveness, self-esteem, and somatisation.

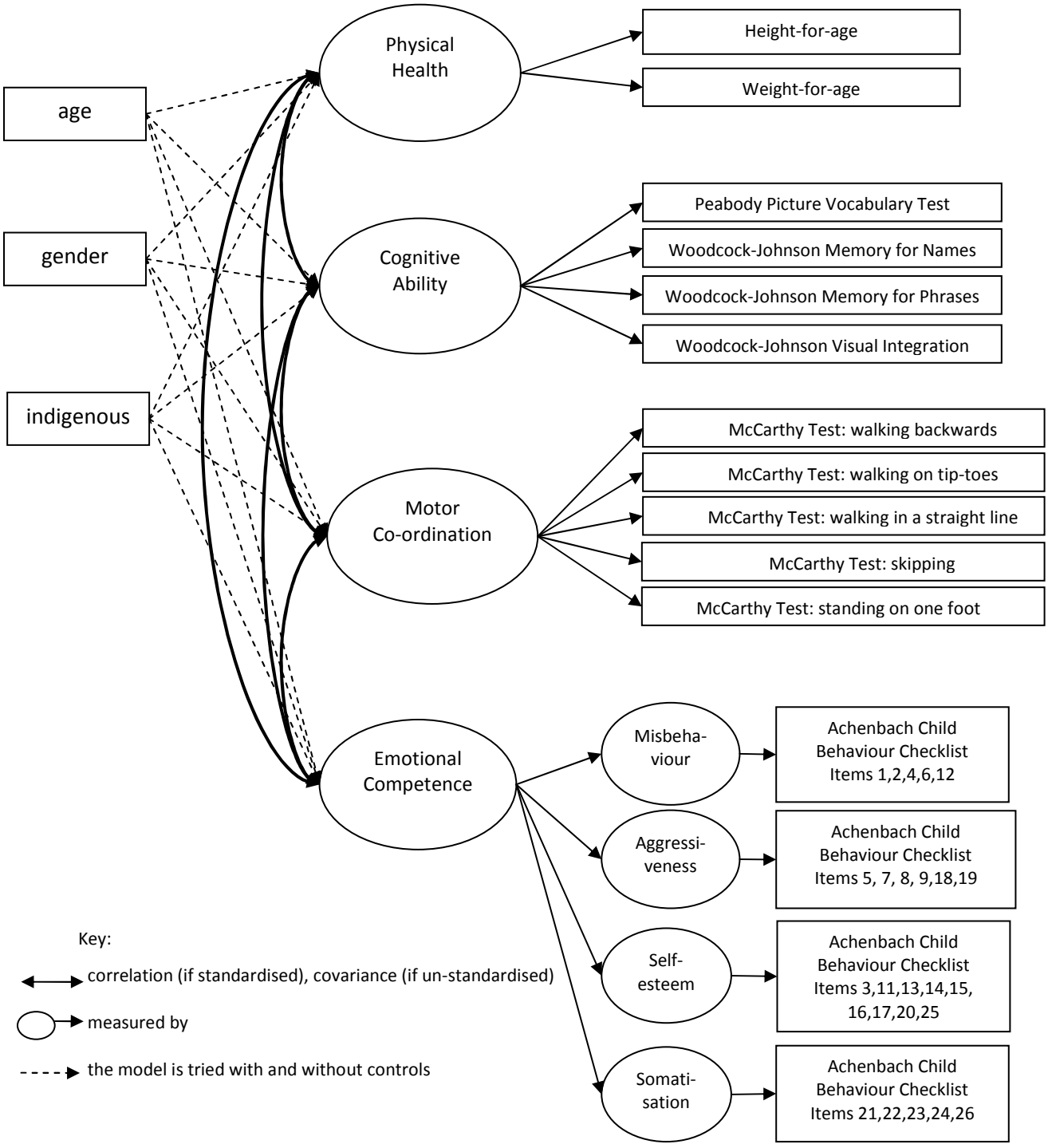
The indicators that measure each of the four dimensions of well-being are based on the conceptualisations of child well-being presented in the previous section of this chapter. Also, these

[35] Question #10 was excluded in this analysis because it enquired about behaviour at school, which is not relevant for this age-group.

[36] The clustering of observed indicators obtained from the ENCEL was confirmed on empirical grounds by running preliminary Exploratory Factor Analysis (EFA). The EFA was conducted in SPSS and in MPlus and both orthogonal and oblique rotations were tried.

indicators have been used by other scholars in different contextual settings (Burchinal, Lee, and Ramey, 1989; Desai, 1995; Griffore and Phenice, 2008; Guo and Harris, 2000; Korenman and Miller, 1997; McCulloch and Joshi, 2002; Whitehurst and Fischel, 2000) as well as in Mexico (Gertler and Fernald, 2004; Fernald *et al*, 2005) and other Latin American countries (Champion *et al*, 2003). Hence, the model is to some extent comparable to existing research. However, while most research has looked at these outcomes individually, the measurement model of child well-being developed here takes advantage of one of the key features of SEM: the unobserved concepts are assumed to be correlated. Correlations between dimensions of child well-being allow us to explore the state of children in four areas (physical, cognitive, motor, and emotional) that could be related but that do not necessarily perform in the same way. To mention two examples, children may have excellent physical health but medium cognitive ability and low motor co-ordination and emotional skills. Or, children could suffer from poor physical health but manifest good indicators in the other dimensions of well-being. Therefore, given the data available in the ENCASEH/ENCEL, the model provides a multidimensional conceptualisation of child well-being. The measurement model of child well-being is visualised in Figure 4.1.

Figure 4.1. Measurement Model of Child Well-Being.



Apart from the four latent variables (physical health, cognitive ability, motor co-ordination, and emotional competence) the model includes three correlations between observed indicators and three socio-demographic controls. The pairs of observed indicators that are assumed to be correlated with each other are: standing on one foot and standing on the other foot; getting involved in fights and getting involved with problematic people; and being nervous/tense and being anxious/fearful. The associations between these three pairs are taken into account given their closeness in the phrasing of the questions in the survey and the empirical proximity they manifest. The socio-demographic controls are age, gender, and ethnicity.

Age and gender are included as controls to examine whether children in this sample manifest a delay with regard to the age and gender norms for the indicators of well-being. Also, gender helps to grasp possible differences in the ways in which boys and girls are treated, disparities in the resources provided to them, or different expectations from parents. Gender is particularly important in the context of this study, not only because rural settings have been associated with worse outcomes for girls but also because there is a high proportion of indigenous children. As previous research has found (Hallman *et al*, 2006), indigenous girls in Latin America are particularly vulnerable to under-nutrition and are more likely to receive inferior healthcare and less cognitive stimulation than boys.

Indigenous background is another important control because this sample includes at least 20 of the 62 indigenous groups recognised in Mexico. Even though specific socio-economic and cultural characteristics vary across groups, it is possible to argue that two general matters related to ethnicity may play a role in this model. Firstly, indigenous background bears genetic pre-disposition that may be reflected in shorter height-for-age or lower weight-for-age. Secondly, ethnicity carries social meaning: in the Mexican context, indigenous background is related to limited access to resources, education, healthcare, and persistent and deeper levels of deprivation and social exclusion (Hall and Patrinos, 2004). Indigenous background is measured through a question included in the ENCEL about speaking any indigenous language at home. Even though this variable is a very crude measure about ethnicity, it is important to take into consideration that basically everyone who speaks an indigenous language in Mexico could be considered to possess indigenous background[37]. In this sample, 42.8% of children speak an indigenous language at home.

[37] For instance, bilingualism is basically practiced only by indigenous groups, probably due to assimilation policies that aimed at merging indigenous groups into mainstream society that lasted until the 1990s.

This measurement model of child well-being has two main advantages: One, it describes the individual state of each domain of well-being by using observed indicators. And two, the model illustrates the general state of the well-being of children taking into account the simultaneous processes that take place in child development. The next section offers the results of the measurement model.

Results

The statistical robustness of the model, or the extent to which it fits the data, is explored through various goodness of fit tests. Two versions of the model are compared: with and without adding age, gender, and ethnicity as controls. While the model without controls (Base Model) examines how well this organisation of variables empirically corresponds to the conceptual understanding of child well-being, the model with controls takes into account how results vary for specific age, gender, and ethnic groups. Results for four tests of goodness of fit are presented in Table 4.1

Table 4.1. Tests of Model Fit for Measurement Models of Child Well-Being

Test	**Base Model: without controls**	**Model with Controls: age, gender, and ethnicity**
Chi-Square (degrees of freedom)	1014.718 (df = 277)	1238.718 (df = 332)
CFI	0.924	0.912
TLI	0.949	0.938
RMSEA	0.038	0.038
Number of cases	1870	1854

As Table 4.1 summarises, both models present adequate figures in the goodness of fit tests: the Chi-Square is relatively low for this sample size, the CFI and TLI are above the suggested .90, and the RMSEA is below the recommended .05. As expected, adding controls causes the model to slightly lose statistical power due to the complexity it gains. Nevertheless, the reduction in the fit statistics is almost negligible, the tests are anyway satisfactory, and the model gains sophistication. Thus, it seems that the model that controls for age, gender, and ethnicity provides a more solid

explanation about the physical, cognitive, motor, and emotional well-being of children. However, in order to uncover the effects of the controls on each domain of well-being, it is necessary to compare factor loadings and correlations between domains of well-being between the Base Model and the Model with Controls. These are explored next.

Measuring Unobserved Concepts: Factor Loadings

As the Methodology chapter described, SEM measures unobserved concepts through observed indicators. Observed indicators load onto the domain of well-being that they are presumed to measure. For the Base Model and the Model with Controls, Table 4.2 provides factor loadings for each domain of child well-being and Table 4.3 offers factor loadings of the four sub-dimensions of emotional competence.

Table 4.2. Factor Loadings for Each Domain of Child Well-Being; Base Model and Model with Controls[38]

Domain of Well-being	**Base Model**		**Model with Controls (age, gender, indigenous)**	
	Un-Standardised Estimate p < .001	**Standardised Estimate** p < .001	**Un-Standardised Estimate** p < .001	**Standardised Estimate** p < .001
Physical Health				
Height-for-Age	1.00*	1.00	1.00*	1.00
Weight-for-Age	0.56	0.60	0.58	0.61
Cognitive Ability				
Woodcock-Johnson Memory for Names	1.00*	0.62	1.00*	0.64
Woodcock-Johnson Visual Closure	1.27	0.79	1.24	0.78
Woodcock-Johnson Memory for Phrases	0.99	0.61	0.97	0.62
Peabody Picture Vocabulary Test	1.16	0.72	1.17	0.74
Motor Co-ordination				
Test 3 : walking on tip-toes	1.00*	0.77	1.00*	0.77
Test 1: walking backwards	0.98	0.76	0.98	0.76
Test 6: skipping	0.87	0.66	0.87	0.67
Test 4: standing on the other foot	0.86	0.66	0.86	0.66
Test 5: walking on a straight line	1.01	0.76	1.00	0.77
Emotional: Misbehaviour				
Item 1: arguing	1.00*	0.58	1.00*	0.58
Item 12: jealousness	0.90	0.52	0.92	0.53

[38] Full un-standardised solution with standard errors is provided in Annex 4.

Table 4.2. Factor Loadings for Each Domain of Child Well-Being; Base Model and Model with Controls (continued)				
Item 2: bragging	1.02	0.59	1.02	0.59
Item 4: crying too much	0.98	0.56	0.99	0.58
Item 6: demanding too much attention	0.96	0.55	0.95	0.55
Emotional: Aggresiveness				
Item 5: abusiveness	1.00*	0.67	1.00*	0.66
Item 7: destroying own belonging	0.83	0.55	0.84	0.55
Item 8: destroying others´ belongings	0.94	0.63	0.94	0.62
Item 9: disobeying	0.81	0.54	0.81	0.54
Item 18: getting involved in fights	1.05	0.70	1.06	0.70
Item 19: getting involved with problematic people	0.80	0.53	0.80	0.53
Emotional: Self-Esteem				
Item 3: feeling lonely	1.00*	0.58	1.00*	0.58
Item 11: guiltless	0.75	0.43	0.75	0.44
Item 13: afraid of acting wrong	1.10	0.63	1.07	0.63
Item 14: feels that has to be perfect	0.71	0.41	0.70	0.41
Item 15: feeling unloved	1.33	0.76	1.32	0.77
Item 16: feeling that others are out to get him/her	1.26	0.73	1.25	0.73
Item 17: feeling inferior	1.31	0.76	1.30	0.76
Item 20: prefers to be alone	0.69	0.40	0.67	0.39
Item 25: feeling guilty	1.23	0.71	1.22	0.71
Emotional: Somatisation				
Item 21: cheating	1.00*	0.59	1.00*	0.60
Item 22: nervous/tense	1.02	0.60	1.00	0.55
Item 23: anxious/fearful	0.82	0.48	0.82	0.49
Item 26: overtired	1.03	0.60	1.00	0.60
Item 24: feels dizzy	1.07	0.63	1.05	0.62
*the loading of one indicator is set at 1 by default to establish the scale.				

Table 4.3. Second-Order Measurement Model for Emotional Competence

	Base Model		**Model with Controls**	
Emotional Competence	Un-standardised Estimate $p < .001$	Standardised Estimate $p < .001$	Un-standardised Estimate $p < .001$	Standardised Estimate $p < .001$
Misbehaviour	1.00*	0.92	1.00*	0.92
Aggressiveness	1.10	0.87	1.09	0.87
Self-Esteem	0.83	0.76	0.84	0.77
Somatisation	0.96	0.87	0.98	0.87
*the loading of one indicator is set at 1 by default to establish the scale.				

Factor loadings represent the contribution of each indicator towards the unobserved concept. They have been provided in un-standardised and standardised versions. Un-standardised estimates represent factor loadings that are based on the original scale of the indicators, except for one indicator that needs to be defined as constant (with a loading of 1) to set the scale of the latent variable. In the un-standardised solution, factor loadings "are interpreted as unstandardized [sic] regression coefficients that estimate the direct effects of the factors on the indicators" (Kline, 2005, p. 176). Therefore, un-standardised factor loadings represent the estimated change in the indicators given a 1-point increase in the latent variable. In a different way, standardised estimates provide a solution where the variances of all the indicators have been adjusted to 1 and are therefore comparable against each other in a fixed scale.

Most of the standardised factor loadings range between .55 and .70, with a few exceptions that show coefficients of around .40. This indicates that the indicators accurately measure the unobserved domain of well-being that they are supposed to assess. Also, the fact that factor loadings are relatively similar in the Base Model and in the Model with Controls suggests that the inclusion of age, gender, and ethnicity does not change the overall structure of the model.

Standardised coefficients help to evaluate the relative strength of the indicators in measuring the underlying concept[39]. In the Model with Controls, physical health is measured mainly by height-for-age (1.00) but also in an important way by weight-for-age (.60). Cognitive achievement is measured in comparable ways by the three WJ tests and the PPVT, with standardised loadings between .62 and .78. The four indicators of this domain have strong loadings, a situation that denotes convergent validity of the construct. In other words, short term-memory and vocabulary knowledge are strong indicators for cognitive ability. Motor co-ordination is also accurately measured by the observed indicators. All of the aptitudes asked to be performed are solid measures of the construct because they present standardised loadings higher than .66. Nonetheless, it is important to recognise that these tests require balance skilfulness and the use of lower limbs solely and do not take into account skills that could be performed with other parts of the body or reflect a conceptualisation of well-being for physically disabled children. Finally, factor loadings for each sub-division of emotional competence denote solid correlations between the indicators and their respective constructs: The items under misbehaviour have standardised loadings of around .55; the ones under aggressiveness present standardised loadings between .53 and .70; the items that

[39] For factor loadings of the Base Model please refer to Tables 4.2 and 4.3

belong to self-esteem show standardised loadings between .41 and .77; and the items under the sub-division of somatisation have standard loadings between .49 and .62.

With regard to the factor loadings of the four sub-divisions of emotional competence, standardised loadings are between .77 and .92. This denotes that emotional competence has been accurately divided into distinct areas. According to the factor loadings, emotional competence is largely driven by misbehaviour, but aggression, self-esteem and somatisation also manifest solid estimates. Self-esteem is the sub-division with the lowest loading of the group (.77). However, this is probably derived from the fact that is the sub-concept with the largest number of items and thus the highest variation.

Finally, three pairs of observed indicators were assumed to be correlated given their closeness. The estimates between "destroying own belongings" and "destroying others´ belongings" is .30; between "getting involved in fights" and "getting involved with problematic people" is .26; and between "being nervous" and "being anxious" is .26.

Correlations between Constructs

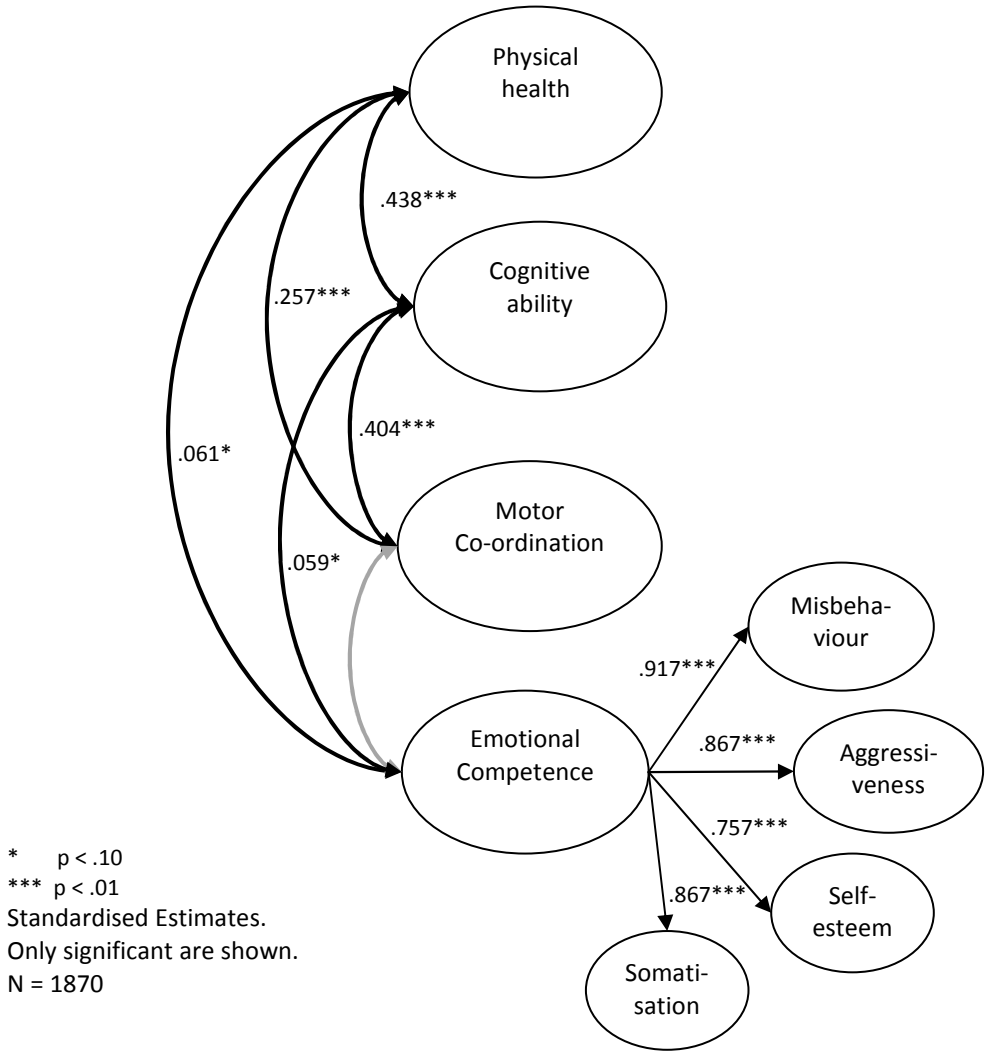
As the first part of this chapter reviewed, the conceptualisation of child well-being evolved from an illness-centred perspective towards an approach that includes a broader range of indicators. The last couple of decades have particularly seen the emergence of scholarly work that looks at the effects of deprivation on various dimensions of child well-being. For example, Blau (1999) looked at cognitive, emotional, and motor co-ordination outcomes; and Duncan, Brooks-Gunn, and Klebanov (1994) and Han, Waldfoge, and Brooks-Gunn (2001) included cognitive and behavioural indicators in their examinations. These studies have enriched the academic evidence on the negative consequences of poverty on children by looking at a variety of aspects of a child´s life. However, the analyses were conducted using linear regressions in which each outcome variable is examined separately. Therefore, even though these pieces of research include various dimensions of well-being, they are not correlated and hence the conceptualisation of well-being is not comprehensive.

A few studies have taken into consideration a compound of various indicators, with the aid of structural equation models that allow correlations between dimensions of well-being. For example, Brody and Flor (1998) and Brody, Flor, and Morgan (1999) include academic achievement and psycho-social competence as unobserved variables to measure child well-being. The work of

Dodge, Petit, and Bates (1994) includes externalisation of problems and aggression as two dimensions of child outcome. However, none of these studies discuss whether correlations between the latent variables were statistically significant or even if the models included those correlations. At present, the work of Gershoff *et al* (2007) is one of the few that includes a description of the correlation between two latent variables that measure child well-being in their model. In this piece of research, cognitive ability and socio-emotional competence show a correlation of .37.

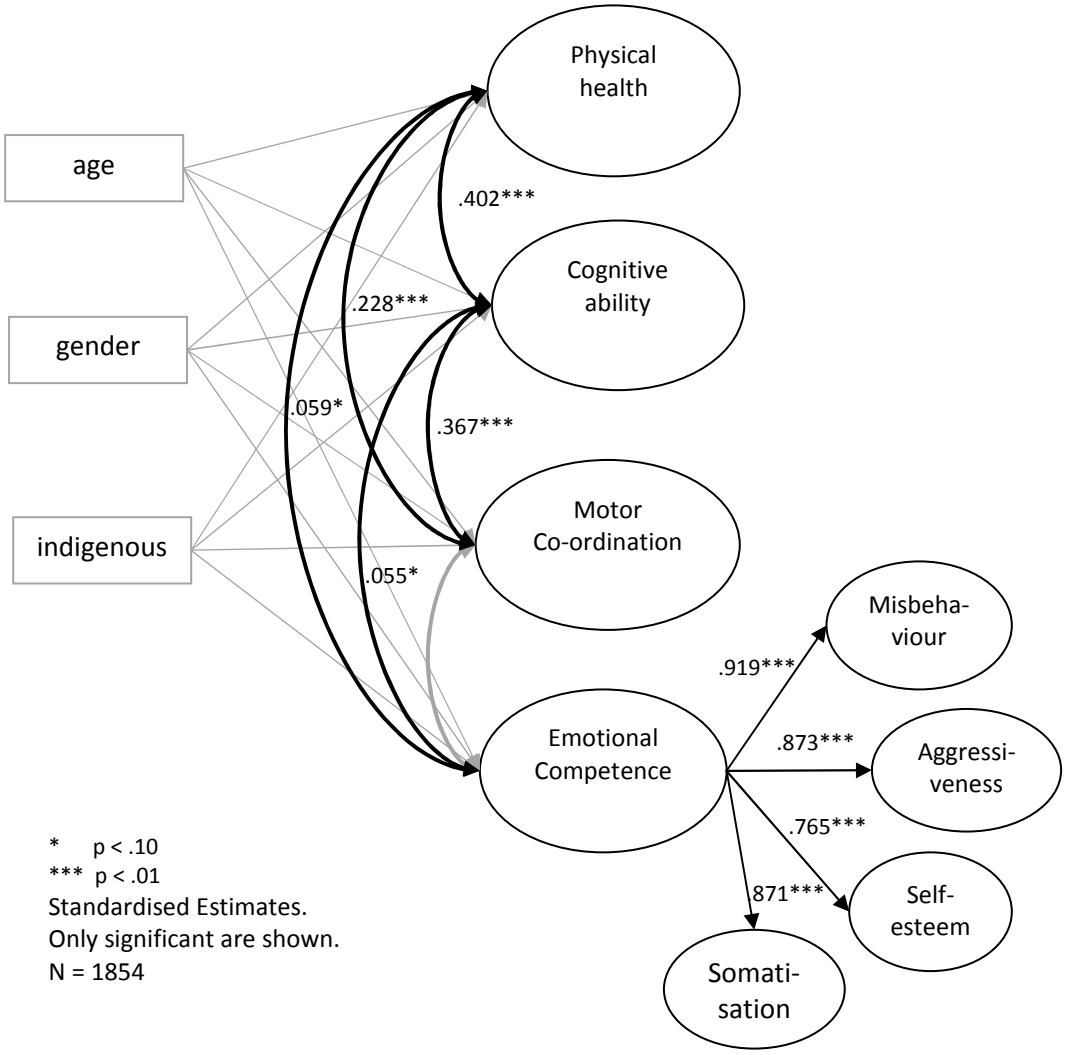
The model in this chapter builds up on the literature of child well-being by utilising a definition that includes four domains of well-being and that accounts for possible correlations between them. Physical health, cognitive ability, motor co-ordination, and emotional competence capture most of the aspects of child development during the pre-school years and their correlations resemble the way in which the developmental process takes place. Results for the Mexican sample, however, show that only four out of six of the correlations between domains of well-being are statistically significant. Figures 4.2 and 4.3 show the correlations between domains of child well-being, for the Base Model and the Model with Controls, respectively:

Figure 4.2. Correlations Between Domains of Child Well-being; Base Model



* p < .10
*** p < .01
Standardised Estimates.
Only significant are shown.
N = 1870

Figure 4.3. Correlations Between Domains of Child Well-being; Model with Controls



Correlations between domains of well-being are similar in both measurement models. Physical health is correlated with cognitive ability (.44 in the Base Model and .41 in the Model with Controls). The medium-size correlation between physical health and cognitive ability alludes to the importance of long-term nutritional status in understanding current physical and cognitive development. Physical health and motor co-ordination are also correlated (.25 in the Base Model and .23 in the Model with Controls). This relationship is of smaller strength than the former because other indicators of physical health that were not included in this construct, such as fitness or current sickness, may have a larger influence in motor aptitudes.

Cognitive ability and motor co-ordination also show a strong correlation (.40 in the Base Model and .37 in the Model with Controls). This suggests that motor and cognitive abilities go, to some extent, hand in hand in the developmental process. However, there is a vast amount of

cognitive abilities - including language, memory, reasoning, problem solving, or abstract thinking just to mention a few- that do not necessarily relate to dexterity.

Finally, the correlations between emotional competence and cognitive ability and between emotional competence and physical health are weak (around .06 for both cases, in both models). Also, this correlation shows the weakest significance level ($p < .10$) compared to the others ($p < .01$). This could partly result from using this specific set of questions for the Achenbach CBCL, which measure behavioural problems that are not expected to be associated with the vocabulary and memory abilities measured by the Woodcock-Johnson and Peabody Tests. On the other hand, it could reflect that while physical, cognitive, and motor well-being are associated because they are observed against objective norms, emotional well-being is a subjective and culturally-bound independent component. Furthermore, the questions about the emotional well-being of children were answered by their mothers. Therefore, the answers could have some subjective bias derived from the mothers´ own perception of their children or their desire to respond that their children behave properly. On the contrary, the answers for the tests that measure cognitive ability and motor co-ordination were obtained directly by professionals who administered the tests; and measures for height and weight were obtained by nurses.

Correlations between domains of well-being exhibit that while the physical health and cognitive ability of these children are closely related, their performance in motor co-ordination is related to their physical and cognitive development in a medium extent. A couple of decades ago, Halpern argued that even though child development is the result of numerous factors, “for children in Latin America [it is] shaped most powerfully by the consequences of poverty in early childhood - malnutrition, morbidity, and parental care giving focused on survival” (1986, p.194). The fact that children in this sample manifest a high correlation between physical health and cognitive ability suggests that Halpern´s remark is still the case in this context. Given that children´s performance in this set of mental skills is primarily correlated with their long-term nutritional status, it is possible to infer that the quality of their long-term nutritional status has an effect on mental capabilities that are evident at pre-school age.

Results from these models show that the physical, cognitive, and motor development in children in this sample are correlated. However, the disconnection between emotional traits and the other domains of child well-being raises an issue about a disparity between the theoretical understanding and the operationalisation of concepts into variables. As some scholars have pointed

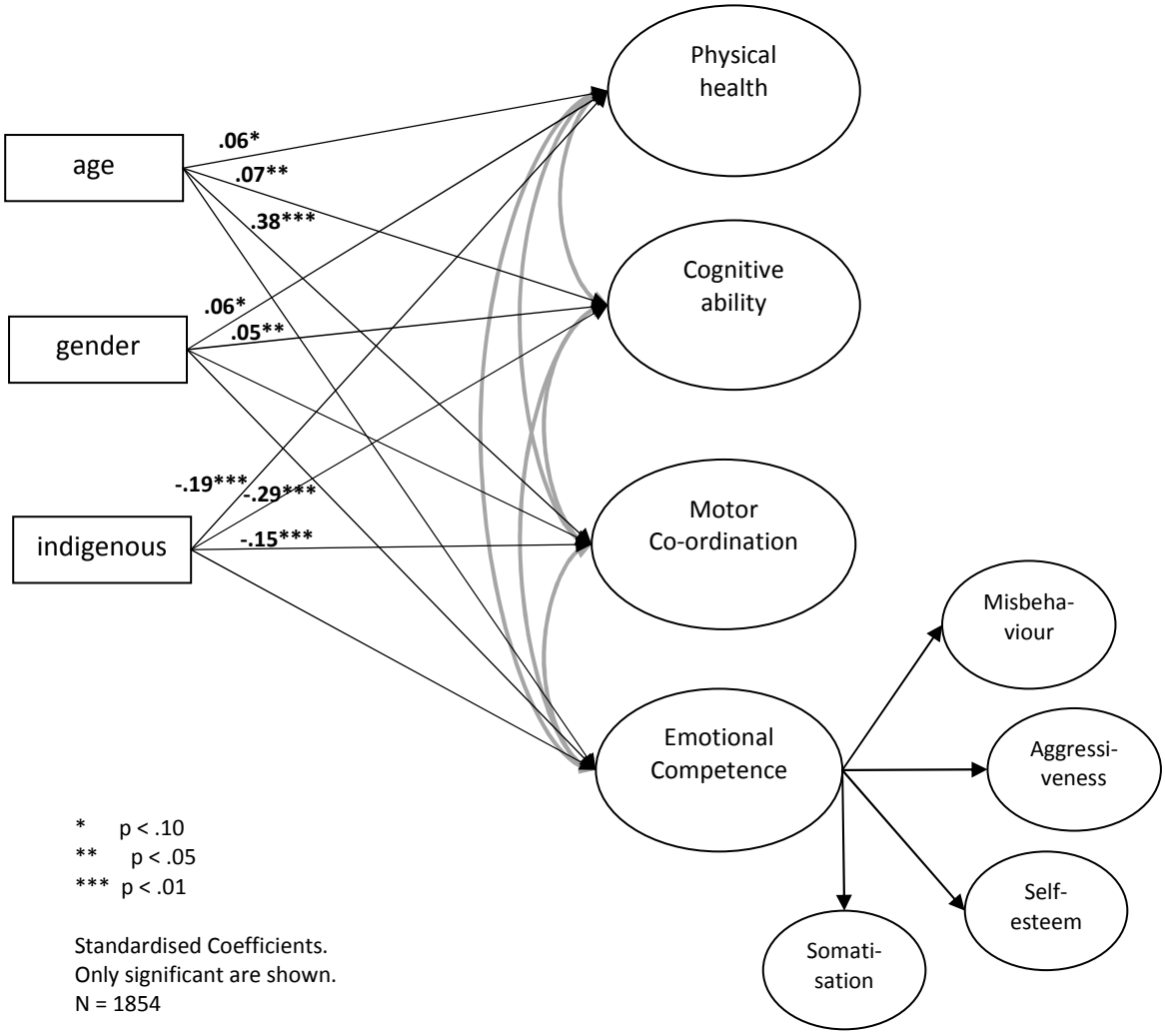
out, there is a generalised gap between the conceptualisation and the measurement processes, which results in the unclear constructs (Roelen, Gassmann, and de Neubourg, 2009). It is relevant to remember that the ENCASEH/ENCEL contains results of tests that were not intended to capture an all-embracing notion of well-being. Instead, the measures for child height, weight, the Peabody Test, the McCarthy Test, the Woodcock-Johnson Test, and the Achenbach Child Behaviour Checklist are intended to measure separate but possibly inter-related dimensions of child well-being. Therefore, the disconnection of the latent variable of emotional competence from the rest of the areas of well-being raises a debate about the instruments that measure child well-being.

The disassociation between the conceptualisation and the measurement of child well-being has been noted by other scholars (Pollard and Lee, 2002; Roelen, Gassmann, and de Neubourg, 2009). According to some, the disassociation is mainly due to lack of data collected to measure well-being as a multi-dimensional concept, which leaves researchers to rely on separate instruments that measure specific indicators (Pollard and Lee, 2002). This is actually the case for this model, which heavily relied on data included in the ENCEL and which was collected for purposes somewhat different than the ones of this analysis. Therefore, the disjuncture between the emotional domain and the rest of the indicators of well-being in this sample could be the result of relying on tests that were created to measure specific areas of development and not well-being as a comprehensive notion. Also, relying on secondary data made it impossible for this model to include aspects of child well-being that some authors (Bradshaw, 2008; White, Leavy, and Masters, 2002; Roelen, Gassmann, and de Neubourg, 2009; Biggeri and Mehrotra, 2008) have advocated for, such as subjective well-being, family and household environment, safety, or social standing.

Effects of the Controls

As the previous sections have illustrated, the Base Model and the Model with Controls show similar factor loadings and correlations between the latent concepts that measure well-being. Thus, the inclusion of age, gender, and ethnicity as controls does not change the core structure of the model. Furthermore, the controls provide important information about differences related to age, gender, and ethnicity given that they have some statistically significant effects on some of the domains of well-being. The coefficients of the controls are depicted in Figure 4.4.

Figure 4.4. Effects of Controls on Domains of Child Well-being



Age is positively associated with physical health, cognitive ability, and motor co-ordination, although its standardised coefficient on the first two (.06 and .07) is considerably smaller than on the last one (.38). The relatively important effect of age on motor co-ordination could be explained by the fact that the McCarthy test does not differentiate between specific age-groups. That is, this test does not differentiate if particular skills are mastered by children at different times between the ages 4 and 6 years. However, height-for-age and weigh-for age have already been age-dnormed. Similarly, the WJ and PPVT tests, which measure cognitive ability, have been normalised to very specific age-groups[40]. The fact that age is significant reflects that children are falling behind their supposed cognitive development. Gender has small but significant effects on physical health and on cognitive development: In this sample, boys tend to have better nutritional status than girls (.06 p <

[40] The norms for these tests are available for month-specific age-groups. For example, 48, 50, 52, 54(…) 72 months of age and not only 4, 5, or 6 years.

.05). Also, boys´ scores in the cognitive ability tests are .05 Standard Deviation higher than girls´ scores. This possibly suggests that boys are prioritised for receiving education and for learning Spanish, which is consistent with previous literature (Flórez, Medina, and Urrea, 2001; Hallman *et al*, 2006). Indigenous background is also significantly associated with differences in the domains of physical health, cognitive ability, and motor co-ordination.

Results indicate that indigenous children generally have -.19 in the SD of lower physical health than non-indigenous children in the sample. Tests conducted separately on the indicators show that indigenous children have lower height-for-age by -.2, lower weight-for-age by -.12, and increased BMI-for-age by .05 in standard terms than non-indigenous children. While the former indicator reflects long-term nutritional status, the latter two indicate short-term nutritional status or recent changes in food consumption that cause rapid changes of weight and body mass. Given that indigenous background is associated with worse household material circumstances, these estimates suggest that the effect of indigenous background on physical health is correlated not only to possible genetic predisposition to shorter and thinner infants, but also signals a greater vulnerability to malnutrition that in turn relates to the greater material deprivation in which most indigenous children live.

Indigenous children in this sample also show lower levels of motor co-ordination (-.15) and cognitive development (-.29) than non-indigenous children. In relation to the WJ Memory for Words and the PPVT tests included in the construct of cognitive development, this may be because the tests were in Spanish and do not reflect the language/s spoken at home or in other surroundings, or the cultural context of the sample (Manriquez-López and Acle, 2006). It is also important to consider that these children were not yet attending school when the tests were administered and thus language acquisition came essentially from the immediate environment of the children.

Conclusions

Child well-being is a concept that has evolved as a result of the work of international institutions, non-governmental organisations, governmental plans, medical and child development professionals, and scholars during the last few decades. The definitions developed by these actors point towards four main areas: physical health, cognitive ability, motor co-ordination, and emotional

competence. Theoretically, these four areas encompass most aspects of the developmental processes that take place during the pre-school ages.

The measurement model presented in this chapter follows the main four areas identified by professionals, public institutions, and researchers as key aspects of child well-being. Empirically, the model proves to be a robust approximation of child well-being given the appropriateness of the goodness of fit tests and the factor loadings of observed indicators onto the concepts that they are supposed to measure. In this sample, physical health and cognitive ability are closely correlated with each other; motor co-ordination is correlated with the physical and cognitive domains in a medium way; and emotional competence is only slightly correlated with cognitive ability and physical health.

Most contemporary voices have advocated for a view of child well-being that goes beyond the areas included in this model such as family and household environment and social standing. However, some authors (Pollard and Lee, 2002; Roelen, Gassmann, and de Neubourg, 2009) have argued that there is a mismatch in research about child well-being. On the one hand, some researchers and advocacy groups have voiced a need for broadening the view of well-being in a way that reflects not only the multiple aspects of life but also children´s needs and perspectives. On the other hand, the operationalisation of indicators has demonstrated a more limited scope given that researchers rely on instruments that were not specifically created for measuring well-being in a multi-dimensional way.

This theoretical-empirical gap is found in Mexico´s policymaking and academic work. In the policy realm, the government of this country has ratified the Convention of the Rights of the Child and has manifested an interest in promoting the wide range of rights included in this document. However, the understanding and measurement of child well-being embedded in most policies concentrates in the areas of physical health and cognitive development. The limited scope of Mexico´s perspective on child well-being is evident in its flagship programme for poverty alleviation, PROGRESA-Oportunidades. This Cash Transfer Programme concentrates on health, nutrition, and education. This policy does not takes into account other aspects of well-being such as emotional health, family environment, vulnerability to risk, abuse, child labour, and social standing. As a result, most of the academic work in Mexico concentrates on evaluating the effects of this programme on children´s health, nutritional, and cognitive status.

Further research could be conducted to improve the instruments that measure child well-being so that they reflect other areas apart from physical health, cognitive ability, motor co-ordination, and emotional competence. However, while these instruments are developed, Structural Equation Modelling provides a great aid in exploring multiple dimensions of child well-being simultaneously. The model presented in this chapter includes some of the most important areas of early child development.

The measurement model of child well-being developed in this chapter will be used as the outcome indicators in the analysis of how different experiences of household poverty are associated with the well-being of children. By using the same outcome indicators, it will be possible to test various hypotheses about the ways in which poverty affects child well-being. The next chapters of this thesis develop models on the effects of depth, timing, and patterns of household poverty on child well-being at age 4 to 6 years.

CHAPTER 5

Effects of Early Household Material Conditions and Infant Care on Child Well-Being at Age 4 – 6 years[41]

Introduction

Early childhood, defined from birth to five years old, is considered to be a crucial period in human life. On the one hand, it is during these years when critical physical milestones are passed, and motor coordination aptitudes, mental competences, and socio-emotional abilities are acquired (Illig, 1998; Grantham-McGregor *et al*, 1999; Moore 2006; Shonkoff and Phillips, 2000; Smith, Brooks-Gunn, and Klebanov, 1997; UNICEF, 2011). On the other hand, the potential achieved during childhood has also been linked with later indicators of success, such as educative achievement, employment performance, or socio-economic status (Ceroni, 2000; Corcoran, 1995; Castañeda and Aldaz-Carroll, 2001; Ermisch and Francesconi, 2001; Heckman and Masterov, 2004; Mayer and Lopoo, 2001; Minujin, Delamonica and Davidziuk, 2006).

In the medical field, the first year of life has especially been identified as a decisive stage in the developmental process because it comprises the most drastic physiological and cognitive changes that a person undergoes (Woodhead, 2006). During the first year, physical growth is at its greatest (Bogin, 1999) and the lymphoid and nervous systems reach around 30% and 40% of their total capacity respectively (Lipsitt and Reese, 1979 *apud* Scammon, 1930). During the first year of life, human development is particularly malleable and susceptible to be influenced. Thus, it is possible to speculate that poverty during this time is highly likely to interrupt fundamental developmental processes. In fact, it has even been argued that "the earlier poverty strikes in the developmental process, the more deleterious and long-lasting its effects" (Aber *et al*, 1997, p. 470[42]).

[41] The model in this chapter is a sophisticated version of the one published in Valadez, L. (2010). "Medium-term effects of household poverty on child well-being: a study in a subsample of pre-school children in rural Mexico". *Journal of International Development.* Vol. 22; issue 8. pp. 1146-116. Some of the narrative in this chapter is similar to the one presented in the aforementioned chapter.

[42] Please note that Barajas, Philipsen, and Brooks-Gunn (2007) use the same exact quote on page 312, without referring to Aber *et al*.

The recognition of the importance of the early years in physical and cognitive development has served as the foundation for Early Childhood Intervention Programmes in multiple countries. For example, Sure Start in the United Kingdom, Head Start in the United States, or PROGRESA-Oportunidades in Mexico aim at helping children to achieve their full developmental potential. For instance, some have argued that "primary school and even kindergarten (for children 4-5 years old) may be too late to counteract negative physical, neurological, psychological, and social factors associated with early deprivation and inadequate stimulation" (Young, 1997, p. 1).

A considerable amount of research on the effects of poverty on children have been conducted over the past couple of decades[43]. Explanations of the routes through which poverty affects child development prioritise certain aspects over others, depending on the theoretical foundations, the cultural context, and the available data. Important achievements have been made in understanding the negative consequences of poverty on people, especially long-term indicators related to educational achievement or employment status. However, some caveats remain in understanding the effects that poverty has on child well-being pre-school age, which are evident in the short term and may have long-lasting consequences. Firstly, most of the existing research has linked childhood poverty with medium or long-term outcomes but not with indicators of school readiness (at ages 4-6 years). And secondly, most research has evaluated outcomes for poor children against non-poor children but has not evaluated differences within "the poor". This chapter aims at contributing to fulfil the gaps in the literature by addressing two hypotheses:

H1: Household poverty during the first months of life has a negative effect on children that is evident at age 4-6 years.

H2: Degree of household poverty is significantly associated with child well-being at age 4-6 years; deeper levels of household poverty are associated with worse outcomes.

These hypotheses correspond to two of the questions set in the Methodology Chapter: Is depth of poverty associated with differences in indicators of child well-being at pre-school age? And, is the first year of life (timing of poverty) associated with child well-being at age 4-6 years? These issues are explored by evaluating the effects of household material and non-material conditions around the time of birth on indicators of child well-being at age 4 to 6 years in a rural sub-sample in Mexico. The first section explains the theoretical framework and the model that sustains the analysis. The second part examines the results by looking at variations of the same model. The last section offers the conclusions and delineates lines for further research.

[43] Please refer to Literature Review Chapter.

The Theoretical Model

The effects of household poverty around the time of birth on children are explored through a Multiple Indicator Multiple Cause (MIMIC) model. The model evaluates the effects that early material and non-material surroundings of the child during have on indicators of physical, cognitive, dexterity, and emotional well-being at age 4-6 years. Due to the confirmatory nature of SEM, assumed associations should be "based on knowledge of the theory, empirical research, or both" (Byrne, 2001, p. 6). Also, as Korenman and Miller (1997) have accurately pointed out, "correlational evidence alone cannot establish a convincing case for a causal relationship between poverty and [child well-being]" (p. 97). Therefore, it is important to address the theoretical underpinning of the model that will allow the construction of an analytic narrative.

The model builds on findings of existing literature, particularly on the elements that consistently appear to be significantly associated with the effects of poverty on child well-being. A first set of items is related to the material surroundings of children. Direct indicators of material circumstances such as income or wealth as well as indirect measures such as parental occupation or socio-economic status have been found to be associated with differences in health outcomes (Burgess, Propper, and Rigg, 2004; Korenman and Miller, 1997; Phipps *et al*, 2006; Liu, 2007; Séguin *et al*, 2007), in verbal, memory, rational thinking skills, IQ scores, and other indicators of educational achievement (Smith, Brooks-Gunn, and Klebanov, 1997; Hanson, McLanahan, and Thomson, 1997; McCulloch and Joshi, 2002;) as well as in or socio-emotional indicators (Pagani, Boulerice, and Tremblay, 1997). Also, quality of housing and the physical environment in which the child grows have also been found to be predictors of child well-being (Evans, Saltzman, and Cooperman, 2001; Guo and Harris, 2000).

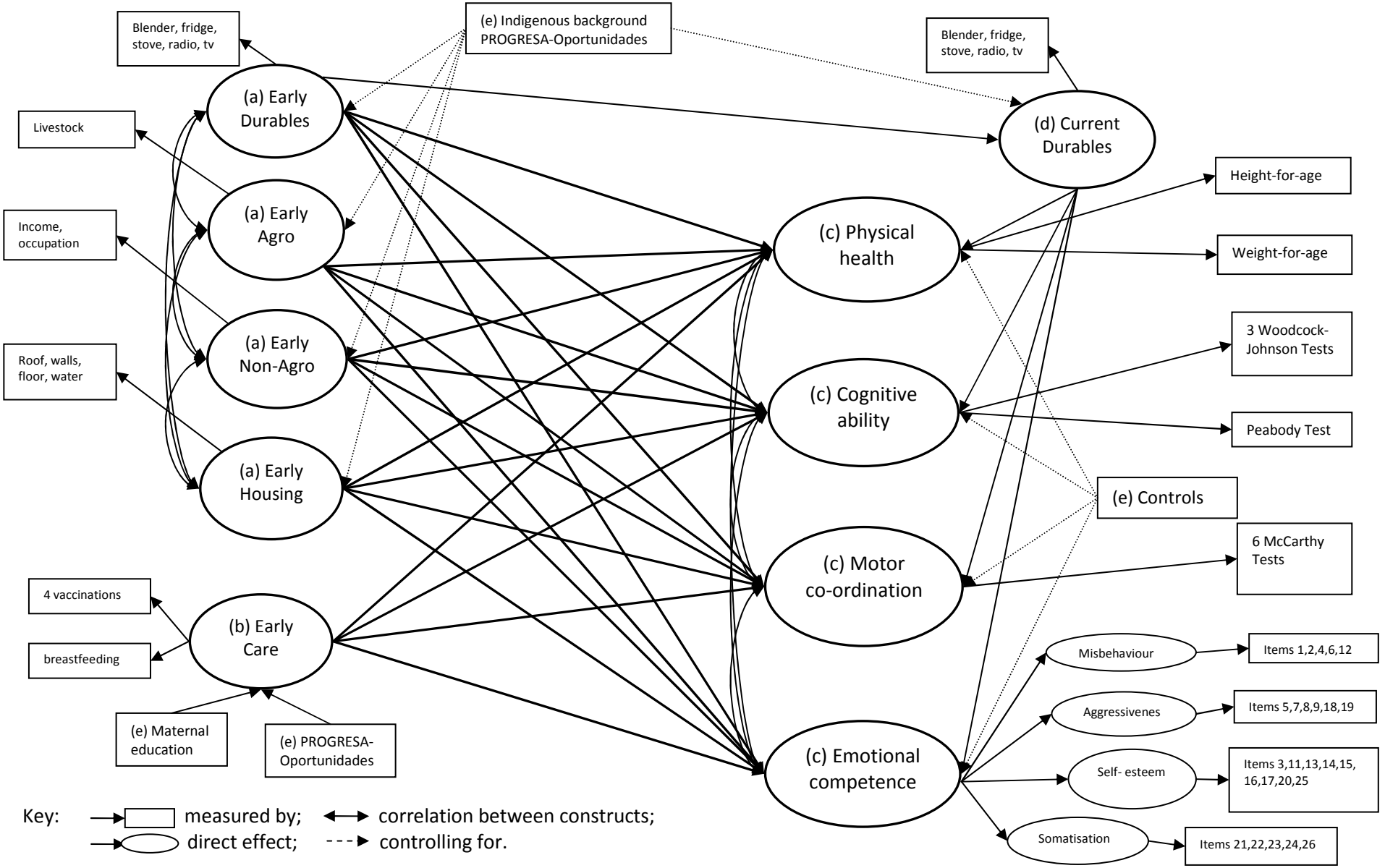
A second set of elements that affect child well-being relates to household socio-demographic characteristics. The element that has probably most widely been explored is maternal socio-demographic profile. Maternal age and educative level have been found to be strongly correlated with indicators of child physical, cognitive, and emotional health (Baydar and Brooks-Gunn, 1991; Brody and Flor, 1998; Burchinal and Clarke-Stewart, 2007; Carneiro, Meghir, and Parey, 2007; Desai, Chase-Lansdale, and Michael, 1989; Gortmaker, 1979; Farah, Noble, and Hurt, 2005; Mare, 1982; McLoyd, 1998; Séguin *et al,* 2007). Another non-material characteristic that has been included in the analysis of child development is household composition. Particularly, family structure and

number of children in the household have been used to understand differences in indicators of child well-being (Desai, 1995; Fomby and Cherlin, 2007).

Finally, a third group of items that have been considered in trying to understand the elements that shape child development is parenting. Parenting enfolds a broad set of practices, for example: spending time with the child, involvement and communication, and setting goals and objectives. An element associated with parenting is healthcare and health practices provided to children. Healthcare received during the first year of life has constantly been found to play a role in child outcomes. Generally, vaccinations, medical check-ups, and a healthy lifestyle have been associated with a sustained positive effect on children (Rubio-Codina, 2007; Korenman, Miller, and Sjaastad, 1995; Currie and Cole, 1993).

Indicators related to these three sets of elements are incorporated into the model that drives the analysis in this chapter. Figure 5.1, below, is the visual representation of a MIMIC model that tests the hypothesised significance of early household poverty on indicators of well-being at 4-6 years of age. It includes the effects of (a) household material conditions during the first months of life and (b) early care on (c) child well-being at age 4-6 years. Also, in order to isolate the effects of the early moments, the model takes into account (d) current household material circumstances and (e) socio-demographic controls. These elements are described after the diagram.

Figure 5.1. MIMIC Model: The Effects of Early Household Material Conditions, Infant care, and Current Durables on Child Well-Being at Age 4-6 Years



The MIMIC model presented above is rooted in strong theoretical foundations that have been empirically corroborated[44]; the following paragraphs describe each of its parts.

(a) Early Household Material Conditions

The top left hand side of the diagram shows the measurement model of household material conditions around the time of birth. This measurement model encompasses four dimensions: household durables, quality of housing, agricultural means, and non-agricultural means. This measurement model reflects the surroundings of the child during his or her first months of life as it includes data extracted from the first wave of the panel in which the child was born[45]. The four dimensions of household material circumstances have been used by other scholars (Guio and Maquet, 2006; Iceland and Bauman, 2007; López-Calva and Ortiz-Juárez, 2008; Vegeris and Perry, 2003; Weich and Lewis, 1998) to reflect the various aspects of life in which people could be deprived. It is important to include a multi-dimensional perspective of household poverty because there is a remaining puzzle about "whether or not links between income poverty and child well-being are due to income *per se* or to the other family conditions that often occur with poverty" (Brooks-Gunn, Duncan, and Maritato, 1997, p. 1).

"Household durables" is measured through possession of a list of items: blender, refrigerator, stove, radio, and television. These goods provide a direct benefit (a refrigerator, for example, improves the likelihood to have access to healthier food) and an instrumental benefit (for example, if having a television is a sign of wealth or status in the community), as well as a potential buffer value (liquidity in case the household needs to sell them in times of financial stress). "Quality of housing" is measured through four indicators: main materials of floor, roof, and walls, and access to water in the plot. This construct is an approximation to the living conditions of children and the benefits that growing up in a spacious, clean, and properly ventilated and lit place bring to a person´s development. Quality of housing also carries instrumental value because the kind of housing in which a person lives has social meaning and is related to social status.

"Agricultural means" covers the possibility of consuming self-produced goods and the acquisition of income that is linked to agricultural activities. This construct is measured through

[44] The loading of indicators onto factors was corroborated through Explanatory Factor Analysis in SPSS and MPlus. Various ways of rotation were tried; the items loaded onto factors in a consistent way.
[45] "Around birth" refers to information for the first time the child appeared in the panel. Given that the panel was conducted every six months, "around birth" indicates a situation at most 6 months before the child was born.

possession of livestock (the amount of animals is OECD equivalised). "Non-agricultural means" includes household income (measured as the OECD-equivalised income from employment, pensions, interests, rent, and public transfers) and number of people in the household (OECD-equivalised) who are employed in payroll and who are self-employed.

These four dimensions of household conditions rest on Ringen´s conceptualisation of poverty. Using Ringen´s words, "in the first case, poverty is defined indirectly through the determinants of way of life, in the second case, directly by way of life (1987, p. 146)". Thus, the conceptualisation of poverty includes standard of living (direct component) as well as the means to achieve it (indirect component). Standard of living mainly refers to material well-being and tangible resources that are available in the household in which the child grows up. The means to achieve a certain standard of living refers to potential access to resources via economic activities. In this MIMIC model, the dimensions of assets and housing are closely related to standard of living and the dimensions of agricultural means and non-agricultural means reveal channels for acquiring such a standard. The two realms of economic activity have been distinguished as different employment dynamics that provide different direct benefits and access to resources. However, they co-exist in this model because while some members of the household could specialise in agriculture others could specialise in non-agricultural activities.

The four dimensions included in the measurement model of household material circumstances refer to how different aspects of life could influence the well-being of children. Given that all households in the sample are located in poor and extremely poor communities in rural Mexico, this model measures living standards and means for achieving them within a poor population. The MIMIC model aims to maximise the analysis about the ways in which differences within a marginalised sample have an impact on children.

(b) Early Care

The bottom part of the left hand side of the MIMIC model illustrates early care. Infant care is certainly a complex set of practices that include healthcare, cognitive stimulation, and emotional nurturance. Also, infant care is embedded in socio-economic frameworks (Malmberg *et al,* 2007) that shape the amount and type of parental-child interaction.

In this model, early care is a latent variable measured by breastfeeding and vaccinations for tuberculosis, Diphteria-Tetanus-Pertussis (DTP), Poliomyelitis, and Measles. This latent variable accounts for direct and indirect benefits of care on children. Directly, it refers to the benefits that breastfeeding and inoculation that have been found to have on people according to long medical research. Inoculations have been proved to reduce mortality and infectious diseases that could permanently affect children. As Poland and Jacobson´s have argued: "vaccines (...) have been one of the greatest public health success stories" (2001, p. 2440). Also, given that inoculations reduce the health gap between groups of people, Jimenez (2001) has identified them as a tool for promoting equity amongst societies. Indirectly, the indicators contained under the concept of care are assumed to represent other unobserved practices presuming that parents who favour breastfeeding and child vaccination would conduct other care activities that are beneficial for children. For example, the concept could mirror personal hygiene, time spent with the child, sleeping habits, or aspects related to nutrition.

(c) Child Well-Being

The right hand side of the model includes the outcome variables. As defined in the previous chapter, child well-being is assessed in a measurement model that contains four dimensions: physical health, cognitive ability, motor co-ordination, and emotional competence[46]. Each of the four domains of child well-being is presumed to be affected by the measurement model of early household material conditions, by early care, and by current level of durables.

(d) Current Durables

The latent variable of current goods measures the material conditions of the household at the moment when the indicators of child well-being were measured. "Durables" is the variable amongst the four dimensions of household material circumstances that best captures possible changes in living standards. Conceptually, "durables" is the most volatile dimension because they could be acquired, lost, or sold in an easier way than the indicators included in housing, agricultural means, and non-agricultural means. Empirically, "durables" was the construct that showed the largest

[46] The rationale for conceptualising and measuring child well-being in this measurement model was explained in Chapter 4, "Bridging the Gap: Conceptual and Empirical Dimensions of Child Well-Being in Mexico".

variation within the sample and across waves[47]. Therefore, it is included in the model for being the dimension that most accurately depicts the current material circumstances of the household.

The inclusion of this latent variable serves as a control for the explanatory power that concurrent material conditions may have and therefore helps to isolate the effects of household material conditions in the past. Also, it is important to bear in mind that a condition is partly dependent on its previous state in time. This has been found the case for poverty, given that the probability of falling into poverty is higher if previous episodes of poverty have been suffered (Hulme and Shepherd, 2003; Rank and Hirschl, 2001). Therefore, "current durables" is regressed on early level of durables to account for its lagging characteristic and for possible changes in household material circumstances over time.

(e) Socio-Demographic Controls

The MIMIC model includes socio-demographic controls that are assumed to be associated with differences in child well-being, in the material circumstances of households, and in early care. The controls are: age, gender, ethnicity, proportion of children in the household, maternal age, maternal education, and PROGRESA-Oportunidades. Even though they are assumed to influence each part of the MIMIC model differently, these socio-demographic characteristics have been found to be associated in a statistically significant way with differences in indicators of child well-being (Hill and Upchurch, 1995; Kiernan and Mensah, 2010), as well as in the level of nutrition, care, and educative opportunities that children are provided.

Firstly, each domain of well-being is controlled for age, gender, and ethnicity. As described in the previous chapter, these three demographic characteristics have been found to account for differences in well-being indicators. Additionally, three other controls have been added to the dimensions of child well-being in this chapter: proportion of children in the household, maternal age, and maternal education. These are presumed to signal socio-economic characteristics that are not captured by the measurement model of household material circumstances and are assumed to affect the well-being of children[48].

[47] Please refer to Annex 1, Descriptive Statistics.
[48] Please refer to the explanation about the use of controls in the Methodology Chapter.

Secondly, household material circumstances and the latent variable of current durables are controlled for ethnicity (indigenous vs non-indigenous) and PROGRESA-Oportunidades. Ethnicity is included because indigenous groups in Mexico tend to be the poorest and the most socially excluded groups in the country (Atal, Ñopo, and Winder, 2009; CONEVAL, 2011). With regard to PROGRESA-Oportunidades[49], it is included to account for possible changes in the material circumstances of households derived from receiving the cash transfer. Given that children who have been part of the Programme have had increased access to resources, it is necessary to look at the material effect of PROGRESA-Oportunidades.

Finally, the level of care received by the child is assumed to be mediated by maternal education and PROGRESA-Oportunidades recipiency. Maternal education is assumed to influence the type and quality of care given to children. Similarly, PROGRESA-Oportunidades could not only shape the material circumstances of households but could also influence health care practices derived from the requirement of attending regular medical check-ups.

Results

This section presents the results of the MIMIC model. The first part provides factor loadings and correlations between latent variables for the measurement model of household material circumstances as well as factor loadings for early care and current durables. The second part evaluates the results according to the hypotheses established earlier in this chapter. Specifically, it offers an examination of the effects of early household material conditions, of infant care, of current durables, and the socio-demographic controls on child well-being.

Before examining the results for each of the parts that compose the MIMIC model, it is important to assess the statistical robustness of the model. Table 5.1 presents some tests of goodness of fit. All of the values show good ranges: Chi-Square is relatively small; CFI and TLI are above .9; and RMSEA is below .05. These figures show that the model is solid enough as data fit the theoritised relationships and therefore provides an accurate depiction of reality.

[49] From the 1870 children who compose the sample, 76.6% lived in households that had received some kind of benefit from PROGRESA.

Table 5.1. Tests of Model Fit; MIMIC Model of the Effects of Early Material Conditions, Infant Care, and Current Conditions on Child Well-Being

Goodness of Fit Test[50]	Value
Chi-Square (degrees of freedom)	1593.064 (600)
CFI	0.903
TLI	0.917
RMSEA	0.031
Number of observations	1669

Measurement Parts

A key advantage of SEM is the capacity to work with unobserved concepts that are measured by observed indicators. This section presents the results for the measurement model of early household material circumstances and for the latent variables of early care and current durables.

Measurement Model of Early Household Material Circumstances

The first point to examine is the strength to which each observed indicator is loaded onto its corresponding dimension of household material circumstances (see Figure 5.2 and Table 5.2, below). Standardised factor loadings (all significant at .01) show that all of the observed indicators have high loadings with their respective latent variables. The items included in the latent variable of "durables" have standardised factor loadings between .59 and .95, which shows that all the indicators are strongly correlated to the underlying construct. The construct of "housing" is mainly measured by materials of floor, roof, and walls because they are the ones that possess the highest factor loadings (standardised loadings between .65 and .86). Having water in the plot provides a measure to a lesser but significant extent to the latent concept (standardised loading of .36). With regard to "agricultural means", it is primarily measured by cows (standardised loading of .95), but also in an important way by the other animals (standard loadings between .41 and .58). Finally, the dimension of "non-agricultural means" is measured by income and employment with standard loadings of .49 and .31, respectively.

The second issue to examine in the MIMIC model of household material circumstances is the correlations between unobserved constructs. Correlations between latent constructs indicate that

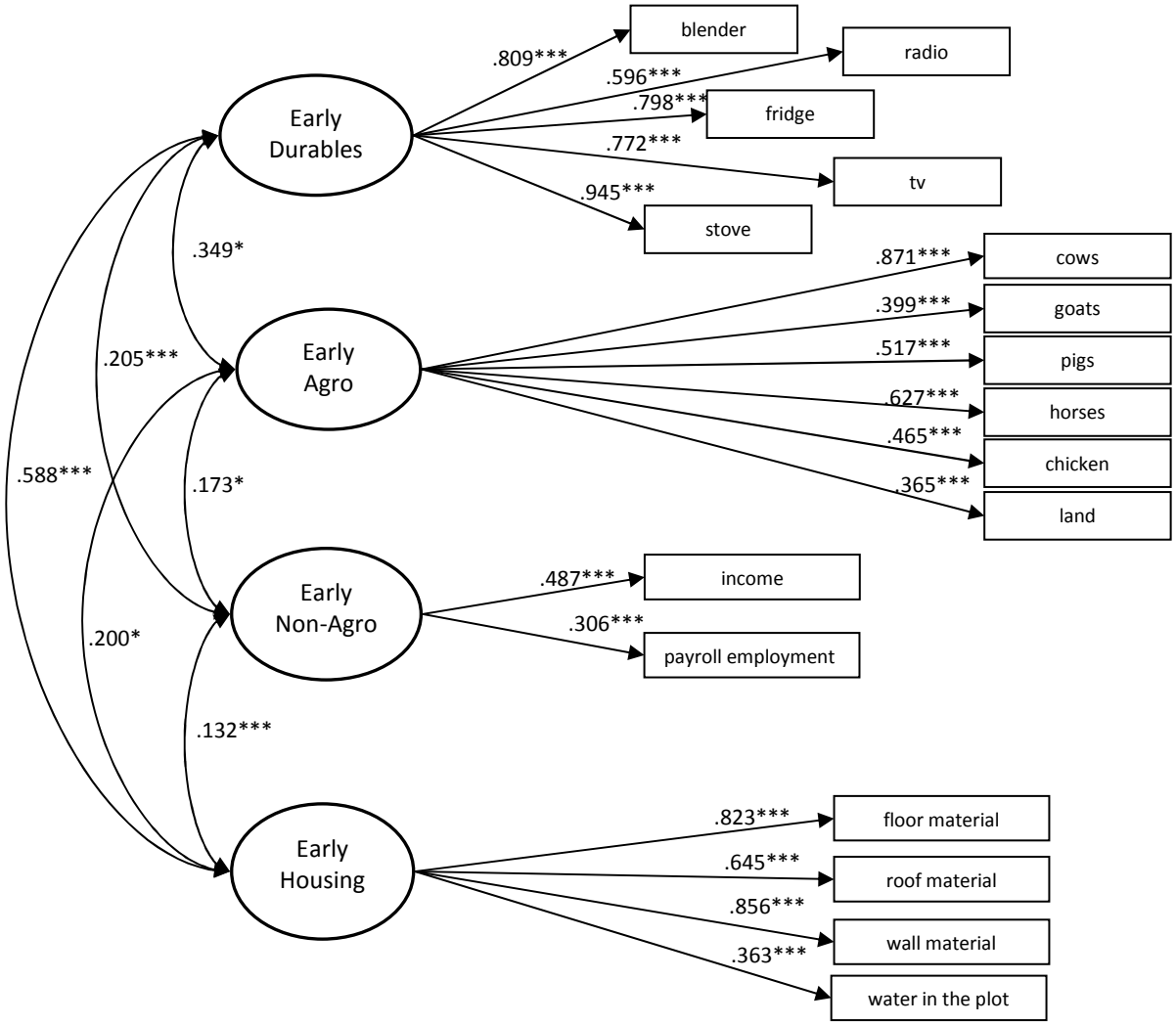
[50] Consensus among scholars has defined the following adequacy ranges: CFI = .9 or higher, TLI =.9 or higher, RMSEA =.05 or lower.

all dimensions of material circumstances are related to each other. However, the strongest association is between household durables and quality of housing (.588, $p < .01$). The latent variable of on-agricultural means is also associated with durables, housing, and non-agricultural means, although the significance of the first two correlations (.205 and .132, $p < .01$) is stronger than the last one (.173, $p < .10$). The association between agricultural means and housing is also weakly significant (.200, $p < .10$). This resembles what Damián and Boltvinik (2003) have stated for the region: in Latin America as in other countries around the world, there is no exact correspondence between income and other dimensions of material well-being. In other words, households could have enough income for acquiring goods and services and, at the same time, possess bad quality housing and few assets.

The amount of durables a household possesses is also highly correlated with the non-agricultural domain (.736 standard; $p < .01$). In fact, this correlation is higher than the one between durables and agricultural means (.357 standard; $p < .01$), which implies that households who specialise in non-agricultural economic activities tend to have a higher amount of durables than the ones who specialise in farming. The opposite is observed for housing, which is showing a higher correlation with the agricultural domain (.192 standard; $p < .01$) but has no statistically significant correlation with the non-agricultural one construct. This could be the result of: First, that those who specialise in non-agricultural activities prioritise devoting their resources to acquiring assets over improving housing. And second, that the construct of housing is highly driven by land, which is an item that refers to a different nature of housing that these two groups possess. While those who specialise in agricultural activities tend to have larger plots (measured by the positive estimate of land), those who specialise in non-agricultural activities tend to have better construction materials. The correlation of the overall measure of housing with the agricultural and non-agricultural dimensions is reflecting this distinction.

Figure 5.2 provides standardised coefficients that are statistically significant. Following the SEM language, ovals represent latent variables, rectangles represent observed indicators, single-headed arrows indicate measurements, and double-headed arrows signal correlations between latent variables. Table 5.2 offers un-standardised coefficients.

Figure 5.2. Results: Measurement Model of Early Household Material Conditions



Key:

Correlation

Measured by

Standardised Estimates

* p < .10

*** p < .01

N = 1669

Table 5.2. Un-Standardised Coefficients of the Measurement Model of Early Household Material Conditions

Dimension of Household Material Conditions	Observed Indicator	Un-standardised Estimates
Early Household Durables	Blender	1.000[+]
	Fridge	0.964
	Stove	2.104
	Radio	0.540
	Television	0.883
Early Agricultural Means	Cows	1.000[+]
	Goats	0.157
	Pigs	0.182
	Horses	0.247
	Chicken	0.155
Early Non-Agricultural Means	Income	1.000[+]
	Non-agricultural payroll workers	0.170
Early Housing	Floor	1.000[+]
	Roof	0.581
	Walls	1.141
	Water in the plot	0.269
[+] Fixed at 1 to establish the scale. All factor loadings are significant at .01 level. N= 1669		

The overall scenario about the material composition of households in this sample is consistent with the one found in previous research in Mexico. López-Calva and Ortiz-Juárez (2008) found correlations between dimensions of material deprivation in Mexico. In their study, housing that has dust floor, non-durable walls, or non-durable roof are highly associated with not having sufficient income for acquiring the official basket of goods. Also, possession of goods (comparable to the house-ware items included in the latent variable of durables in the model of this chapter) is correlated with fewer probabilities of not having sufficient income for purchasing the official basket of goods. In another study, the ways in which various dimensions of deprivation co-exist in Latin America were explored. Battiston *et al* looked at correlations between income, child school attendance, head of household education level, sanitation, quality of housing, and access to water. These authors concluded that

> in Brazil, Mexico, El Salvador and in the rural areas of Chile, if someone is deprived in one indicator, she is likely to be deprived in several other indicators at the same time, while if she lived in the urban areas of Argentina, Chile or Uruguay, she is likely to be deprived only in that single indicators. Moreover, within Brazil, El Salvador and Mexico, coupled deprivations are more likely in rural areas than in urban ones (2009, p. 15).

The last issue to address in relation to the measurement model of early household material circumstances is the effects of the controls. Ethnicity elucidates differences in the material circumstances of this sample: indigenous households have lower scores in three of the four dimensions. Indigenous households had -.454 SD ($p < .01$) lower durables, -.359 SD ($p < .01$) lower quality of housing, and -.369 SD ($p < .01$) non-agricultural means. However, there were no differences in the level of agricultural means between indigenous and non-indigenous households. Differences in the dimensions of durables, housing, and non-agricultural means show that indigenous background is associated with worse living conditions, lower income, and fewer employment opportunities. Social exclusion derived from ethnicity plays an important part in the material circumstances of households in Mexico (Bello and Rangel, 2002; Navarrete, 2008) as well as in other Latin American countries (Flórez *et al*, 2001). Evidence drawn from this sample suggests that indigenous children live in households with worse material circumstances than non-indigenous children. The position of disadvantage in which indigenous groups are in this sample is consistent with figures at the national level. The National Council for the Evaluation of Social Development Policy (CONEVAL) has recently published figures about multi-dimensional poverty in the country. Even though the approach used by CONEVAL[51] is different from the one used in this chapter, their approximation showed that indigenous groups in Mexico are deprived in average in 4 areas. The areas in which these groups are especially disadvantaged are housing, nutrition, health, education, and social security (CONEVAL, 2011).

Receiving a monetary benefit from PROGRESA-Oportunidades was also studied as an independent control on the dimensions of material circumstances around the time of the child´s birth. Households that received the cash transfer had -.30 SD ($p < .01$) lower level of durables, -.35 SD ($p < .01$) lower quality of housing, -.16 SD ($p < .10$) lower level of agricultural means, and -.26 SD ($p < .01$) lower level of non-agricultural means. Estimates suggest that households that receive PROGRESA-Oportunidades had worse material conditions (lower scores for the four dimensions of material circumstances) during the first months of the child´s life than those that did not receive the cash transfer, which reflects that the programme was targeted at the poorest households in this sample. These figures are similar to what other studies have shown with regard to the original state of households that were eligible for receiving the cash transfer. For example, Scott (1999) exposes that PROGRESA-Oportunidades recipients were larger households, had a larger proportion of children, had a smaller proportion of employed members, had lower education level, had lower

[51] CONEVAL´s measurement is based on the Alkire-Foster (2007) method and the proposal of the Oxford Poverty and Human Development Initiative. For more information please refer to www.ophi.org.uk.

income per capita, and worse housing conditions that those that did not receive the cash transfer. For instance, these characteristics are the ones that made households to be eligible in the first place. The fact that PROGRESA-Oportunidades is associated with lower coefficients for the four dimensions of the measurement model of household material circumstances exposes the accuracy of the programme in directing the cash transfer towards households that were originally poorer. Conjoint effects of ethnicity and PROGRESA-Oportunidades are contained in Table 5.3.

Table 5.3. Effects of Controls on the Measurement Model of Early Household Material Conditions

N = 1669	**Un-standardised Estimates** (significant a .01, otherwise stated)		**Standardised Estimates** (significant a .01, otherwise stated)	
	Indigenous background	**PROGRESA**	**Indigenous background**	**PROGRESA**
Early durables	-1.259	-1.010	-0.454	-0.303
Early agricultural means	-0.421 (not significant)	-1.089	-0.072 (not significant)	-0.156
Early non-agricultural means	-0.284	-0.240	-0.369	-0.260
Early quality of housing	-1.051	-1.218	-0.359	-0.347

The inclusion of indigenous background and PROGRESA-Oportunidades as controls for the four dimensions of household material conditions hints a possible economic dynamic for this sample. Indigenous background is not significantly associated with the domain of early agricultural means once the cash transfer has been controlled for. Hence, there are no statistically significant differences in the level of agricultural means that indigenous and non-indigenous households have once the cash benefit has been accounted for. Perhaps, this could suggest that indigenous households used the cash transfer for acquiring agricultural goods. This argument has been also provided by Gertler *et al* (2006), who explored the use that PROGRESA beneficiaries made of the cash transfer. Their estimates indicate that households that are part of the programme are more likely to start micro-enterprise activities and to invest in agricultural assets and activities.

Latent Variable of Early Care

As the theoretical part of this chapter explained, the quality of care that a child receives has been found to be associated with medium-term indicators of well-being. The construct of care in the MIMIC model is measured by breastfeeding and four vaccines. However, breastfeeding did not appear to measure the concept of care in a statistically significant way due to the low variation in

responses (95% reported positively). Therefore, given that the concept is measured in a statistically significant way only by the four vaccinations, it is renamed to "inoculations". Hence, the original assumption that the latent concept of care served as an approximation to a wider range of care practices is lost. Nevertheless, the concept of inoculations shows that the four vaccinations provide an accurate measure for the latent construct.

Table 5.4. Un-Standardised Factor Loadings of the Latent Variable of Inoculations (Care)

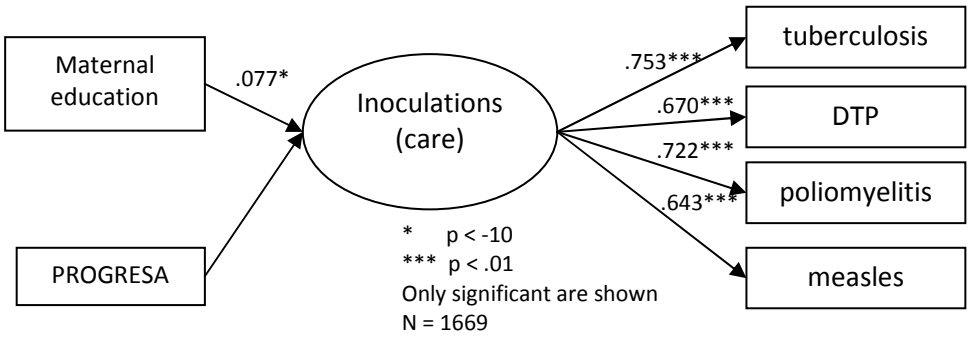
	Un-Standardised Estimates
Tuberculosis vaccine	1.000[+]
DTP vaccine	0.890
Poliomyelitis vaccine	0.959
Measles vaccine	0.854
[+] Fixed at 1 to establish the scale.	
All factor loadings are significant at .01	N = 1669

As Table 5.4 shows, all of the un-standardised loadings are extremely high, which means that the probabilities for a child having one of the vaccines are closely correlated with having the rest. The high proportion of children who were inoculated by the four vaccines included in the construct is related to a sustained medical tradition in Mexico that supports inoculations as health care practices for children. The Universal Inoculation Programme has been operating in the country since 1991 to reduce mortality and morbidity rates (Santos, 2002). Reported figures in the sample support this argument: 83.3% were vaccinated against tuberculosis, 83.5% had the DTP vaccine, 89.1% were inoculated against Poliomyelitis, and 35% had the measles vaccine. Also, Pearson correlations show that having a vaccine is correlated with having the others[52]. This reflects the way in which inoculations are administered in the country, which tend to happen conjointly.

Standardised loadings for each of them are: tuberculosis has a loading of .75; DTP has .67; poliomyelitis shows .72; and measles presents a loading of .64 (all significant at .01). Figure 5.3 summarises standardised factor loadings along with the effects of the controls.

[52] Pearson correlations are: tuberculosis with DTP = .296; tuberculosis and poliomyelitis = .244; tuberculosis and measles = .227; DTP and poliomyelitis = .274; DTP and measles = .164; and poliomyelitis and measles = .206. All are significant at .01 level.

Figure 5.3. Standardised Estimates of the Latent Variable of Inoculations (Care)



The effects of maternal education and participation in PROGRESA-Oportunidades on infant inoculation were also examined. Maternal schooling is positively associated with the level of vaccinations: it is improved by .077 (standard, significant at .10 level) by each year of maternal education[53]. Even though the estimate is low possibly because there is little variation in reported frequencies of inoculation, it is still possible to state that more years of maternal education are reflected in slightly better care practices that children received.

The specific ways in which maternal education influences child health have been contested by some members of society and health care workers. On the one hand, there is a group who Poland and Jacobson (2001) identify as the "anti-vaccine movement", who are sceptical about the real benefits and side-effects of inoculations. On the other hand, others have stated that it is necessary to separate the effects of income and parental education on child health given that "education acts as a proxy for command over such resources as clothing, shelter, food, medical care, sanitary facilities, and water supply" (Ware, 1984, p. 198).

A general finding in existing literature, however, is that maternal education has a positive effect on child health care. The effect of maternal education on level of inoculations found in this MIMIC model is consistent with the evidence found by other scholars. For example, Borrás *et al* (2008) found a positive association between maternal education and inoculations in Spain. In Latin America, Desai and Alva (1988) found that even though socio-economic status reduces the effect of maternal education, the latter is anyway associated with differences in the level of immunizations in Bolivia, Colombia, Dominican Republic, and Guatemala. These authors argue that, particularly in Latin America, maternal education is positively associated with child inoculation even after controlling for socioeconomic factors. Possible hypothesis have been raised to try to explain how

[53] This estimate results of a MIMIC model before including community level and parental presence in the household. After adding a large number of socio-demographic controls, the statistical significance of some variables tends to drop.

maternal education affects child´s health. According to Cleland and Van Ginneken, "educated mothers may attach a higher value to the welfare and health of children, have greater decision-making power on health-related and other matters, be less fatalistic about disease and death, be more knowledgeable about disease prevention and cure, be more innovative in the use of remedies, be more likely to adopt new codes of behaviour" (1988, p. 1364).

While maternal education is positively associated with the level of inoculations, taking part of PROGRESA-Oportunidades is not associated in a statistically significant way with the construct[54]. This suggests that this specific set of vaccinations is independent from taking part of the Programme given the governmental inoculation strategy, albeit the medical check-ups required by the Programme would entail other benefits not measured in this construct. PROGRESA-Oportunidades has potential long-term benefits in the health care practices of beneficiaries given that it provides free seminars on nutrition, basic hygiene, sexuality, pregnancy, infant care, treatment of infectious diseases, addictions, disabilities, and other health-related topics (Quiñones, 2006). An overall idea of the effects that PROGRESA-Oportunidades could have on care practices that go beyond inoculations could be found in a study conducted by Rubio-Codina (2007). Using a more complex definition of care and with the aid of semi-parametric analyses, this author found that, within a sample of PROGRESA-Oportunidades recipients, young women devote less time to caring for siblings given that they spend more time in school and that, simultaneously, the overall time allocated to child care in the household increases. Rubio-Codina argues that "Oportunidades fosters human capital accumulation in two different ways: first, through keeping teenage girls in school; and second, through more and arguably better (mother provided) child care" (2007, p.1).

Results suggest that the level of inoculations a child received is more related to governmental action than to the material circumstances of the household. To explore a possible relationship between inoculations received by the child and household socio-economic circumstances, the construct of vaccinations was controlled for the level of household durables and quality of housing during the first months of the child´s life[55]. Controlling for these items takes into account whether the material circumstances of the household affects spending in child healthcare. Neither early durables nor early housing were associated with levels of care in a statistically significant way.

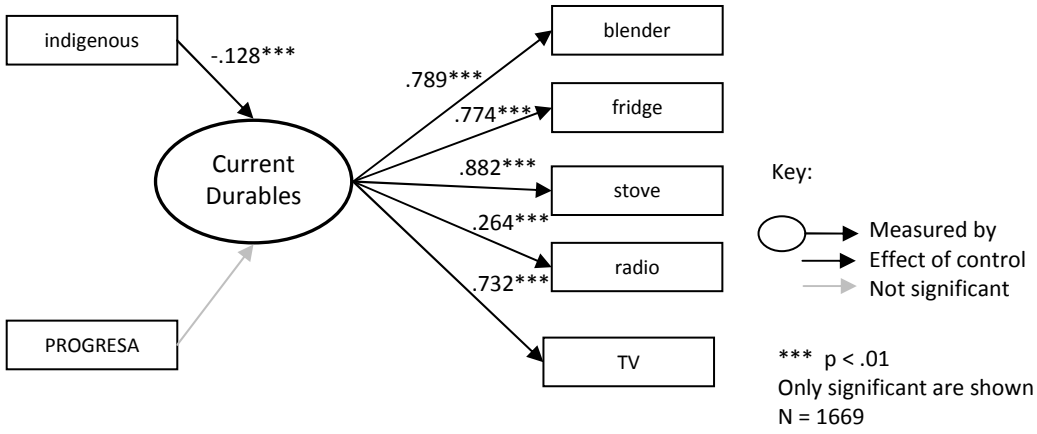
[54] This is not significant even if all the socio-demographic controls are eliminated.
[55] Results not shown here. Model available upon request from the author.

Current amount of durables is measured through the same list of items used in the construct of early durables. Un-standardised estimates are summarised in Table 5.5. Standardised estimates of factor loadings and of the effects of ethnicity and PROGRESA-Oportunidades are presented on Figure 5.4.

Table 5.5. Un-Standardised Factor Loadings of the Latent Variable of Current Durables

Household Assets	**Un-Standardised Estimates**
blender	1.000[+]
fridge	0.921
stove	0.920
radio	0.362
tv	0.902
[+] Fixed at 1 to establish the scale. All factor loadings are significant at .01 N = 1669	

Figure 5.4. Standardised Estimates of the Latent Variable of Current Durables



Results show that the concept is mainly measured by having a refrigerator, a stove, a television, and a blender (standard estimates between .73 and .88; all $p < .01$) and to a lesser extent by having a radio (.26 standard; $p < .01$).

With regard to the effects of the controls, ethnicity and receiving PROGRESA´s cash transfer were assumed to be associated with differences in the construct of current durables. Indigenous households tend to have lower level of durables (-.13 SD; $p < .01$) than non-indigenous households. However, the difference between households that took part in PROGRESA and households that did not is not statistically significant. These results, read *vis-à-vis* the coefficients on the construct of

early durables, suggest important findings with regard to the effect of PROGRESA-Oportunidades over time. Measured around the child´s birth, indigenous households were -.41 Standard Deviations lower in the level of durables than non-indigenous households. Also, measured around the child´s birth, PROGRESA was associated with a difference of .333 Standard Deviations in the level of durables between recipients and non-recipients. The changes in the coefficients over time make it is possible to infer that the Programme helped in eliminating the gap between recipients and non-recipients (difference no longer significant) and reduced the gap between indigenous and non-indigenous households (from -.41 to -.13).

Many pieces of research have evaluated the impact of PROGRESA-Oportunidades on household poverty[56]. Some studies provide evidence supporting the argument that the programme helped to reduce the gap between recipients and non-recipients over time. For example, Skoufias and Di Maro (2008), who also used ENCASEH/ENCEL data, found that receiving the cash transfer means income improvements especially for the poorest, thus reducing the poverty gap within the sample. The study of McKee and Todd (2009) predicts future earnings of children who are receiving the cash benefit. These authors find that PROGRESA-Oportunidades is expected to increase future mean earnings of children who are currently receiving the benefits and that this will have modest effects on poverty and inequality rates.

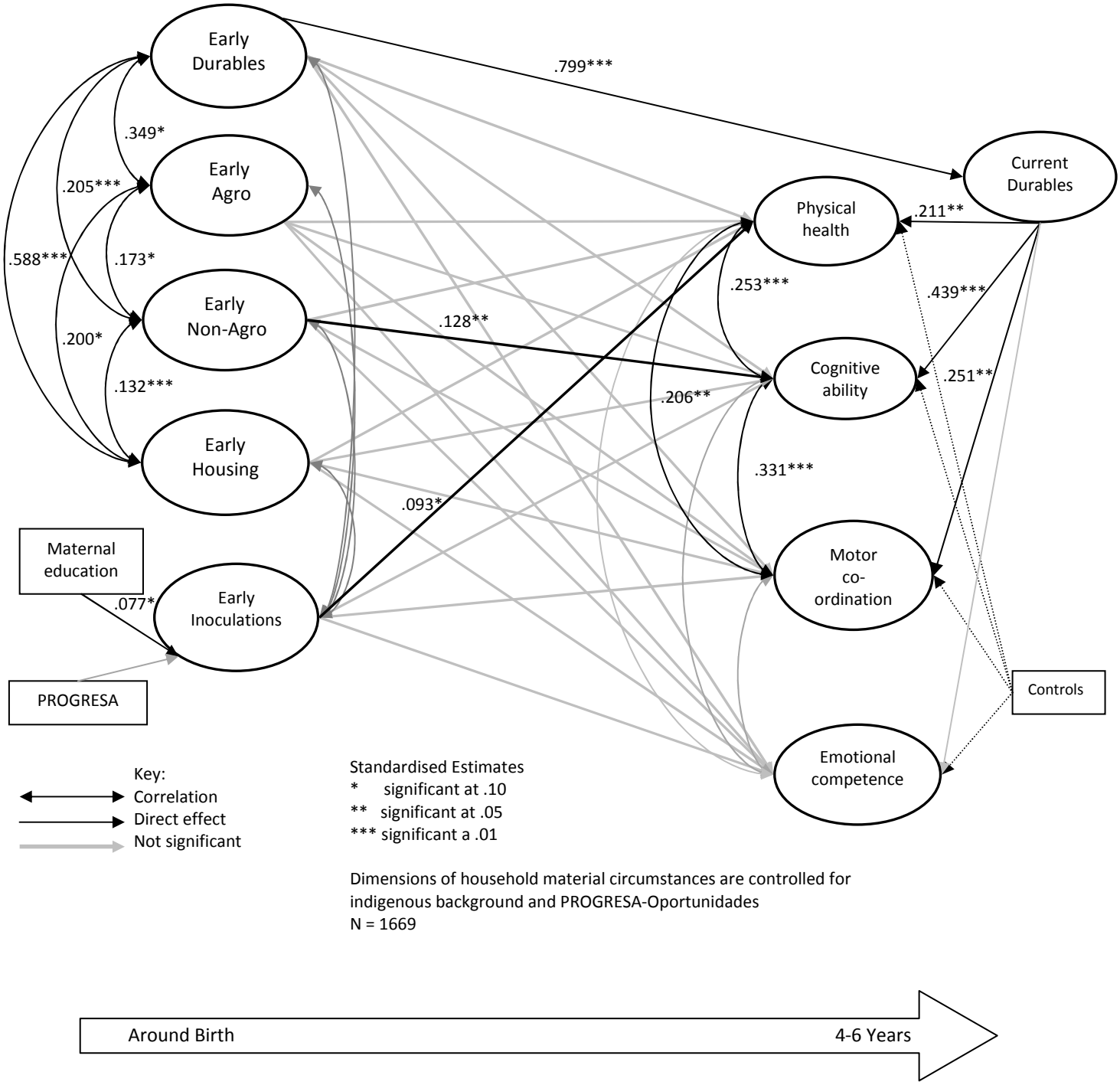
Once the measurement parts of the model have been presented, the next section looks at the association between dimensions of household material circumstances around the time of the child´s birth and dimensions of child well-being at age 4-6 years.

Path Analysis: Effects of Early and Current Circumstances on Child Well-Being

This section presents an examination of the effects of early household material circumstances, early care practices, current level of durables, and the socio-demographic controls on child well-being at age 4 to 6 years. Figure 5.5 illustrates the results from the path analysis. Only significant standardised estimates are shown here; full un-standardised coefficients and standard errors are provided in Annex 4.

[56] Most of them are found in: http://evaluacion.oportunidades.gob.mx:8010/en/index.php

Figure 5.5. Results: MIMIC Model Showing Correlations Between Constructs and Direct Effects of Early Household Material Circumstances, Early Care, and Concurrent Durables on Child Well-Being at age 4-6 Years



Out of the four dimensions that compose the measurement model of early household material conditions, "early non-agricultural means" (income and occupation) is associated in a statistically significant way with the cognitive dimension of child well-being. This result suggests that higher household income and higher levels of employment during the child´s first months of life are associated with better cognitive outcomes at age 4-6 years. Specifically, a 1 Standard Deviation (SD) increase on non-agricultural means around the time of birth would be associated with an increase of .128 points in the SD in cognitive ability at age 4-6 years. Given that this MIMIC model controls for the household´s concurrent situation and socio-demographic characteristics, the effect of early non-agricultural means on cognitive ability at age 4-6 years is a reflection of the importance of the first months in life.

Results from the MIMIC model are consistent with previous research. For example, parental income and socio-economic status during infancy was a predictor of mental competence and academic performance later in life in the studies reviewed by Grantham-McGregor *et al* (2007), which were conducted in Peru, Philippines, Guatemala, and Brazil. Consistently with the literature in the topic, income and occupation play an important role in child outcome since their first months in life, even after taking into account differences associated with ethnicity and receiving a cash transfer.

Bearing in mind that this domain of household material circumstances is composed by income and employment in the household, these findings could borrow from two sets of explanatory theories. On the one hand, this could be understood under the light of the Human Capital Investment model, which states that income is a large determinant of the quantity and quality of resources available for child development (Becker, 1981, Ceroni, 2000; Corcoran, 1995; Castañeda and Aldaz-Carroll, 2001). On the other hand, the effect of non-agricultural means could be read under Duncan *et al* (1998)´s argument. These authors state that children´s cognitive development is not income *per se* but other elements that are interrelated with it, such as parental mental health, parental and carer attitudes and competences in the labour market.

Given that the construct of early non-agricultural means includes both income and occupation, both of the arguments presented above could seem helpful in understanding the association between income and occupation and cognitive ability in this sample. Parental income and occupation influence child development not only because it determines the material resources

that parents have but also equip them with skills to promote stimulating cognitive environments, a broader set of language skills, and active mindsets. Even though employment could also influence child development negatively if it makes parents to spend less time with their children, in this case better non-agricultural occupational status of the household is associated with better indicators of cognitive ability at age 4 to 6 years. By including income and occupation, this construct is more powerful than a single indicator. As Bradley and Corwyn stated, "most social scientists agree that a combination of income and occupational status provides a better approximation to financial capital than either alone" (2002, p. 373).

Nevertheless, the issue of whether material circumstances have a "true" direct effect on children or they act through other elements has been part of the academic debate. For example, Yeung, Linver, and Brooks-Gunn (2002) examined the effects of income and family processes on the cognitive development of pre-school children. Using the Panel Study of Income Dynamics and the Child Development Supplement, these authors examined scores in the Woodcock-Johnson test at age 3 to 5 years old by using average household income throughout the child´s life as well as other socio-economic indicators. Yeung, Linver, and Brooks-Gunn conclude that "the direct effect of income on a child´s achievement was reduced by more than half and became nonsignificant [sic] when the investment mediators were added to the baseline model" (2002, p. 1870). Duncan *et al* (1998) have also raised a concern about the real effect that income appears to have on child well-being. They argue that "the effect of income might be spurious, caused by the mutual association that parental income and the outcomes for children share with some un-measured `true´ causal factor" (1998, p. 409). The inclusion of controls in the MIMIC model accounts for structural elements that shape child well-being. Particularly, ethnicity, maternal characteristics, and household composition were found to be associated with the indicators of well-being in a significant way. The specific effects of the controls on child well-being will be detailedd later. Meanwhile, it is important to note that early non-agricultural means is a strong predictor of cognitive ability in the Mexican sample even after including a wide range of controls.

The fact that household material circumstances around the child´s birth is not significant for any of the other domains of child well-being is also interesting. Some scholars have found that poverty affects the nutritional status of children or that it has positive as well as negative effects on behavioural outcomes (Duncan and Magnuson, 2002). Others have found that social class is associated to educational achievement in a larger way than with psychosocial indicators (Sacker, Schoon, and Bartley, 2002). Furthermore, others have found that poverty poses a negative effect on

height-for-age and weight-for-age during the early years on a general scale but that the effect varies across outcomes and subsamples (Korenman and Miller, 1997). In this last study, Korenman and Miller argue that "the relationship between lifetime poverty and stunting may reflect the ability of a long-term income measure to capture the effects of poverty in the prenatal year and at ages zero to three rather than the effect of long duration *per se*" (1997, p. 94).

Contrary to the theoretical model and previous evidence, results of this MIMIC show that the only significant effect related to the circumstances around birth is the relationship between non-agricultural means (income and occupation) and cognitive ability at age 4-6 years. The fact that concurrent material circumstances is controlled for, indicates a possible causality between household income and occupation around birth and outcomes at age 4-6 years. Nevertheless, concurrent household material conditions are significantly associated with physical health, cognitive ability, and motor co-ordination at age 4-6 years. The significance of concurrent material situation provides a broader picture of the elements that are helping to understand child well-being at pre-school age. The effects of current household material circumstances on child well-being are explained next.

Effects of Current Durables

Concurrent material circumstances of the household, measured through current durables, is associated with differences in the physical, cognitive, and motor co-ordination domains of child well-being. An increase of 1 SD in the level of durables in the household are associated with better physical health (.21 SD; $p < .05$), higher cognitive ability (.44 SD; $p < .01$), and better motor co-ordination skills (.25 SD; $p < .01$). These results provide some evidence that depth of poverty matters within a context of poor and extremely poor communities.

These findings are also consistent with previous research conducted elsewhere. Just to mention some of them, Whitehurst and Fischel argue that the socioeconomic status of children has been found to be "one of the strongest predictors of performance differences in children at the beginning of first grade" (2000, p. 54). Similarly, Farah, Noble, and Hurt concluded that "not surprisingly, in view of the literature on SES (socio-economic status) and standardized cognitive tests, the middle SES children performed better than the low SES children on the battery of tasks as a whole" (2005, p. 7). The possible pathways that the authors use to describe the effects of poverty

in the cognitive development of the children are inadequate nutrition, maternal substance abuse during pregnancy, lead exposure, and less cognitive stimulating environments.

A key feature of this MIMIC model is that it correlates two moments in time and therefore provides some information about the association between sustained household material circumstances and the indicators of well-being at age 4-6 years. Results show that "current durables" is correlated to the construct of "early durables" by .799 ($p < .01$), which signals a relatively stable situation in this aspect of household material circumstances between the child´s birth and age 4-6 years. Although being a different procedure, the high correlation between the latent variable of early durables and the latent variable of concurrent durables draws back to what other pieces of work have found. Scholars who have utilised measures of material well-being over time, such as mean income over the child´s life, have argued that sustained poverty is a better indicator of material circumstances than a single point in time. The study of McCulloch and Joshi (2002) demonstrated that current income is not sufficient to understand deficiencies in cognitive test scores but that sustained poverty shows a stronger effect. Similarly, Blau (1999) found that current income is not as strongly correlated to child outcome as permanent income and that household characteristics such as ethnicity and maternal educative level play as well an important role. This MIMIC model indicates a similar scenario: Taking into consideration the high correlation of the construct of durables in these two points in time, it is possible to argue that embedded in the effect of current durables on child well-being is the sustained level of durables that the household has had throughout the child´s life.

Even though "durables" is the dimension of material well-being that has the possibility to be more volatile, it presents a particularly high correlation in these two points in time. In Annex 1, it is possible to see that the level of agricultural means and the quality of housing in this sample was even more stable during this period of time. Even though the period studied only comprises 4 to 6 years, figures about the amount of resources that households in this sample had in each wave of the panel suggest that social mobility possibly tends to be slow in this context. The micro-scenario depicted in this sample mirrors the findings about inequality and rigidity of social stratification that has been addressed by other academics (Lustig, 1995; Solís, 2007; Zenteno and Solís, 2006).

Effects of Inoculations

As opposed to what might be expected, the construct of inoculations is only weakly associated with the dimension of physical health at age 4-6 years and not associated with any of the other dimensions of well-being. The construct of early inoculations was hypothesised to counteract the negative effects of material deprivation but it is generally not associated with the dimensions of well-being in a statistically significant way. Nevertheless, these results need to be read carefully given three main reasons. First, the scope of the construct is limited to inoculations and other healthcare practices and routes not measured in this model, especially related to nutrition, could have an effect on child outcomes at age 4 to 6 years. Second, there is low variation in the indicators. Given that most children received the vaccinations, these indicators see their explanatory power diminished. And third, another crucial issue to take into account is that the indicators of well-being are obviously available only for those children who survived the panel until 2003. It is not possible to know if not receiving vaccinations had an influence on the mortality rates of the communities included in this study: according to the author´s own calculations, around 15% of children in this sample who were born between 1997 and 2003 died.

Effects of Socio-demographic Controls

The effects of the socio-demographic controls are shown in the following table (only significant).

Table 5.6. Effects of Socio-Demographic Controls on Child Well-Being

	Physical Health		**Cognitive Ability**		**Motor Co-ordination**		**Emotional Competence**	
	Un-standardised	Standardised	Un-standardised	Standardised	Un-standardised	Standardised	Un-standardised	Standardised
Age					.062***	.378***		
Gender			.080**	.054**				
Indigenous background			-.126**	-.084**	-.371***	-.161***		
Proportion of children	-.009***	-.129***	-.008***	-.166***	-.005**	-.076**		
Maternal education	.089***	.239***	.089***	.350***	.030**	.077**		
Maternal age	.020***	.156***	.010***	.112***			.005**	.070**
** significant at .05 *** significant at .01			Only significant are shown					N = 1669

Age is only statistically associated with motor co-ordination (.378, $p < .01$). As the previous chapter described, this possibly reflects that the McCarthy tests do not differentiate between activities that could be performed at age 4, at age 5, and at age 6 years. Gender is only associated with cognitive ability (.054, $p < .05$). Generally, boys have slightly higher scores in the Peabody and Woodcock-Johnson tests than girls. Ethnicity is associated with cognitive ability and motor co-ordination (-.084, $p < .05$ and -.161, $p < .01$, respectively); indigenous children tend to perform worse in the tests of cognitive ability and motor co-ordination than non-indigenous children, possibly due to language differences.

With regard to household composition, children living in households with larger proportion of children (aged 11 years and under) have modest but significant lower levels of physical health (-.128 standard; $p < .01$), cognitive ability (-.166 standard; $p < .01$), and motor co-ordination (-.076 standard; $p < .01$). Keeping in mind that this study uses a different sample from the one used by other scholars, these findings are similar to their findings. For example, Ware argues that gender is an important explanatory characteristic because in some cases "children are not only unwelcome when they are the `wrong´ sex, they may simply be the latest addition to a family that the parents feel is already large enough" (1984, p. 207).

Maternal socio-demographic profile is also significantly associated with some of the indicators of well-being. Maternal education is positively associated with better outcomes with three domains of child well-being. The largest effects are on cognitive ability (.350 standard; $p < .01$) and on physical health (.249 standard; $p < .01$). However, there is also a slight positive effect on motor co-ordination (.077 standard; $p < .05$). Maternal age is also positively associated with indicators of child development. The most important effect is on physical health (.156 standard; $p < .01$), followed by an effect on cognitive ability (.112 standard; $p < .01$) and on emotional competence (.070 standard; $p < .05$). It is interesting to note that this is the only case in which the domain of emotional competence is statistically related to an indicator. This could indicate that maternal age reflects readiness and maturity towards motherhood. Consistently, parental education, parental age, household composition, and other socio-demographic characteristics have been found to be associated with medium-term indicators of child well-being (Brody and Flor, 1998; Burchinal and Clark-Stewart, 2007; Baydar and Brooks-Gunn, 1991).

The effects of the controls on the dimensions of child well-being are similar to results on the previous chapter (See Chapter 4). Also, the coefficients of the controls are virtually the same if

different combinations of them are included in the MIMIC model. The stability of the controls reflects that their effects on the indicators of well-being are stable regardless of the material conditions of the household and the level of care that children received during the first months of life.

Results in this chapter could be examined alongside another study conducted with the same sample. Fernald *et al* (2005) used the Bayley Scales of Infant Development, which includes indicators of memory, problem-solving abilities, learning, perception, and language development, to examine the whether the timing of an intervention of the style of Oportunidades would have a differentiated effect in the physical and intellectual development of children. The study also included anthropometric information for children along with the indicators examined in the psycho-social test. The analysis was conducted through multiple regression models. Perhaps the most relevant finding of Fernald *et al*´s study was that "none of the parental or socio-economic factors that (the authors) included in the analyses contributed significantly to MDI or HAZ [Mental Development Index and Height-for-Age Score]" (2005, p. 182). These authors acknowledge a key issue to take into consideration in this study: the sample that came from very similar socio-economic backgrounds and that little variation was found in the predicting poverty-related variables. Thus, the effect of non-agricultural means around the time of birth on cognitive ability is more important than it seems at first sight. Had the sample included a wider range of socio-economic backgrounds, the effects of material circumstances on children would probably be larger.

Conclusions

This chapter has explored the association between household poverty and care practices during the first months of life of a sample of children on indicators of physical, cognitive, motor co-ordination, and emotional well-being at age 4-6 years. The analysis is based on the assumption that the first year of life is crucial to subsequent human development and that deprivation during this period may have a permanent scarring effect. It was found that the level of non-agricultural means (measured by income and occupation levels) a household had during the first months of a child´s life has a statistically significant effect on cognitive outcomes at age 4 to 6 years. Also, concurrent material circumstances of the household (measured through durables) are associated with differences in the physical, cognitive, and motor co-ordination domains of child well-being.

Importantly, concurrent level of durables is highly correlated with earlier level of durables; this suggests that households in this sample have low socio-economic mobility between these two points of time. Based on the results of this chapter, it is possible to conclude that not only the early conditions of non-agricultural (income and occupation) circumstances matter in understanding cognitive outcomes at age 4 to 6 years but also that long-term deprivation (measured by the high correlation between current durables and early durables) negatively affects children.

Inoculations were not found to have statistically significant effects on well-being when measured at age 4 to 6 years, except for a small and slightly significant effect on physical health. However, it is important to bear in mind the limitations of the construct with regard to the indicators that measure it. Also, it would be necessary to explore whether inoculations have an effect on other aspects of well-being, particularly mortality rates. Nevertheless and consistent with the literature, the level of inoculations is positively influenced by the mother's educational level.

Descriptive statistics about the indicators of well-being of these children illustrate that a considerable proportion of this sample are falling behind international norms, particularly in the tests of cognitive ability[57]. With this in mind, it could be possible to infer that this group of children possibly have worse indicators of well-being than children living in better-off families and more developed communities.

The findings of this MIMIC model are important in another way that has had limited coverage in Mexico. Traditionally, studies concentrate on differences in indicators of well-being between poor and non-poor children. However, results for this sample reveal that depth of poverty is important in understanding cognitive ability at age 4 to 6 years. Even within a sample comprised only of poor and extremely poor communities, the level of household non-agricultural means (income and occupation) around the time of the child´s birth are associated with cognitive well-being at pre-school age. Keeping in mind that the database used for this study only contains information about households that live in poor or extremely poor communities, children who are born into households with lower income and lower employment levels manifest worse outcomes for cognitive ability at pre-school age. Therefore, these results should be read under the light of the sample´s characteristics, which makes them particularly interesting. This group of children was drawn from households living in communities identified as poor or extremely poor in rural Mexico. The fact that the household´s material circumstances, specifically the dimension of early non-agricultural means,

[57] Please refer to Annex 1, Descriptive Statistics.

are associated with indicators of child well-being at age 4-6 years reveals that depth of poverty affects child development. Amongst those living in poverty, children who live in households with lower income and fewer household members working in the formal labour market tend to have worse outcomes for cognitive ability.

The material circumstances of the household in which a child grows up plays an important role in understanding indicators of well-being. Results in this chapter suggest that income and parental occupation may influence the quantity and quality of resources available for child rearing. Allocation of resources, however, could depend on socio-demographic characteristics. For instance, the socio-demographic controls used in this chapter point to important distinctions with regard to the well-being outcomes. Given that mothers are the primary carers of children in this sample (as reported in the database), maternal education level and maternal age are importantly associated with the indicators of well-being. Also, the proportion of children in the household is a significant predictor given that it shapes the amount and the ways in which resources are allocated. Gender predicts differences in cognitive ability: boys have a slight advantage over girls in cognitive ability, which mirrors differences in the cognitive stimulation that boys and girls receive. With regard to ethnicity, it was found that the indigenous children manifested worse outcomes for health, cognitive, and motor co-ordination than did non-indigenous children. In fact, the coefficients of indigenous background and of maternal education on cognitive development are larger than the coefficient of the latent variable of non-agricultural means.

Using ethnicity as a factor to understand differences in the four dimensions of material circumstances, indigenous background is associated with lower levels of durables, quality of housing, and non-agricultural means. This double effect of ethnicity (on the indicators of child well-being and the indicators of household material circumstances) reflects the long-term and systemic material deprivation, under-nutrition, higher probability of illness and infections, and limited access to healthcare and public services that are constant during the lives of many indigenous children.

These findings raise important policy implications in relation to securing the environment in which children grow during their early infancy. However, public action is particularly needed in tackling the disadvantages faced by indigenous communities. Although official education in Mexico has been bilingual for indigenous groups since the 1990s, indigenous children have a delay in vocabulary and other cognitive skills manifested since pre-school age that may appear evident later in their lives given the predominance of Spanish in higher education and employment opportunities.

Another policy-related issue is the effects of programmes like PROGRESA-Oportunidades, Mexico´s main poverty alleviation programme, which is based on human capital investment. This scheme works on the assumption that investments in early childhood would have sustained health and cognitive benefits. Based on the evidence of the effect of early non-agricultural means on cognitive ability, a programme like Oportunidades could ensure that household income and employment are secured during the first months of a child´s life.

Another issue that emerges is the relevance of the tests included in the ENCASEH/ENCEL to measure the well-being of Mexican children. Even though the Latin American versions of the WJ and the PPTV were used, they may not be accurate instruments for the specific cultural setting of this sample especially because there is a strong difference in the language component. Similarly, the ACBCL enquires about problems that could be defined by western values and not be related to the ones of these communities.

This analysis could be developed further by incorporating other observed indicators in the care construct, especially nutrition, as well as other socio-demographic controls such as birth order. It would also be possible to evaluate how different patterns of poverty spells affect indicators of child well-being. However, given that this sample includes only children who have lived in poor or extremely poor communities, such pathways of research could provide some light on how timing of deprivation and trajectories in the material circumstances of the household over time affects child development. The next chapters address these issues.

CHAPTER 6

When Poverty Happens: Timing of Income Fluctuations and Child Well-Being[58]

Introduction

The previous chapter started to explore the issue of whether timing of poverty is associated with child outcomes. Particularly, it examined the association between household poverty around the time of the child´s birth and well-being indicators at age 4-6 years. Results suggest that occupation and household income around the time of birth are associated in a statistically significant way with indicators of cognitive ability at age 4-6 years. This chapter continues the exploration of the importance of timing of poverty by including other time-points into the analysis.

Since the 1980s, research has emphasised that poverty is a dynamic phenomenon. Household resources change over time, could be affected by external shocks, and depend on household decisions and life-cycle events (Addison, Hulme, and Kanbur, 2008; Bane and Ellwood, 1986; Baulch and Hoddinott, 2000; Clark and Hulme, 2005). Therefore, people may move in and out of poverty or may experience various degrees of poverty at different points in time. Given that early childhood is a period when multiple developmental processes take place, a dynamic perspective has increasingly been integrated into the studies that explore the effects of poverty on children. Some scholars have stated that "questions need to be asked about the influence of both the duration and the timing of poverty upon children´s well-being" (Brooks-Gunn, 1997, p. 89), and that it is important to examine "the timing and sequencing of exposure" to poverty (Wagmiller *et al*, 2006, p. 847). Hence, academic research has started to evaluate whether different poverty experiences, in terms of depth, duration, and timing, affect children differently.

Conceptual and methodological sophistication in poverty research has been accompanied by larger availability of panel data. These advances have made it possible to take into account the

[58] The proposal of this chapter was presented at the 5th International Conference on Interdisciplinary Social Sciences, August 2010, Cambridge University. Results were presented in the Poverty Journal Club of the Department of Social Policy and Intervention, January 2011, Oxford University.

longitudinal aspect of poverty in the studies of child development. Therefore, literature that explores the poverty experiences of children over time has increased during the last decade. However, some caveats remain in the understanding of the relationship between longitudinal experiences of poverty and indicators of child well-being. On the one hand, as some authors have pointed out, (Aber *et al*, 1997; Brooks-Gunn, 1997; Duncan, Brooks-Gunn, and Klebanov, 1994; Lewit, Terman, and Behrman, 1997; Wagmiller *et al*, 2006), most of the existing research on the effects of poverty on children has taken into consideration a single point in time. That is, they may link a poverty measurement in the past with outcomes in the future, but do not take into consideration the whole period or fluctuations of poverty over time.

On the other hand, evidence on whether timing of poverty is a significant factor in understanding child outcomes is divergent. At the moment of writing, the literature that explores the relationship between timing of poverty and child development is limited and seems to present inconclusive evidence. Some studies (Baydar *et al*, 1993; Duncan *et al*, 1998; Duncan *et al*, 2009) argue that earlier poverty is the period that has the largest influence for children. Contrarily, results from a study conducted by the NICHD (2005) indicate that poverty suffered in late childhood is associated with worse indicators of child well-being in a stronger way than earlier poverty. Other pieces of research (Guo, 1998) have found that while earlier poverty affects some indicators of well-being, later poverty is associated with other aspects of well-being. Finally, another study (Campbell, 2007) did not find significant differences in the effects of early, current, and average household wealth on the indicators of child well-being.

Nevertheless, evidence should be read under the light of each study´s design given that research that looks at whether timing of poverty is associated with indicators of child well-being shows substantial differences. Examinations differ in their contextual setting, the data and sample that they use, in their methodological approaches, and the ways of measuring poverty and well-being. Schoon *et al* (2002) have also recognised the limitations in the literature that looks at timing of poverty: “Differences in findings can be explained by methodological variations in the studies that involve different developmental periods, different indicators of adversity and adjustment, and different analytical strategies” (2002, p. 1488).

The apparently contrasting evidence about the ways in which timing of poverty is associated with indicators of child well-being, nevertheless, starts to show points of coincidence if these studies are carefully examined according to their design. On the one hand, the studies that have used

outcome indicators during adulthood are the ones that have claimed that early poverty (measured at ages 0 to 5 years old) is more detrimental for people than later poverty (Baydar, Brooks-Gunn, and Furstenberg, 1993; Duncan *et al*, 1998; Duncan *et al*, 2009; Duncan and Brooks-Gunn, 1997). On the other hand, the studies that look at childhood and teenage outcomes present mixed evidence with regard to the importance of timing of poverty. Firstly, the studies of Burchinal *et al* (2008) and the NICHD (2005) looked at outcomes at similar age ranges and their findings show that poverty suffered later in childhood, but not early poverty, is associated with child well-being. In the former, an examination that included 74 African American children in the USA found that concurrent poverty is the only period that is associated with child outcome at age 9 to 11 years. In the latter, American children who experienced poverty at age 4 or older had worse cognitive and emotional outcomes at age 6 to 9 years than children who experienced poverty during the first 3 years of life. Secondly, the studies conducted by Guo (1998) and Schoon *et al* (2002) find that both poverty during the first years in life and during the teenage years are associated with indicators at ages 6 and 13 and ages 5 to 16, respectively.

These studies represent important advances in understanding whether timing of poverty interrupts the developmental processes that take place during early childhood. However, there is still no conclusive evidence. The contesting results with regard to whether timing of poverty matters in trying to understand the elements that shape child outcome points to the need for further research on the topic. This chapter aims to contribute to this topic by exploring the association between indicators of poverty at different points in time with indicators of child well-being at age 4 to 6 years old in rural Mexico. This chapter takes into consideration the following question: Is timing of poverty associated with differences in indicators of well-being at age 4-6 years? This is explored by redressing the following hypothesis:

H1: Early poverty is more detrimental for children than later poverty.

The hypothesis is explored by taking into account indicators of household poverty around the child´s birth as well as income variables at other time-points. Specifically, the analysis is based on Multiple Indicator Multiple Cause (MIMIC) models that link a measure of household poverty at different points in time with the measurement model of child well-being at age 4-6 years. The first section of this chapter describes the theoretical foundation and describes the models. The second part discusses the results. The last section offers conclusions.

The Theoretical Model

This section describes the theoretical foundation of the models. In order to disentangle the association between poverty measurements at specific time-points as well as the cumulative nature of poverty with indicators of child well-being at age 4 to 6 years of age, the analysis is sustained on two main areas of knowledge: the study of poverty over time and the study of child development.

The Dynamic Nature of Poverty

Since the 1980s, scholarly work on poverty has increasingly included what Clark and Hulme (2005) identify as a meta-dimension: time[59]. Bane and Ellwood´s (1986), two of the pioneers in the study of poverty over time, used the USA´s Panel Study of Income Dynamics (PSID) to identify continuous periods during which household´s income is lower than the poverty line. These authors calculated exit probabilities that allowed them to model poverty dynamics according to beginning and ending events. Since the 1990s, several researchers have explored the differences between transitory and chronic poverty (see Baulch and Hoddinott, 2000, for a review of some studies). For example, also using the PSID, Rodgers and Rodgers (1991) proposed a method for measuring chronic and temporary poverty; and Ashworth, Hill, and Walker (1994) identified patterns of childhood poverty according to spacing, severity, and duration of spells. Another group of authors have taken into consideration the longitudinal aspect of poverty by looking at average income over a period of time instead of a single-point measurement. Using the National Longitudinal Survey of Youth, Blau (1999) as well as Korenman, Miller, and Sjaastad (1995) found that the effects of long-term household income on indicators of child development are considerably higher than the effect of concurrent or a single year income.

Recent conceptual and empirical advances have made it possible for researchers to explore whether different longitudinal experiences of poverty shape child development differently. Some have argued that "the whole life course is important, not just the early years" (Schoon *et al*, 2002, p. 1497) in understanding what shapes child outcomes. However, as Aber *et al* have argued, "despite the extensive literature available that addresses the relationship between poverty and child health

[59] The other two, according to these authors, are breadth (or dimensions) and depth (or severity) of poverty.

and development, as yet there is no consensus on how poverty should be operationalized to reflect its dynamic nature" (1997, p. 463).

The longitudinal operationalisation of poverty, however, depends not only on data availability but also on the conceptual underpinning of poverty over time. McDonough, Sacker, and Wiggins (2005) describe three hypotheses with regard to the conceptualisation of the time dimension of poverty[60]. First, the persistence hypothesis is based on the idea that poverty is perpetuated due to institutional or individual elements. According to this perspective, social, socio-economic, labour market, or welfare institutions create and reproduce a system in which certain individuals fall or stay into poverty. Individual elements refer to personal and family characteristics that are related to the maintenance of the *status quo* by engaging in counterproductive attitudes and conducts. Second, the life-cycle hypothesis takes into consideration transitions in the family. Changes in household structure could, for example, be the result of births, deaths, divorce, or migration. Finally, the individualisation hypothesis is based on the premise that lifestyles are changing as a result from modernity and post-industrialisation. The emergence of new social risks results in more types of poverty experiences and more discontinuous life courses.

These three approaches provide a conceptual foundation for understanding household poverty over time. Given the design of this study, however, the life cycle and the individualisation hypotheses do not seem to provide a helpful understanding of poverty over time. The former is not helpful in understanding poverty dynamics in this sample because households are in relatively similar stages of their life cycle. The sub-sample included in this study was extracted from the database by looking at children who were aged 4-6 years in 2003 (who were born between the first 2 years of the panel); this process naturally excludes households with no children and households where the majority of children are older than 6 years. The latter is also not helpful in understanding poverty dynamics in this sample because it only includes marginalised rural communities in Mexico where around 80% of the households specialise in agricultural economic activities. This context could not be considered to be strongly influenced by post-industrialisation. The one that best suits the analysis in this study is the persistence hypothesis. Preliminary appraisals of the data show that despite slight variations over time, households who tend to have better living standards maintain their material circumstances and households who are poorer tend to stay in poorer conditions[61]. Therefore, the persistence hypothesis seems the approach that could throw light on explanations of perpetuating factors of material deprivation in this sample, both structural and household-related.

[60] This is a summary of the work of Andress and Schulte (1998) and of Leisering and Walker (1998).
[61] Please refer to Annex 1, Descriptive Statistics.

An important issue in the study of long-term poverty is the observation period as different measurement periods may yield different results. "A short observation period can produce sample censorship, which happens because some occurrences of the phenomena of interest, in this case periods of poverty, commence before the survey data begin, while others end after the latest period of observation" (Ashworth, Hill, and Walker, 1994, p. 661). It is important to note that even though it is not possible to examine the material circumstances of households before 1997 (when the ENCASEH/ENCEL started), this problem is reduced given that the observation threshold is the moment when children were born. The subsequent poverty experience of children is not year-based but instead adjusted to their lives. In other words, the models include time-points that refer to moments in the child´s life: around birth; at 12, 18, 24, and 36 months; and concurrently with the assessment of well-being at age 4-6 years. This approach goes conjointly with notions about child development, explained next.

The Developmental Process of Children

The model that sustains this chapter not only takes into consideration the dynamic nature of poverty but also theoretical foundations on why specific time-points in the child´s life could be importantly related with outcomes at age 4 to 6 years. During the first years in life, important physiological, cognitive, and emotional developmental processes take place (Berk, 2007; Illig, 1998; Schonkoff and Philipps, 2000). Therefore, the model takes into consideration the household´s material conditions at different points in time throughout the child´s life that are hypothesised to influence these processes.

Berk has identified two main ways of understanding child development: as a continuous process and as a discontinuous process. The former thinks of development as smooth course where individuals slowly "add more of the same types of skills" (2007, p. 6). This approach believes that individuals possess the same abilities since birth to adulthood but that complexity in these abilities is gained by aging. The latter regards development as stages in which a person undergoes "qualitative changes in thinking, feeling, and behaving that characterize [sic] specific periods of development" (*Ibid*). This framework emphasises stages in which humans gradually gain new different capacities as they grow old.

Interestingly, even if some scholars have favoured one perspective over the other, there is extensive recognition (Illig, 1998; Grantham-McGregor *et al*, 1999; Moore 2006; Shonkoff and Phillips, 2000; Smith, Brooks-Gunn, and Klebanov, 1997; UNICEF, 2011) that the changes that

children undergo during the first five years of life are drastic. Also, Paediatricians and Psychologists have identified as common patterns, often called milestones, in child development. Table 6.1 summarises the developmental process; it shows some of the most commonly recognised milestones.

Table 6.1. Milestones in Child Development (summary from Berk, 2007; NHS, 2010; Shelov, 2006)

Age	**Milestones**
6 months	• Gains strength in limbs • Face recognition • Smiling • Lifting head, neck control • Basic object manipulation (holding, reaching) • Tapping with feet • Incipient noises • Eye co-ordination and increased visual capacity • Starts to recognise sounds
12 months	• Hand-to-hand co-ordination • Sitting down without problems • Plays with objects: hiding them, finding them, building blocks. • Action imitation: brushing hair, dialling telephone, holding a cup. • Crawling. • Walking. • Teething. • Identifies pictures of objects. • From eating solids (6-7 months) to feeding themselves with fingers (around 12 months).
18 months	• Walking (if not already). • Running. • Kicking a ball. • Start feeding themselves. • Responding to own name, self-consciousness. • Recognising names of familiar people and objects. • Follows simple instructions. • Organises objects according to colour and shape. • Language acquisition: linking words.
24 to 30 months	• Walking with no problems. • Walking up and down the steps by themselves. • Uses simple phrases. • Basic drawing. • Opening and closing boxes. • Opening doors. • Independence: Solitary play, using spoon and fork, attempts to dress self, uses toilet, “reads” a book to adults, gives instructions to adults about how to play.

Table 6.1. Milestones in Child Development (continued)	
4-6 years	• Refined motor skills. • Expansion of language. • Counts numbers. • Time awareness. • Remembers key parts of stories. • Knows colours. • Understands some concepts like similar/dissimilar. • Evident sense of morality and socialisation. • Role playing.

Human development is a process that is particular to each person and which results from interactions between genetic endowments (nature) and the environment (nurture) (Berk, 2007; Young, 1997). Nevertheless, the milestones summarised in Table 6.1 have been identified as common observed patterns in children. Therefore, the inclusion of household material conditions every 6 months in the MIMIC model allows an examination of whether poverty at these crucial moments interferes in the developmental processes.

The Models

This chapter continues the examination carried out in the previous one (see Chapter 5) as it takes into consideration the effects of household material circumstances around the time of birth on children. However, the analysis is extended by including measurements of household material circumstances at additional time points that are assumed to be important in child development. Building on medical and psychological research, the moments that are hypothesised to have a crucial role are: around birth up to 6 months of age, and at age 12, 18, and 24 months[62].

Apart from poverty measurements every six months from birth to age 24 months, the examination includes a measurement of the household´s material situation at the time when indicators of child well-being were measured (4 to 6 years old). Concurrent material situation is included to account for the dependency nature of poverty over time. As previous research has found, in many case studies in the world as well as in Latin American countries, being poor is largely related with probabilities of being poor in the future (Aldaz-Carroll and Morán, 2001; Devicienti and Poggi, 2011; Haughton and Khandker, 2009). This is especially evident for certain minorities (Corcoran and Chaudry, 1997), including the indigenous groups included in the sample.

[62] Also, these are all the available time-points in the dataset with sufficient case numbers for running the models.

Child well-being is captured by the measurement model used throughout the thesis. Consistently, the analysis includes the same set of socio-demographic controls. On the four domains of child well-being, the variables included have previously (Burchinal *et al*, 2000; Hill and Upchurch, 1995; Kiernan and Mensah, 2010) been identified as explanatory factors of child outcome at age 4 to 6 years: child age, gender, and indigenous background; household composition, maternal age, and maternal education level.

Household material conditions at different points in time from birth to age 24 months are measured by OECD-equivalised income. Income is the best alternative for this examination because it is the indicator of household material circumstances with most variation within the sample and across waves of the panel[63]. Therefore, it is possible to maximise differences within a sample that is comprised of households that live in poor and extremely poor communities. Also, in order to account for possible effects of socio-economic characteristics, the variables of income, durables, and housing are controlled for PROGRESA-Oportunidades and indigenous background.

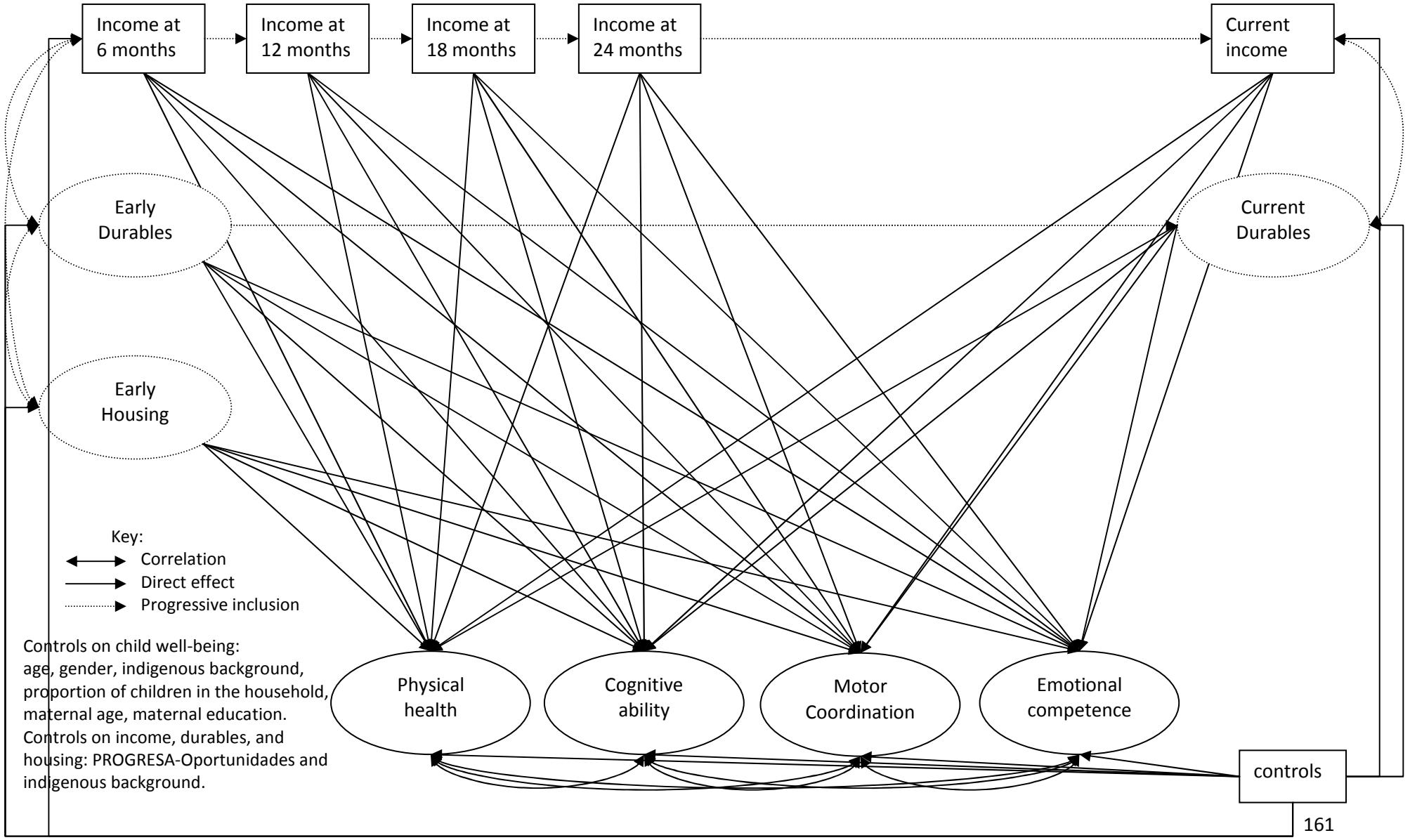
It is important to note that income has been criticised (Alkire, 2007; Boltvinik, 1999; Burtless and Smeeding, 2001; Desai and Shah, 1988; Guio and Maquet, 2006; Iceland and Bauman, 2007; López-Calva and Ortiz-Juárez, 2008; Vegeris and Perry, 2003; Weich and Lewis, 1998) because it does not account for other dimensions of deprivation, living standards, or social exclusion. Nonetheless, income is still widely used to understand differences in household material well-being[64], which facilitates comparing results in this chapter with findings elsewhere. Finally, the analysis here seeks to evaluate the relative effects of income *vis-à-vis* other dimensions of household material circumstances on children and to include a more comprehensive perspective of poverty. Thus, combinations of income and two latent variables that comprise a broader set of indicators: household durables and quality of housing[65] are used. The MIMIC model that contains all of the analytic parts is visually represented in Figure 6.1:

[63] Preliminary assessments showed the indicators included in the latent variables of household goods, agricultural means, non-agricultural means, and quality of housing tended to be similar across waves (please refer to Annex 1, Descriptive Statistics). The inclusion of the four latent variables of household material circumstances at various time-points in the model would cause multi-collinearity problems and non-convergence.

[64] Most of the studies that look at longitudinal measurements of poverty use income. See Literature Review chapter.

[65] Due to the high correlation of latent variables across waves, and subsequently collinearity problems, the full measurement model of household material circumstances with the four latent variables used in the previous chapter cannot be used for more than two time-points. Therefore, the models include income and two latent variables: Goods refers to the most volatile aspect of material circumstances and housing refers to the most stable aspect of material circumstances.

Figure 6.1. MIMIC Model with the Effects of Household Income at Various Time-Points on Children at Age 4-6 Years



The model depicted in Figure 6.1 represents the totality of relationships between household material circumstances (income, durables, and quality of housing) and child well-being that are tested. However, disentangling the real effect of timing of poverty on children poses challenges. Apart from addressing the difficulties of defining poverty, having a reliable instrument, and obtaining accurate measures, a longitudinal approach depends on the temporality of measurement. A first implication of temporality of measurement is the duration of the period studied. As Walker (1995) states, longer observation periods imply higher probabilities that material circumstances could fluctuate. A second connotation of temporality of measurement refers to when and how long the assessment took place. For example, different realities appear if income was measured before, after, or during an economic shock; and if the measure of income refers to average income during the previous week, month, or year. Finally, a longitudinal perspective needs to bear in mind that material circumstances at a given time-point partly depend on their previous situation.

The models here address these challenges by defining a starting point: the threshold for the longitudinal material experience is set around the child´s birth. Also, in order to capture lagging characteristic of poverty and to isolate the "true" effects of timing of poverty, the examination contrasts independent and auto-regressive measurements. In other words, the effects of income at different time-points on children are examined independently as well as regressed on the previous time-point. Therefore, the analysis is conducted in stages that permit an inspection of the effects of household material circumstances at each point in time as well as cumulative poverty on children. These stages are described next.

Stage 1: Isolated Effects of Income at Different Points in Time

The first stage looks at the independent effect of household material conditions at each point in time on child well-being. In this strategy, the measurement model of child well-being is regressed on two scenarios: solely on income at each time-point (Figure 6.2); and on income at each time-point along with concurrent income that is regressed on each time-point (Figure 6.2.b). A comparison of both models will allow us to evaluate (a) the individual coefficients derived from income at each time-point; as well as (b) the coefficients of income at each time-point once persistence of income between each time-point and concurrent income has been accounted for.

Figure 6.2. Child Well-Being on Income at Each Time-Point

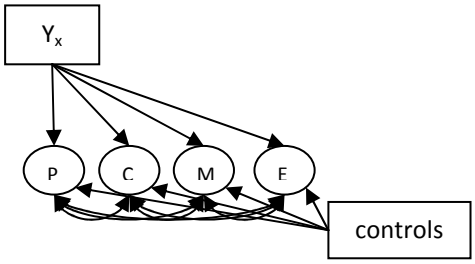
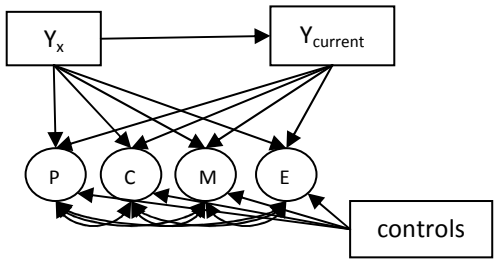


Figure 6.2.b. Child Well-Being on Income at Each Time-Point and Current Income



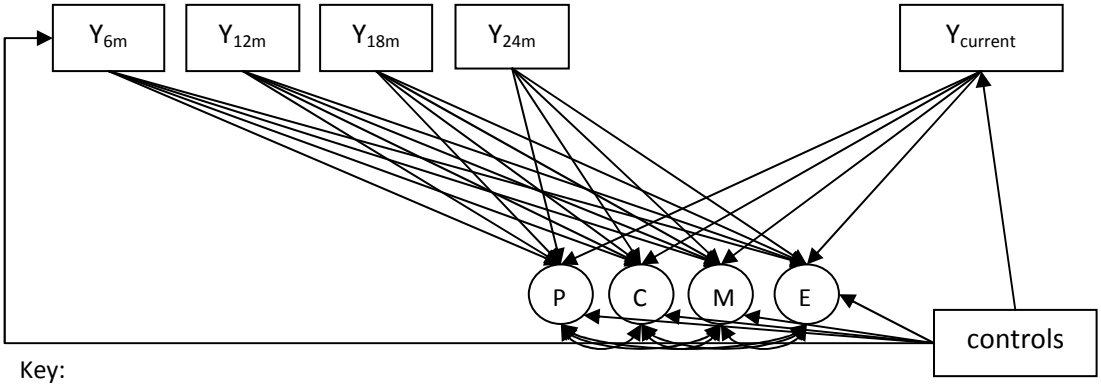
Key:
Y = income
$_x$ = 6, 12, 18, 24 months & concurrently.
P = Physical C = Cognitive M = Motor Co-ordination E = Emotional
↔ Correlation
→ Direct effect

Controls:
age, gender, indigenous background, proportion of children in the household, maternal age, maternal education.

Stage 2: Un-related Effects of All Time-Points

The second stage includes in the model simultaneous but un-related measurements of household material conditions at various points in time as possible explicatory variables on indicators of child well-being. Here, the measurement model of child well-being is regressed on income at all available time-points since birth to age 24 months as well as on concurrent income (Figure 6.3).

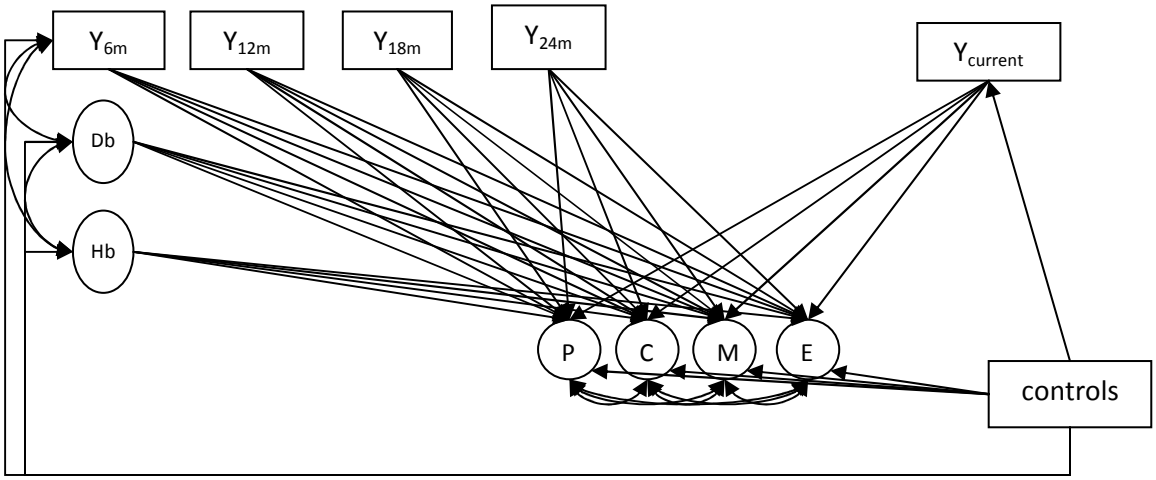
Figure 6.3. Child Well-being on Un-Related Income at Various Time-Points



Key:
Y_{6m} = income birth-6 months. Y_{12m} = income 12months.
Y_{18m} = income 18months. Y_{24m} = income 24 months. $Y_{current}$ = concurrent income.
P = Physical C = Cognitive M = Motor Co-ordination E = Emotional
↔ Correlation
→ Direct effect
Controls on child well-being: age, gender, indigenous background, proportion of children in the household, maternal age, maternal education.
Controls on income: PROGRESA-Oportunidades and indigenous background.

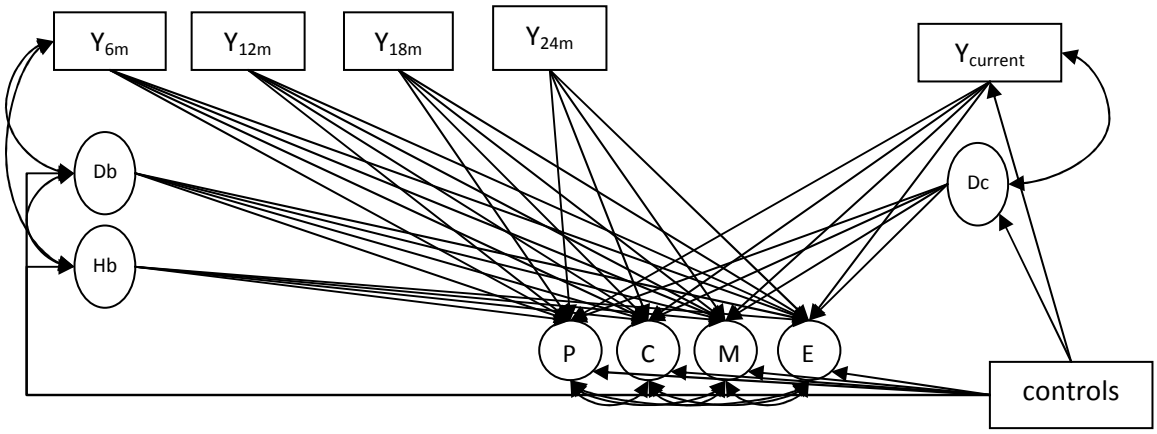
To account for non-income variables of material deprivation, two other versions of the models are provided. These versions incorporate the latent variable of durables and the latent variable of quality of housing. These two variables are assumed to represent different aspects of material circumstances. The former is intended to capture relatively volatile material conditions, given that durables (i.e. television, refrigerator, blender) could be acquired or sold depending on need. The latter is meant to capture the most stable aspect of household material circumstances, given that construction changes in the house (i.e. improving the roofing, change dust flooring to cement) require important investments of resources such as time, money, and workforce. One version of this type of modelling includes the latent variables of household durables and quality of housing around the time of birth (Figure Figure 6.3b). Another version also incorporates concurrent durables (Figure Figure 6.3c).

Figure 6.3b. Child Well-Being on Un-Related Income at Various Time-Points, Early Durables, and Early Housing



Key:
Y_{6m} = income birth-6 months. Y_{12m} = income 12months.
Y_{18m} = income 18months. Y_{24m} = income 24 months. $Y_{current}$ = concurrent income.
P = Physical C = Cognitive M = Motor Co-ordination E = Emotional
Correlation Dc = Concurrent household durables
Direct effect Db = Durables around birth Hb = Housing around birth
Controls on child well-being: age, gender, indigenous background, proportion of children in the household, maternal age, maternal education.
Controls on income, durables, and housing: PROGRESA-Oportunidades and indigenous background.

Figure 6.3c. Un-Related Income at Various Time-Points, Early Durables, Early Housing, and Concurrent Durables



Key:
Y_{6m} = income birth-6 months. Y_{12m} = income 12months.
Y_{18m} = income 18months. Y_{24m} = income 24 months. $Y_{current}$ = concurrent income.
P = Physical C = Cognitive M = Motor Co-ordination E = Emotional
↔ Correlation Dc = Concurrent household durables
→ Direct effect Db = Durables around birth Hb = Housing around birth
Controls on child well-being: age, gender, indigenous background, proportion of children in the household, maternal age, maternal education.
Controls on income, durables, and housing: PROGRESA-Oportunidades and indigenous background.

Stage 3: Auto-Regressed Effects of All Time-Points

The third stage takes into account the simultaneous and related effects of household income at various time-points on child well-being. In this kind of analysis, known as auto-regression, income at each time-point is regressed on income in the previous time-point. Auto-regression allows us to examine the effects of income at each time-point, once the whole income history from around the time of the child´s birth to age 4-6 years has been taken into consideration.

Similarly to the previous stages, various versions of the model are compared. Specifically, the analysis involves a model that only includes the effects of income (Figure 6.4); a model that includes income as well as household durables and quality of housing around the time of birth (Figure 6.4b); a model that incorporates concurrent durables (Figure 6.4c); and a model that additionally links concurrent durables with early durables (Figure 6.4d).

Figure 6.4. Child Well-Being on Auto-Regressed Income

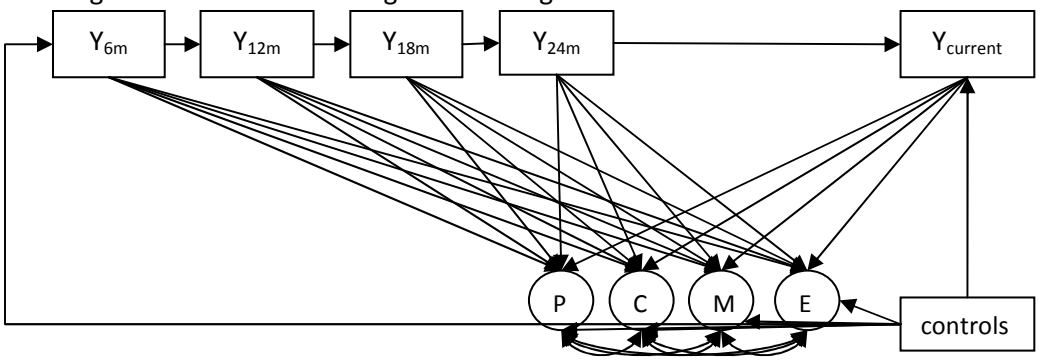
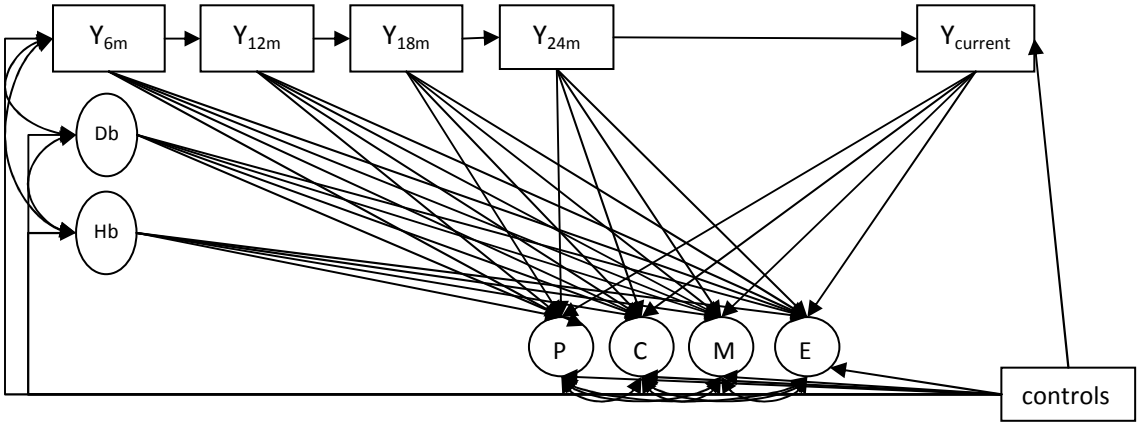


Figure 6.4b. Child Well-Being on Auto-Regressed Income, Early Durables, and Early Housing



Key: Y_{6m} = income birth-6 months. Y_{12m} = income 12months.
Y_{18m} = income 18months. Y_{24m} = income 24 months. $Y_{current}$ = concurrent income.
P = Physical C = Cognitive M = Motor Co-ordination E = Emotional

↔ Correlation
→ Direct effect

Controls on child well-being: age, gender, indigenous, proportion of children in household, maternal age, maternal education.
Controls on income: PROGRESA-Oportunidades and indigenous background.

Figure 6.4c. Child Well-Being on Auto-Regressed Income, Durables Around Birth, Housing Around Birth, and Concurrent Durables

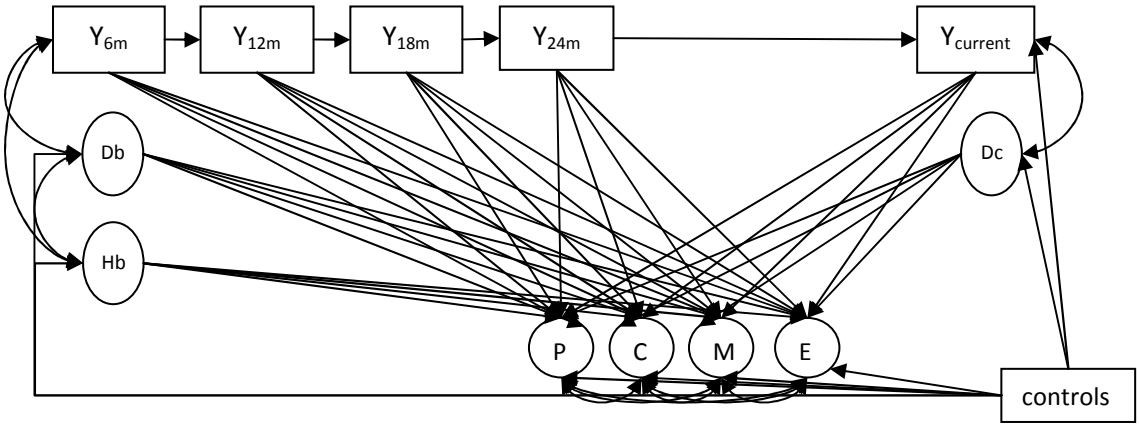
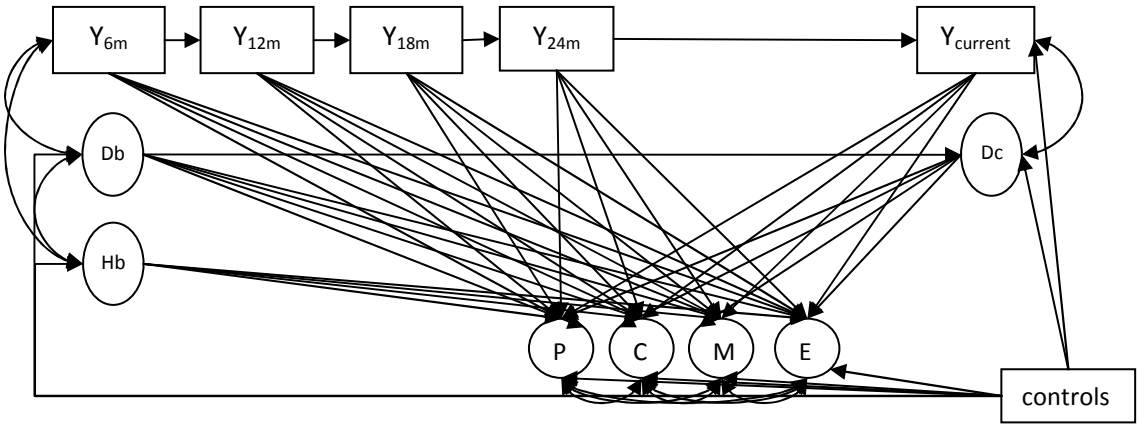


Figure 6.4d. Child Well-Being on Auto-Regressed Income, Durables Around Birth, Housing Around Birth, and Regressed Concurrent Durables



Key: Y_{6m} = income birth-6 months. Y_{12m} = income 12months.
Y_{18m} = income 18months. Y_{24m} = income 24 months. $Y_{current}$ = concurrent income.
P = Physical C = Cognitive M = Motor Co-ordination E = Emotional
Db = Durables around birth Hb = Housing around birth
Dc = Concurrent durables

↔ Correlation
→ Direct effect

Controls on child well-being: age, gender, indigenous, proportion of children in household, maternal age, maternal education.
Controls on income, durables, and housing: PROGRESA-Oportunidades and indigenous background

The progressive construction of models, from Step 1 to Step 3, helps to test whether specific time-points are associated in a statistically significant way with child outcomes at age 4 to 6 years old. Also, the juxtaposition of results helps us to examine whether there is an underlying pattern of household deprivation over time that is associated with the indicators of child well-being. The results of the various versions help us to disentangle the effects of income, household durables, and quality of housing at specific time-points in the child´s life as well as the persistence of these

variables from around the child´s birth to age 4-6 years. The next section provides the results for each type of modelling.

Results

Stage 1: Isolated Effects of Income at Different Points in Time

This section looks at independent effects of household income at different points of the child´s life on indicators of well-being at age 4 to 6 years old. The effects of income poverty at different points in time on children aged 4 to 6 years old are first examined in isolation using income at birth-6 months, 12 months, 18 months, 24 months, and concurrently. The analysis includes a comparison of the sole effect of income at each point in time (Figure 6.2) and the effects of income at each time-point and current income, given that the former is regressed latter to account for income stability over time (Figure 6.2.b). Table 6.2 summarises the statistically significant standardised effects of income on each domain of child well-being. White rows refer to Figure 6.2 and grey rows refer to Figure 6.2.b.

Table 6.2. Individual Effects of Income at Various Time-Points on Child Well-Being

Figure 6.2

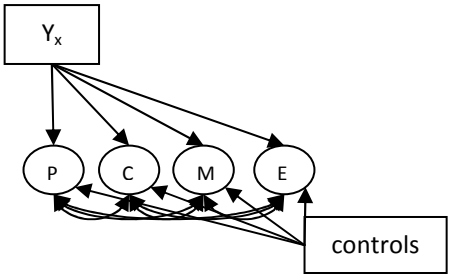
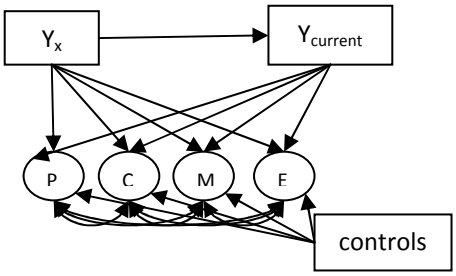


Figure 6.2.b



	Dimension of Well-being			
	Physical	**Cognitive**	**Motor**	**Emotional**
Income birth-6months		.085***		
Income birth-6months Current income	.092**	.082*** .100***	.119***	
Income 12months		.059**		
Income 12months Current income		.089***	.091***	
Income 18months		.108***		
Income 18months Current income	.088**	.098*** .072***	.101***	
Income 24months		.102***		
Income 24months Current income		.089*** .099***	.071*	
Current income	.072*	.104***	.088***	

Tests of model fit for all of these models present good ranges; CFI of .91 or higher; TLI of .93 or higher; RMSEA of .035 or lower.
Number of cases are at least 1,300.
*significant at .10 **significant at .05 ***significant at .01
Only significant are shown. Standardised Coefficients.

When the effects of different time-points on child well-being at age 4 to 6 years old are examined individually[66] (white rows), past household income is only statistically significantly related with cognitive ability at age 4 to 6 years. The coefficients, however, are modest: Income at birth-6 months has an effect of .085 ($p < .01$) on the Standard Deviation (SD) of cognitive ability; income at 12 months has an effect of .059 ($p < .05$) on the SD of cognitive ability; income at 18 months is associated with an effect of .108 ($p < .01$) on the SD of cognitive ability; and household income at 24 months is associated with an effect of .102 ($p < .01$) on the SD of cognitive ability at age 4-6 years. Concurrent household income, nevertheless, is associated with differences in physical health, cognitive ability, and motor co-ordination. The coefficients are also fairly small: current income shows an effect of .072 ($p < .10$) on the SD of the physical health domain; of .104 ($p < .01$) on the SD of the cognitive ability domain; and of .088 ($p < .01$) on the SD of the motor co-ordination domain at age 4-6 years.

Once the sustained household material condition has been taken into consideration by regressing current income on income at a previous time-point (grey rows), the effects of past income on cognitive ability are maintained except in the case of 12 months. Income at birth-6 months is associated with .082 ($p < .01$) of the SD of cognitive ability; income at 18 months is associated with .098 ($p < .01$) of the SD of cognitive ability; and income at 24 months shows an effect of .089 ($p < .01$) on the SD of cognitive ability at age 4-6 years. Similarly, when linked to income at previous time-points, current income appears to be significantly associated with physical health, cognitive ability, and motor co-ordination.

Current income gains significance in understanding what affects child well-being when regressed on income at past time-points. When linked to income at 6 months, current income is associated with .092 ($p < .10$) of the SD of physical health; with .100 ($p < .01$) of the SD of cognitive ability; and with .119 ($p < .01$) of the SD of motor co-ordination. When linked to income at 12 months, current income shows an effect of .089 ($p < .01$) on the SD of cognitive ability and .091 ($p < .01$) on the SD of motor co-ordination. When linked to income at 18 months, current income is associated with .088 ($p < .05$) of the SD of physical health; with .072 ($p < .01$) of the SD of cognitive ability; and with .101 ($p < .01$) of the SD of motor co-ordination. Finally, when linked to income at 24 months, current income is associated with .099 ($p < .01$) of the SD of cognitive ability and with .071 ($p < .10$) of the SD of motor co-ordination.

[66] Apart from the socio-demographic controls on child well-being.

The regression coefficients of current income on income at previous time-points help to elucidate the income dynamics of these households over time. These are summarised in Table 6.3.

Table 6.3. Regression Coefficients of Concurrent Household Income on Income at Previous Time-Points

	Birth to 6months	**12 months**	**18 months**	**24 months**
Regression coefficient	.033	.113	.128	.135
p value	.261	.000	.000	.000
N	1343	1268	1471	1323
	Standardised coefficients			

As expected, the more proximate a time-point is on the current situation, the higher the regression coefficient is. As Baltagi stated, "the further you go back in time, the less is the effect on the current period" (2008, p. 130). This is the case in these models. Income at birth-6 months is not statistically significantly related with current income. The regression of current income on income at 12 months is .113; on income at 18 months is .128; and on income at 24 months is .135 (all significant at .01). The fact that all of these coefficients are relatively low means that current income depends only to a small extent on income in previous years, reflecting income fluctuations over this period of time.

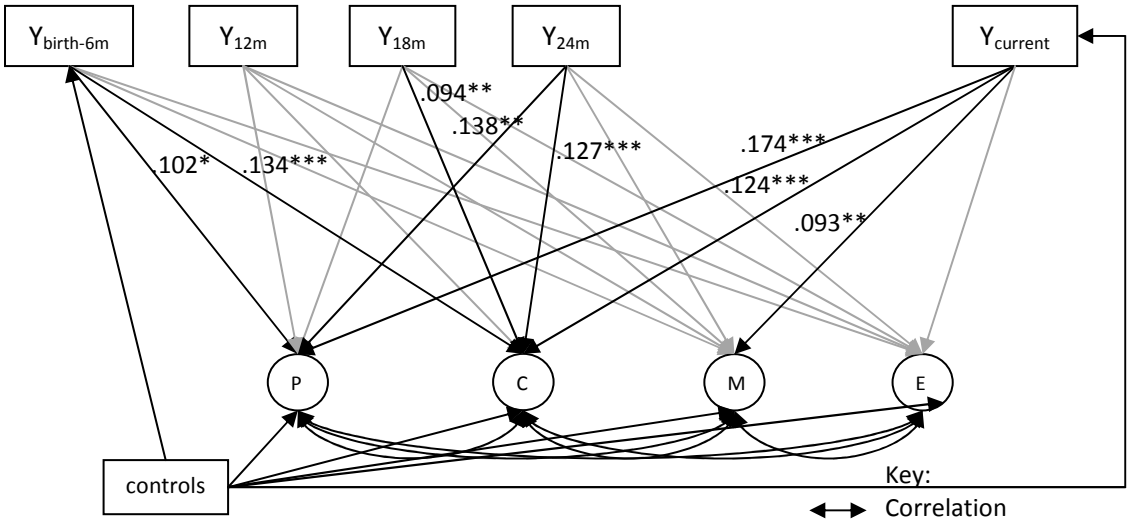
The analysis in this section looked at the independent effects of income at various time-points and of concurrent income on child well-being. The next section looks at the effects of income at each time-point on child well-being simultaneously with income at other time-points.

Stage 2: Un-related Effects of All Time-Points

This section looks at the simultaneous but unrelated effects of household income at various time-points on child well-being (Figure 6.3-R). Also, it examines the simultaneous unrelated effects of household income at various time-points along with the latent variables of durables and quality of housing around the time of birth (Figure 6.3b-R). Finally, the analysis includes a model where current household durables are added into the model (Figure 6.3c-R). A comparison of these models with the results from the previous section will help to evaluate whether the time-points that showed

to be associated with child outcome at age 4-6 years in a statistically significant way hold valid once income at other time-points is taken into account. Figures 6.3-R, 6.3b-R, and 6.3c-R show the standardised coefficients of the time-points that appear to be associated with the indicators of child well-being[67].

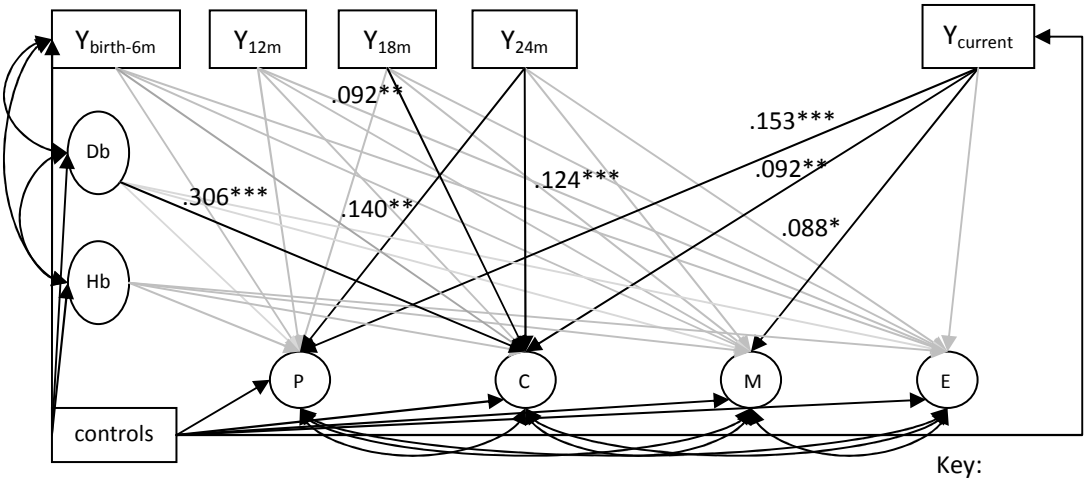
Figure 6.3-R. Results: Child Well-Being on Un-Related Income at Various Time-Points



P = Physical. C = Cognitive
M = Motor Co-ordination. E = Emotional
Only standardised significant effects are shown.
* p < .10
** p < .05
*** p < .01
N = 740 cases
ChiSq = 599.377 (df = 230); CFI =.863; TLI = .865; RMSEA = .047
Controls on child well-being: child age, gender, indigenous background, proportion of children in the household, maternal age, maternal education.
Controls on income: PROGRESA-Oportunidades and indigenous background.

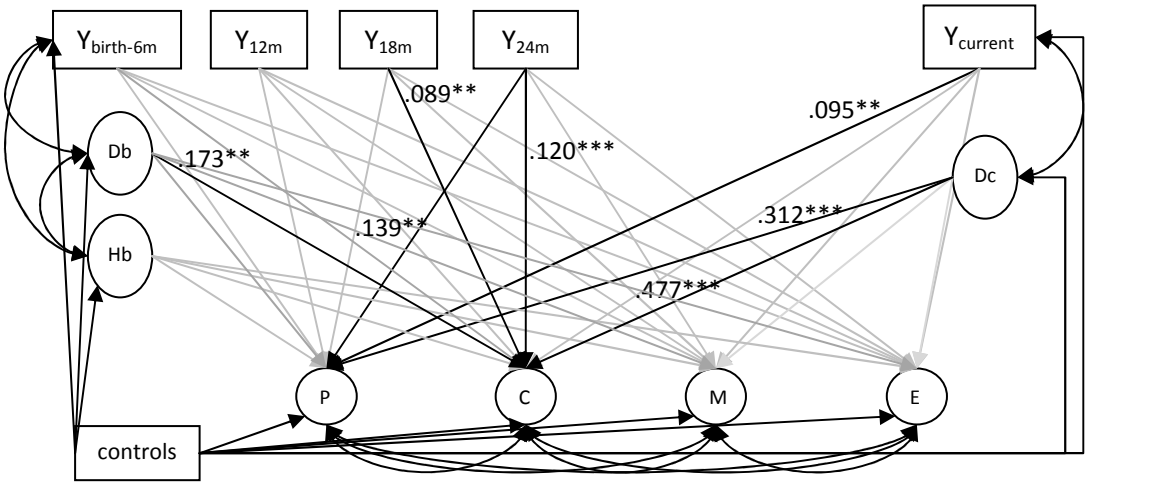
[67] Coefficients of controls and correlations between income, durables, and housing are provided later in this chapter.

Figure 6.3b-R. Results: Child Well-Being on Un-Related Income at Various Time-Points, Durables Around Birth, and Housing Around Birth



P = Physical. C = Cognitive
M = Motor Co-ordination. E = Emotional
Only standardised significant effects are shown.
** p < .05 Db = Durables around birth
*** p < .01 Hb = Housing around birth
N =740 cases
ChiSq = 607.167 (df = 2768); CFI =.866; TLI = .866; RMSEA = .041
Controls on child well-being: child age, gender, indigenous background, proportion of children in the household, maternal age, maternal education.
Controls on income: PROGRESA-Oportunidades and indigenous background.

Figure 6.3c-R. Results: Child Well-Being on Un-Related Income at Various Time-Points, Durables Around Birth, Housing Around Birth, and Concurrent Durables



P = Physical. C = Cognitive
M = Motor Co-ordination. E = Emotional
Only standardised significant effects are shown.
** p < .05 D = Durables
*** p < .01 H = Housing
N = 740 cases
ChiSq = 669.197 (df = 330); CFI =.889; TLI = .899; RMSEA = .037
Controls on child well-being: child age, gender, indigenous background, proportion of children in the household, maternal age, maternal education.
Controls on income: PROGRESA-Oportunidades and indigenous background.

Results from these three models show that, generally, household income at 18 months and at 24 months of age is significantly associated with cognitive outcomes at age 4-6 years. Also, income around the time of birth and concurrent income are associated with cognitive ability, before the variables of durables and housing are added into the model. According to Model 6.3-R, household income at 6 months is associated with around .13 SD of cognitive ability; household income at 18 months is associated with .094 of the SD of cognitive ability; and household income at age 24 months is associated with .127 of the SD of cognitive ability at age 4 to 6 years old. Also, income at 6 months is associated with .102 of the SD physical health and income at 24 months of age is associated with .138 of the SD of physical health at age 4-6 years. Finally, concurrent income is associated with .174 of the SD of physical health; with .124 of the SD of cognitive ability; and with .093 of the SD of motor co-ordination.

When household durables and quality of housing are incorporated into the model (Figures 6.3b-R and 6.3c-R), the significant effects of household income at 6 months and of concurrent income are generally "absorbed" by the latent variable of household durables. In Figure 6.3b-R, income at 6 months is no longer significantly associated with physical health nor with cognitive ability. However, early household durables are associated with cognitive ability, bearing a coefficient of .306 ($p < .01$). In Figure 6.3c-R, early durables is associated with cognitive ability (.173, $p < .05$); and concurrent durables is associated with physical health (.312, $p < .01$) and with cognitive ability (.477, $p < .01$). In this last model, concurrent household income remains significantly associated with physical health at age 4-6 years (.095, p. < .05).

It is important to note that the coefficients of durables are considerably higher than the coefficients of household income. This, along with the fact that durables take up the effects of income, suggest that durables could be a more solid indicator of material circumstances than income.

Stage 3: Auto-Regressed Effects of All Time-Points

This section looks at the simultaneous and auto-regressed effects of income at all available time-points on the indicators of child well-being at age 4-6 years. The direct effects of income at each time-point on well-being are understood as simultaneous regressions of the domains of well-being on household income at each point in time, given that household income at each time-point is regressed on household income at the previous time-point. This type of modelling takes into consideration the dependent nature of poverty over time and therefore looks at timing of poverty as well as the cumulative nature of poverty over the period included. Figures 6.4-R, 6.4b-R, 6.4c-R, and 6.4d-R show results for various versions of the MIMIC models that evaluate the effects of household income at various time-points, durables and housing around the time of birth, and concurrent durables on child well-being. Table 6.4 shows tests of model fit for the four versions. All of them show CFI and TLI of almost or around .90, and RMSEA of .036 or lower.

Table 6.4. Tests of Model fit for MIMIC Models that Look at the Effects of Auto-Regressive Household Material Circumstances on Children

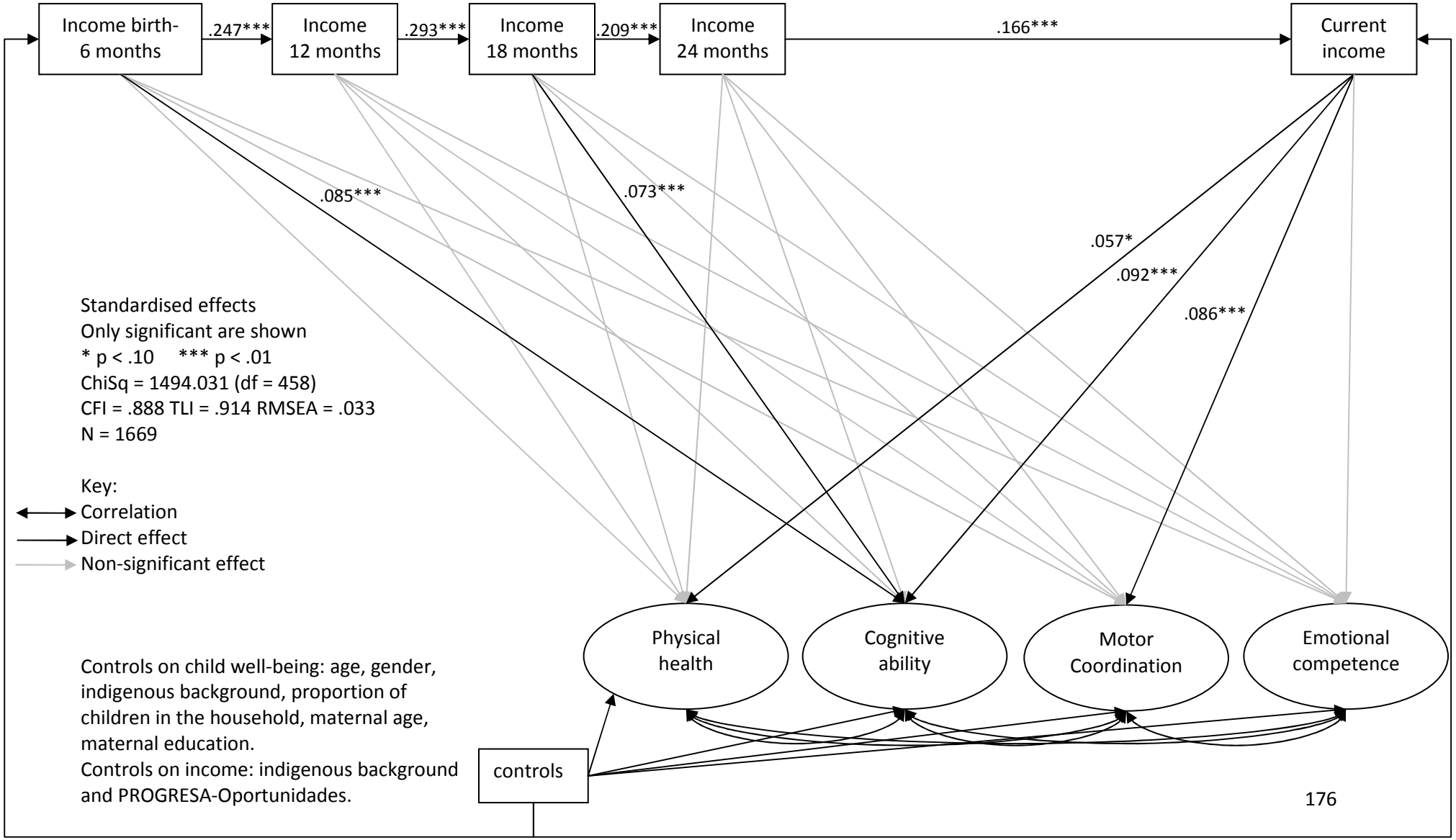
Model	**N**	**Chi-Square (degrees of freedom)**	**CFI**	**TLI**	**RMSEA**
Figure 6.4-R. Only Income	1669	1494.031 (458)	.888	.914	.033
Figure 6.4b-R. Adding Early Durables and Early Housing	1669	1492.097 (535)	.897	.913	.033
Figure 6.4c-R. Adding Early Durables, Early Housing, and Concurrent Durables	1669	1808.785 (581)	.872	.891	.036
Figure 6.4d-R. Adding Early Durables, Early Housing, and Concurrent Durables regressed on Early Durables	1669	1726.455 (594)	.882	.899	.034

All figures are around the threshold for robustness and all of the models present similar fit statistics. Therefore, it is not possible to evaluate which one is best based solely on these tests. Hence, it is necessary to look closer at the effects of each component on child well-being. The effects of income, durables, and housing on child well-being are first described and visually presented. The diagrams below show the standardised coefficients that were statistically significant; un-standardised coefficients and standard errors are provided in Annex 4. After describing the results of each model, evidence is compared across models.

Only Income

Results on Figure 6.4-R (below) show that household income around birth to 6 months and at 18 months are associated with cognitive ability at age 4 to 6 years in a statistically significant way. Also, concurrent household income is associated with indicators of physical health, cognitive ability, and motor co-ordination. The coefficients of all time-points that are significant are relatively the same. With regard to income in the past, household income around 6 months is associated with .085 ($p < .01$) of the SD of cognitive ability at age 4-6 years and household income at 18 months is associated with .073 ($p < .01$) of the same domain of well-being. With regard to concurrent income, it bears a coefficient of .057 ($p < .10$) on the SD of physical health; of .092 ($p < .01$) on the SD of cognitive ability; and of .086 ($p < .01$) on the SD of the motor co-ordination domain at age 4-6 years.

Figure 6.4-R. Results: Effects of Auto-regressed Income at Various Time-Points on Children



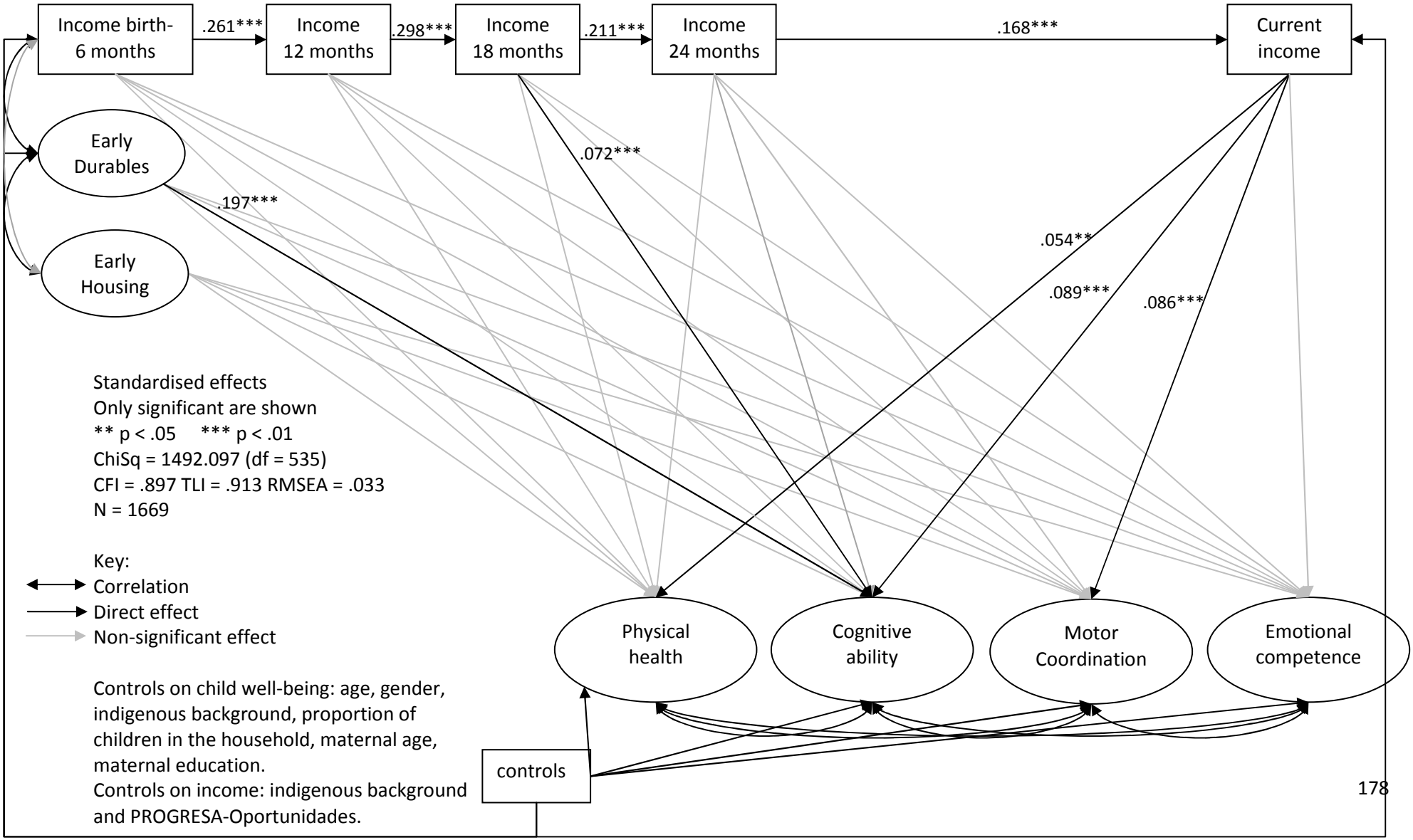
Income, Early Durables, and Early Housing

Results for the model that includes income at various time-points along with durables and housing around the child´s birth are presented in Figure 6.4b-R (below). Coefficients reveal that household income at 6 months is no longer significantly related to child outcomes at age 4-6 years.

The association between household income at 18 months and cognitive ability remains significant, accounting for .072 (significant at .01) of this domain of well-being. In this model, concurrent household income remains significantly associated with physical health (.051, $p < .10$), cognitive ability (.089, $p < .01$), and motor co-ordination (.086, $p < .01$).

The main difference between this model and the previous one is that household income at 6 months is no longer associated with cognitive ability. Nevertheless, the effect of this time-point has been replaced by the latent variable of household durables. Household durables around the time of the child´s birth are associated with cognitive ability at age 4-6 years (.197, significant at .01). This indicates that the level of material circumstances of this sample was stable between these two time-points.

Figure 6.4b-R. Results: Child Well-Being on Auto-Regressed Income, Durables Around Birth, and Housing Around Birth

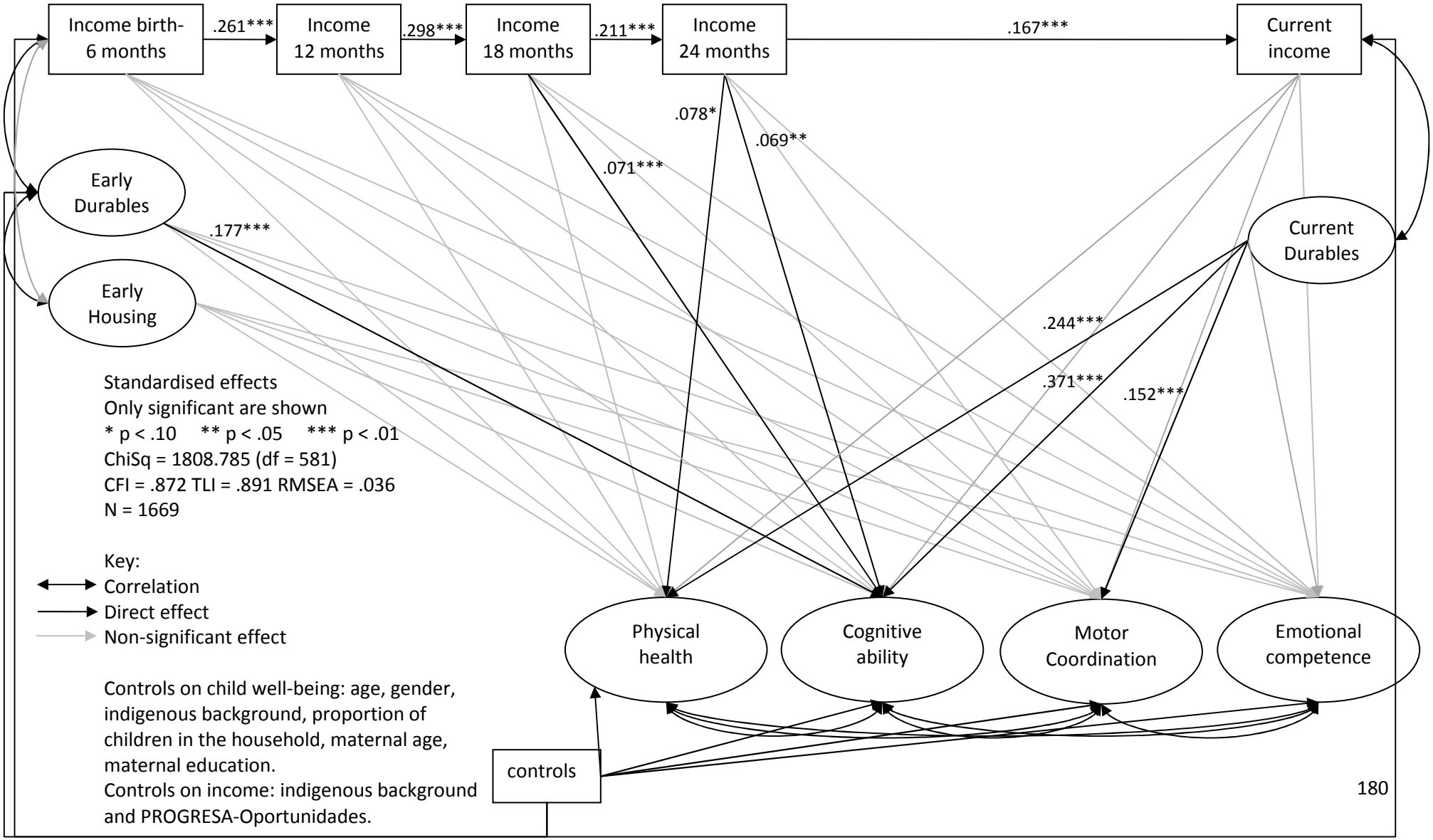


Income, Early Durables, Early Housing, and Concurrent Durables

Figure 6.4c-R (below) shows the results when concurrent durables are added into the model. Household income at 18 months of age and at 24 months of age is significantly associated with cognitive ability at age 4-6 years (.071, $p < .01$ and .069, $p < .05$, respectively). Also, income at 24 months of age becomes significantly associated with physical health, although with low statistical significance (.071, $p < .10$).

The latent variable of early durables remains associated in a statistical significant way with cognitive ability at age 4-6 years (.177, $p < .05$). However, the latent variable of concurrent durable "absorbs" the effects of concurrent income. Concurrent durables are associated with physical health by .244, with cognitive ability by .377, and with motor co-ordination by .152 (all significant at .01).

Figure 6.4c-R. Results: Child Well-Being on Auto-Regressed Income, Durables Around Birth, Housing Around Birth, and Concurrent Durables



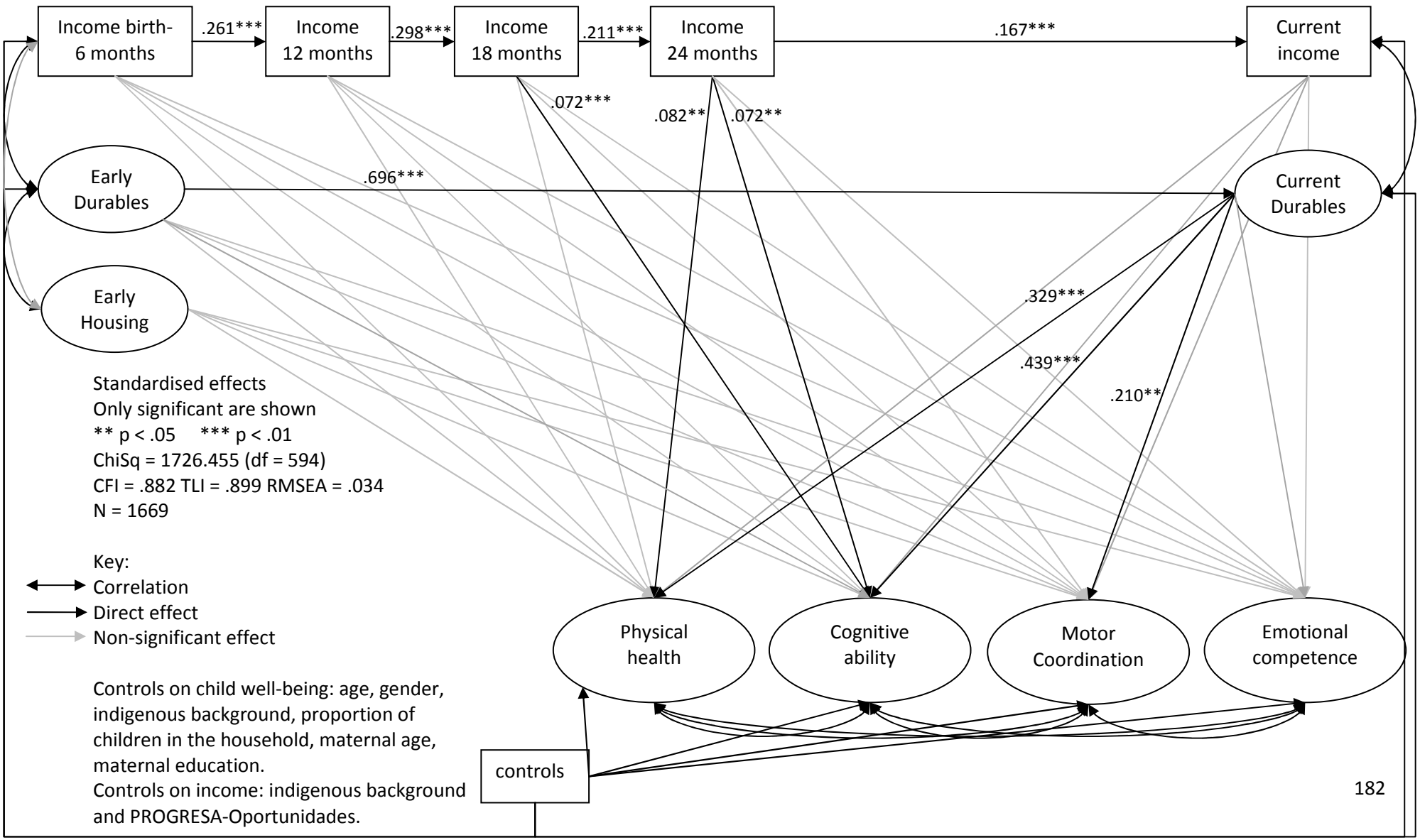
Income, Early Durables, Early Housing, and Concurrent Durables Regressed on Early Durables

The last model incorporates a regression coefficient between the latent variable of early durables and the latent variable of concurrent durables. This association is aimed at exploring the lagged effect of concurrent durables between the child´s birth and age 4-6 years.

Results (Figure 6.4d-R, below) illustrate that income at 18 months of age and at 24 months of age remain significantly associated with physical health and cognitive ability at age 4-6 years. Specifically, household income at 18 months of age is associated with cognitive ability by .072 ($p < .05$). Household income at 24 months of age is associated with physical health by .082 ($p < .05$) and with cognitive ability by .072 ($p < .05$).

Concurrent durables also remains significantly associated with the dimensions of physical health (.329, $p < .01$), cognitive ability (.439, $p < .01$), and motor co-ordination (.210, $p < .05$). Nevertheless, the latent variable of early durables is no longer associated in a statistical significant way with cognitive ability. This coefficient is absorbed by the regression of concurrent durables on early durables, which bears a coefficient of .696 ($p < .01$). The relatively high association between early and concurrent durables suggests that the level of material circumstances of these households remained to some extent similar in these two time-points.

Figure 6.4d-R. Results: Child Well-Being on Auto-Regressed Income, Durables Around Birth, Housing Around Birth, and Regressed Concurrent Durables



The models in this section account for the cumulative (dependent) nature of poverty over time by regressing income on itself. A crucial element in understanding poverty dynamics in this sample is the high correlation between past and present. A study conducted by Garza-Rodríguez *et al* (2010) shows that most of poverty in Mexico is chronic. Similarly, the correlation in income between time-points in this sample suggests that these children were living in chronic poverty. With regard to the regression of income at one point in time on income at the previous point, the coefficients are very stable and are of a medium size: in all cases, the coefficient between income at one point and income at the previous time-point is around .20 ($p < .01$). The coefficient that shows the relationship between current household durables and household durables at the moment when the child was born is even higher (.696 standard), which reflects that the material conditions of households in this sample were relatively constant during the period included in the model. This suggests that while income fluctuates from one point in time to the next, the latent variable of durables is relatively stable over the period of time from around the child´s birth to age 4-6 years.

The importance of the long-term poverty experience in trying to understand child outcomes, against a single-point in time measurement, is something that other studies have found (Ackerman *et al*, 1999; Blau, 1999). Bearing in mind that this sample is comprised only of households living in poor and extremely poor conditions, differences in child outcomes are perhaps related not so much to when poverty happens but to persistence of poverty. "Risk experiences are not randomly distributed in a population, and being born into a relatively disadvantaged family increases the probability of accumulating risks associated with that disadvantage, setting a child onto a risk trajectory (...) Cumulative adversity has effects beyond those associated with current or early adversity" (Schoon *et al*, 2002, pp. 1497-98). The next section reflects on the findings that emerge from all models.

Evidence across Models

This section links the results of all models with the theoretical background presented earlier in this chapter. First, findings related to the hypotheses are presented. Then, other findings that are parallel to the hypothesis are offered.

Findings Related to the Hypotheses

Important issues emerge from the consistent evidence across models with regard to the association between income at certain time-points, the overall poverty experience of households, and child outcomes. The hypothesis explored in this chapter states:

- Early poverty is more detrimental for children than later poverty.

Findings across models indicate a complex scenario. In order to have comparable coefficients, the only way to evaluate the strength of timing of poverty is to compare the effects of the same variable at various time-points. When household material circumstances are measured solely by income at various time-points (Figure 6.4-R), concurrent income is associated with differences in more areas of child well-being than income at past time-points. While concurrent income has significant effects on physical health, cognitive ability, and motor co-ordination, income in past time-points is only associated with cognitive ability. This provides evidence against this hypothesis given that concurrent income has a broader impact on children (more dimensions of well-being) than income at past time-points.

A comparison of the values of the coefficients of concurrent income with those of income in past time-points, however, shows support in favour of the aforementioned hypothesis. This is manifested in the association between income and cognitive ability. In the model that only includes income (Figure 6.4-R), the coefficients of concurrent income on cognitive ability are as large as the coefficients of income around birth and at age 18 months (.092 vs .085 and .073). Therefore, if one only takes into account the association between household income and cognitive ability, it is not possible to state that early poverty has stronger effects on children than concurrent poverty. However, it is neither possible to argue that concurrent poverty has stronger effects on children than early poverty.

Another way to explore the importance of the past relatively to the present is to compare the coefficients of household durables on the dimensions of child well-being. In the model that includes early durables, early housing, and concurrent durables without regressing it (Figure 6.4c-R), concurrent durables is associated with more dimensions of well-being than early durables. This is a similar case to the model discussed above. That is, while concurrent durables is associated with physical health, cognitive ability, and motor co-ordination; early durables is only associated with cognitive ability. However, the coefficient of concurrent durables on cognitive ability is more than double and with higher statistical significance than the coefficient of early durables (.371, $p < .01$ vs

.177, $p < .05$). This provides some support against the hypothesis that earlier poverty has stronger effects on children than later poverty, particularly in the dimension of cognitive ability.

It is important to note that concurrent durables are associated with physical health, cognitive ability, and motor co-ordination in a stronger way than income at any time-point. However, it would be inappropriate to compare the coefficients of current durables with the coefficients of income in the past: Differences in their coefficients are due to their explanatory power and not related to timing *per se*. Therefore, the fact that the coefficients of durables are considerably larger than the coefficients of income suggests that these latent variables are stronger pointers of household material circumstances than income alone. In any case, the significant effects of income and durables on children reveal the importance of household material circumstances in exploring child outcomes.

These findings complement previous research conducted elsewhere. Burchinal *et al* concluded "concurrent exposure was a significant predictor of math skills and a nonsignificant predictor of reading skills, whereas exposure to risk in early childhood was a stronger nonsignificant predictor of teacher ratings of children´s adjustment" (2008, p. 26). School *et al* (2002) concluded that risk at early childhood were associated with academic achievement in late childhood by -.19 in one sample and by -.07 in another sample but that concurrent risk was associated with academic achievement in late childhood in a stronger way: -.38 for the former and -.45 for the latter. Nonetheless, findings on whether earlier or later poverty is more important should be read in a more sophisticated light, as results here suggest that poverty suffered at different moments in life is associated with different developmental processes. It seems that cognitive ability is the most malleable dimension of well-being as it is affected by material circumstances (measured through income) at various time-points.

The time-point that consistently appears to be significantly associated with cognitive ability at age 4-6 years is 18 months. The coefficients of income at 18 months on cognitive ability remain virtually the same across models, which are small (around .07) but statistically significant. Income at 24 months becomes significant when concurrent durables are added into the model. If one considers that the inclusion of concurrent durables provides a closer approximation to the material circumstances of children throughout their lives than the models that do not include concurrent durables, the significance of 24 months is important. Eighteen months and twenty-four months are important in child development given that these moments are crucial in language acquisition. A

possible scenario is the following: If household income is related to broader access to resources such as books, media, or the capacity to meet the financial needs of social interaction around 18-24 months of age, the child would have a larger variety of vocabulary. It is not possible to test with this database whether these activities took place. However, the association between household income at 18 and 24 months of age (when crucial processes of cognitive development take place) and indicators of vocabulary and memory abilities at age 4-6 years raises issues for us to ponder.

With regard to the material circumstances of the household around the time of birth, they are significantly associated with cognitive ability in most of the times. The exception is in the model that includes a regression of concurrent durables on early durables (Figure 6.4d-R). As mentioned before in this thesis, the first six months of life are significantly related to cognitive outcome at pre-school age. Consistently with the findings of the previous chapter, household material conditions around birth are important given the processes related to brain development during this period (Illig, 1998; Woodhead, 2006). The importance of the early moments in understanding later cognitive outcomes is consistent to what Guo found: "childhood appears to be a much more crucial period for the development of cognitive ability than early adolescence" (1998, p. 257). Guo´s point is not possible to be evaluated in this study given that the dataset does not follow the sample up to the teenage years[68]. However, results so far indicate that household material circumstances at various time-points are associated with well-being indicators at pre-school age.

Results across the models highlight an important issue: depth of poverty matters for child well-being. Given that the sample is comprised only by households living in poor and extremely poor conditions, the effects of income variations on children are more important than they would seem at first sight.

Other Findings

There are consistent results with regard to the correlations between income, early durables, and early housing. In the three models that include early durables and early housing, household income around the time of birth is associated with durables, with a correlation of around .21 ($p < .01$). However, household income around the time of birth is never associated in a statistical significant way with early housing. Also, the variable of early durables is associated with the variable of early

[68] At least not at the moment of writing this thesis. Children in this sample are just entering adolescence; it would be interesting to conduct a follow-up study.

housing, with a regression coefficient of around .46 ($p < .01$). Table 6.5 provides the correlations between these variables for each model.

Table 6.5. Correlations between Income Around Birth, Early Durables, and Early Housing

	Correlation Coefficient		
Model	**Income around birth and Early Durables**	**Income around birth and Early Housing**	**Early Durables and Early Housing**
Figure 6.4b-R	$.209^{***}$	$.056^{NS}$	$.459^{***}$
Figure 6.4c-R	$.211^{***}$	$.057^{NS}$	$.466^{***}$
Figure 6.4d-R	$.240^{***}$	$.059^{NS}$	$.478^{***}$
Standardised coefficients.	*** significant at .01	NS = Not significant	N = 1669

Also, the correlation between concurrent income and concurrent durables is similar in the both models that include concurrent durables (Figure 6.4c-R and Figure 6.4d-R). In both cases, the correlation between these two variables is of around .26 ($p < .01$).

There are also consistent results with regard to the effects of the controls on income, durables, and housing. In all case, PROGRESA-Oportunidades and indigenous background are negatively correlated with income, durables, and housing around the time of birth. However, PROGRESA-Oportunidades is not associated in a statistical significant way with concurrent income or with concurrent durables. Table 6.6 concentrates the effects of the two controls on these variables.

Table 6.6. Effects of PROGRESA-Oportunidades and Indigenous Background on Household Income, Durables, and Housing

Model	**Variable**	**PROGRESA-Oportunidades**	**Indigenous background**
Figure 6.4-R	Early income	-.145***	-.221***
	Current income		
Figure 6.4b-R	Early income	-.134***	-.223***
	Current income		
	Early durables	-.318***	-.379***
	Early housing	-.355***	-.372***
Figure 6.4c-R	Early income	-.128***	-.223***
	Current income		
	Early durables	-.280***	-.383***
	Early housing	-.359***	-.372***
	Current durables	-.203***	-.372***
Figure 6.4d-R	Early income	-.134***	-.225***
	Current income		
	Early durables	-.280***	-.462***
	Early housing	-.357***	-.373***
	Current durables		
	Standardised coefficients. Only significant are shown.		
	***p < .01	N = 1669	

The coefficients of the controls on the indicators of household material circumstances are consistent across models. Households who took part in PROGRESA-Oportunidades had around -.13 of a SD lower income around the time of birth, around -.30 of a SD of durables around the time of birth, and almost -.40 SD lower level of durables in 2003 (all $p < .01$). Also, households that received PROGRESA-Oportunidades had around -.36 lower SD of quality of housing ($p < .01$). As expected, given the rules of operation of the programme, households who received the cash transfer were poorer than those who did not receive the cash benefit. However, receiving the cash transfer was not associated in a statistical significant way with the level of income that a household had in 2003[69]. These results confirm that the programme was correctly allocated to households that had worse living standards (lower durables and worse housing) but that it did not influence the household´s sources of income over time. This is similar to what Skoufias and Di Maro (2008) found: that PROGRESA-Oportunidades did not have effects on labour market participation. In other words, during the period 1997-2003, the level of income that this sample had apart from PROGRESA-Oportunidades was independent from receiving the cash transfer. Ethnicity is significantly associated with household income, durables, and quality of housing around the time of the child´s birth. Average household income of indigenous households was around -.2 of a SD ($p < .01$) below non-indigenous households. Also, their level of durables and their quality of housing were around .40 SD ($p < .01$) below those of non-indigenous households.

Finally, another issue emerges from the results of these models: the effects of the socio-demographic controls on the indicators of child well-being are consistent. In fact, some of the coefficients are larger than the coefficients derived from household income, household durables, or quality of housing. Table 6.7 summarises the statistically significant standardised effects of each control variable on the four domains of child well-being at age 4-6 years[70].

Table 6.7. Effects of Socio-Demographic Controls on Child Well-being

Control	Physical Health	Cognitive Ability	Motor Co-ordination	Emotional Competence
Age			0.350***	
Gender				
Indigenous background	-0.161***	-0.174***	-0.127***	
Proportion of children in the household	-0.118**	-0.134***	-0.100***	
Maternal education	0.194***	0.284***	0.073*	
Maternal age	0.140**	0.113***		0.083**
Standardised coefficients. Only significant are shown. * p < .10 ** p < .05 ***p < .01 N = 1669				

[69] This refers to income before receiving PROGRESA-Oportunidades.
[70] These are the coefficients of the model depicted in Figure 6.4-R. Effects on the other models are virtually the same.

The effects of age and gender show that this sample is not delayed according to the norms for their gender and group. Gender is not related in a statistically significant way with any of the domains of child well-being. This means that there is no variation between boys and girls in these indicators of well-being at age 4-6 years. Age has a significant effect of .350 on motor co-ordination; however the medium-size effect is related to the fact that the McCarthy tests used for measuring this domain are not age-normed[71].

With regard to ethnicity, children who come from an indigenous background are -.161 SDs lower in the physical health domain, -.174 SDs lower in the cognitive ability dimension, and -.127 SDs lower motor co-ordination than non-indigenous children (all significant at .01). Indigenous families in Latin America have consistently been identified as the ones with the worst living standards. As stated by other authors, "child-hood poverty, particularly long-term poverty, is more common for minority children, thereby reinforcing racial inequalities across generations" (Corcoran and Chaudry, 1997, p. 41).

With regard to household composition, children living in families with a larger proportion of children reveal worse outcomes. Living in larger families is associated with -.118 SDs lower physical health; with -.134 SDs lower cognitive ability; and with -.100 motor co-ordination skills (all significant at .01). Maternal characteristics are also important: maternal age and maternal education are associated with differences in children at 4-6 years of age. Each year of maternal education would be associated with a gain .194 SDs of physical health, .284 SDs of the cognitive ability, and .073 of motor co-ordination (all significant at .01). For each year of maternal age, children have .140 SDs better physical health ($p < .01$), .113 SDs better cognitive ability ($p < .01$), and .083 ($p < .10$) better emotional competence at pre-school age.

The effects of the controls, both on the material circumstances of the sample and on the four dimensions of child well-being, illustrate dynamics that affect children at pre-school age. Particularly, the effects coming from ethnicity, household composition, and maternal age and education level signal to non-material elements that play a role in child outcomes. This evidence supports the theoretical standing that emphasises the importance of parenting and socio-demographic characteristics over material circumstances (Bowles and Gintis, 2002; Chen, 2004; Lee *et al*, 2009; Mayer, 1997a; McLloyd, 1998) in trying to understand child development. Nevertheless,

[71] As explained in Chapter 4.

the structural conditions that surround these households are relatively similar as the sample comes from relatively equal background. In addition, variations beyond household income been controlled for. Hence, the significant effects coming from differences in the material circumstances at the household level, measured by income and/or durables and housing, gain importance in understanding some of the elements that shape child well-being.

Conclusions

The timing of poverty has been hypothesised to interrupt the developmental processes that take place during early childhood. This chapter has explored whether household poverty around the child´s birth and at age 12, 18, and 24 months are associated with some dimensions of child well-being at age 4-6 years. The analysis derived from various versions of a MIMIC model allowed an examination of how household income at time-points are associated with indicators of physical health, cognitive ability, motor co-ordination, and emotional competence.

Consistently with the evidence from the previous chapter, results in this chapter show that depth of poverty is associated with indicators of child well-being at pre-school age. Even though this sample is comprised by households living in poor and extremely poor communities, differences in their material circumstances are associated with child outcomes. The effects of depth of poverty are evident when household income is used as an indicator but particularly visible when the latent variables of quality of housing and household durables are taken into account. It is important, however, to note that the socio-demographic controls are stronger predictors of child well-being than the indicators of material well-being. Particularly, the significant association between maternal education and ethnicity with the indicators of well-being suggests that children face structural limitations in their development. In Mexico, as in other Latin American countries, indigenous children are more likely to be stunted and to have deficiencies in vocabulary derived from exclusion from the educative and health systems (Hall and Patrinos, 2004).

With regard to the timing of poverty, certain time-points consistently appear to be associated in a statistically significant way with child well-being at 4-6 years of age. Even though the strongest coefficients come from the current situation, household income around birth up to 6 months and at 18 months of age is statistically associated with cognitive ability at age 4-6 years. Furthermore, when the persistence in the level of household durables from birth to age 4-6 years is accounted for,

income at 24 months of age is also significantly associated with indicators of physical health and cognitive ability. These results provide important evidence with regard to how deprivation may interrupt certain cognitive processes that take place at these ages, especially related to vocabulary acquisition.

Finally, another issue is related to the overall poverty experience of children over the period of time studied. The high correlation between past and present household material circumstances raises issues related to what Aber *et al* stated: "beyond persistence of poverty, researchers should also consider more closely income changes among consistently poor families. (...) It is important for researchers to separate out the effects of economic deprivation *per se* from the role of a fluctuating economic climate in creating a stressful household environment" (1997, p. 476). Therefore, it is necessary to evaluate whether these moments are important by themselves or if they reflect a general household poverty trend. The next chapter explores this issue by looking at the association between the general income trajectory of the household and the indicators of child well-being at age 4-6 years.

CHAPTER 7

Growing Together: Overall Household Income Trajectories and Child Well-being

Introduction

The previous chapter started to elucidate the association between a longitudinal perspective of poverty and indicators of child well-being. The analysis looked at whether household income at various time-points is associated with child outcomes at 4-6 years of age. By regressing income and other variables of household material circumstances on themselves at previous time-points, Chapter 6 provided some hints about the significance of a longitudinal approach in examining the association between household poverty and child outcomes. Results suggest that specific moments in the child´s life are significantly associated with outcomes at age 4-6 years, but also that the overall experience of household income matters as well. This chapter continues this line of enquiry; it examines the relationship between overall household income trajectories and indicators of well-being at pre-school age.

During the last two decades, important advances have been achieved in understanding poverty dynamics (Bane and Ellwood, 1986; Baulch and Hoddinott, 2000; Clark and Hulme, 2005). Subsequently, questions have emerged related to how different longitudinal poverty experiences may be related to child outcomes. For instance, the interest in assessing whether longitudinal household income trajectories are associated with child developmental outcomes has been voiced by several scholars (Brooks-Gunn, 1997; Lewit, Terman, and Behrman, 1997; Schoon *et al*, 2002; Wagmiller *et al,* 2006), who have argued that different poverty experiences over time influence children differently. One line of research has looked at the extent to which rate and directionality of income changes are associated with physiological, cognitive, and emotional outcomes. Nevertheless, many issues in the relationship between longitudinal household income and indicators of child well-being remain unexplained. As Strohschein argues, "although it is widely accepted that low household income is associated with worse child mental health, less is known about whether income histories, often differentiated into stable and dynamic components, also matter" (2005, p. 359). Similarly, Lewit, Terman, and Behrman state: "another shortcoming of the way that poverty is

measured is that current measures fail to capture important differences in children's experiences of poverty over their lifetimes" (1997, p. 7).

Longitudinal measurements could be considered to be a closer approximation to reality than assessments at a single point in time as they account for duration as well as for fluctuations of poverty over time. Furthermore, a longitudinal perspective on household poverty seems especially important in childhood studies given the dynamic and plastic nature of child development. As mentioned before, the first five years in life are particularly flexible (Berk, 2007; Schonkoff and Philipps, 2000) because children undergo drastic physical, cognitive, and emotional changes. Therefore, it is possible to hypothesise that different longitudinal poverty experiences influence the developmental processes that take place at various moments in a child´s life.

Even though the need for including a longitudinal perspective of poverty in the examination of child development has been identified by various scholars, "establishing the nature of the relationship between household income and child health" or other dimensions of well-being "using longitudinal data has proved challenging" (Strohschein, 2005, p. 359). During the last decade, scholarly work has witnessed important efforts to include long-term poverty experiences in trying to understand the elements that drive child outcomes through various ways. One group of authors have looked at the longitudinal aspect of poverty by including average household income over a period of time. For example, the studies of Blau (1999) and of Korenman, Miller and Sjaastad (1995) used the NLSY and measured long-term poverty as average household income over a 13-year period of time. Both pieces of research found that long-term income is a stronger predictor of physical, cognitive, dexterity, and emotional outcomes at age 2-9 years and 3-7 years, respectively, than the effect of income in a single point in time.

Another group of authors have categorised poverty experiences according to duration of low-income spells. For example, Wagmiller *et al* (2006) used the PSID and developed Finite Mixture Models to identify classes of children with similar poverty experiences. The four groups identified (long-term poor, moving out of poverty, moving into poverty, and non-poor) were used to understand high school graduation and employment status at age 25 years. Their analysis showed that while those living in long-term poverty attain the least education and possess the lowest employment rates, the never-poor show the highest school completion rate and the largest proportion in full-time employment. With regard to the other groups, moving out of poverty was associated with higher likelihood of graduating than those staying in poverty for a long time.

However, those moving into poverty in late childhood experienced the same odds of graduating as those who were never poor. Also, there were no differences between moving out of poverty, moving into poverty, or never being poor in explaining employment rates in early adulthood. The conclusion of this study sheds some light on understanding how different poverty experiences over a child´s life are associated with later outcomes: "rather, the effect of economic deprivation seems to be contingent on whether deprivation is persistent, whether it is experienced early or later in childhood, and whether family economic circumstances are improving or deteriorating over time" (Wagmiller *et al*, 2006, p. 848).

The studies reviewed above provide insights about the importance of looking at the effects of long-term poverty on children. However, average income and categories of poverty fail to express intensity and directionality of change over time (Dearing, McCartney, and Taylor, 2001). With the aim of exploring whether these two issues are associated with child outcomes, another group of scholars have included the time-dimension of poverty by looking at income trajectories. Strohschein (2005) develops Growth Models to assess the extent to which household income at a certain point in time is associated with indicators of child mental health and the extent to which income improvements over time are beneficial for children. This study concludes that household income during early childhood is linked to higher levels of child depression and anti-social behaviour and that income improvements over time account for significant reductions in child mental health problems. Similarly, Dearing McCartney, and Taylor (2001) construct growth models to explore how changes over time in household income-to-needs explain indicators of well-being at ages 15 and 36 months. The analysis in this piece shows that initial income-to-needs status was positively associated with school readiness and receptive language. With regard to changes over time, the authors conclude that improvements in household income-to-needs were associated with better indicators of child well-being and that household economic deterioration was related to worse child outcomes.

The path for understanding the ways in which poverty trajectories are associated with indicators of child well-being is solid, but nevertheless short. Moreover, it is concentrated in certain contexts, particularly the USA. This chapter aims to contribute to the topic by exploring whether different longitudinal poverty experiences are associated with indicators of well-being at age 4-6 years in a sample of children living in poor and extremely poor communities in rural Mexico. Specifically, the questions that this chapter addresses are: Are improving household incomes associated with better indicators of child well-being and are declining household incomes associated

with worse child outcomes? What is the relative importance of changes in household material circumstances over time in comparison to the poverty level in which a child was born for the indicators of child well-being? These issues are explored through the following hypotheses:

- H1: The level of poverty in which the child was born is associated with child well-being at pre-school age regardless of income trajectory over time.
- H2: Declining household income is associated with worse indicators of well-being and improving household income is associated with better outcomes.
- H3: Subsequent improvements in household income counteract the negative effects of declining household income on children.

In sum, the analysis in this chapter takes into consideration the effect of household material circumstances around the time of birth (starting point) as well as subsequent changes of household income in relation to indicators of child well-being at age 4-6 years. The first section introduces the contextual setting in which the examination is embedded. The second part describes the theoretical foundation of the model that sustains the analysis. The third section examines the results and develops a discussion around them. The last section offers the conclusions.

Overview of the Sample

The longitudinal poverty experience of this sample is best understood by establishing a contextual framework for the analysis. This section reviews the historical setting of the country at the time and offers a depiction of the overall material circumstances of the sample over the period 1997-2003.

Contextual Background

During Carlos Salinas´ presidency (1988-1994), important macro-economic changes that pointed towards a neo-liberal regime were implemented. Primarily, the country experienced the privatisation of banks and the initiation of the North American Free Trade Agreement with the United States and Canada. However, while these changes and sustained economic growth enabled Mexico to be included in the Organisation for Economic Co-operation and Development, political turmoil shadowed the performance of the country. In 1994, there were the assassinations of the ruling party´s candidate for the 1994 Presidential elections during a campaign event and of the party´s Secretary General a few months later. In addition, there was an uprising of the Zapatista

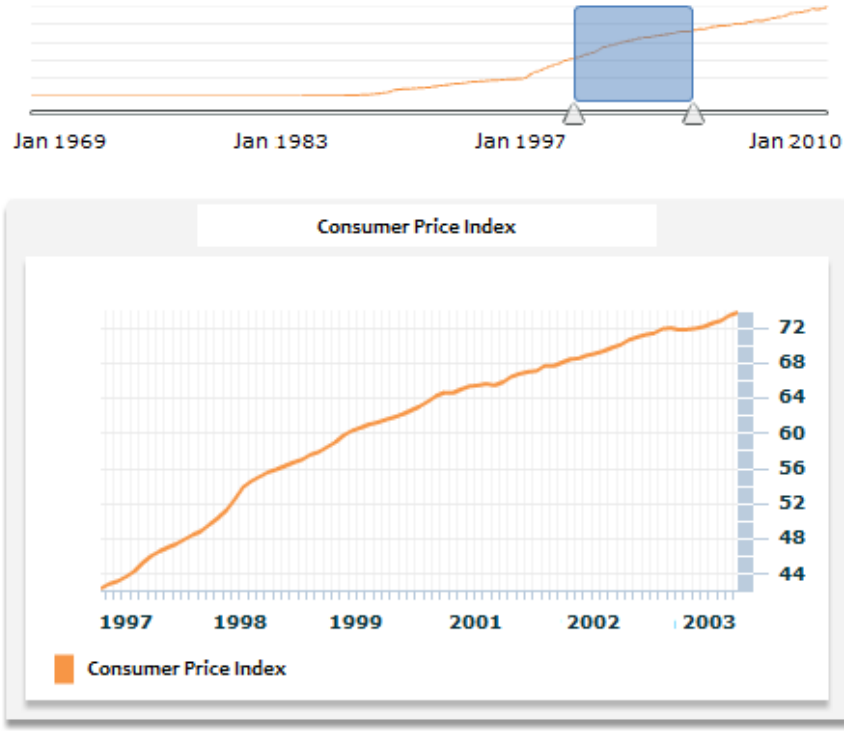
movement in southern Mexico. As a result of the social and political turbulence, many of those who had invested in governmental bonds withdrew their money, resulting in low levels of federal reserves. The situation became unsustainable given that the Mexican peso had been pegged to the US dollar and governmental bonds had also been indexed to that currency, when in reality the peso was over-valuated (Sachs, Tornell, and Velasco, 1996). Shortly after taking power in December 1994, President Ernesto Zedillo announced that the Mexican peso would float against the US dollar and called for devaluation. DeLong, DeLong, and Robinson provide a rich summary of what happened next:

> In December 1994, after a year of political assassinations, a not-very-clean presidential election, and an armed guerrilla movement that appeared in Chiapas in January, (...) Mexico ran to the edge of its foreign exchange reserves and announced the devaluation of the peso. But the peso fell by far more than the twenty percent that Dornbusch and Werner[72] and others had forecast was necessary to restore equilibrium. The peso fell not by twenty but by fifty percent. Economists and observers had been expecting to see a small devaluation that would diminish many of Mexico's economic problems. But what took place was a large devaluation that turned into an economic crisis (1996, no page number).

The years that followed the financial crisis had substantial impacts on the Mexican economy: "the pre-1994 aggregate output levels were not again reached until 1999" (Fields *et al*, 2007, p. 3). Also, the crisis represented a drastic problem for the Mexican society, which was reflected in a sharp increase in poverty levels. According to Cortés and Hernández-Laos (2003), the proportion of the Mexican population that did not have sufficient income for acquiring a basic nutritional basket rose from around 16% in 1994 to 29% in 1996. Households were also affected by inflation rates, which increased around 8.4% per annum between 1992 and 1994 and peaked after the crisis, increasing to around 35% per annum between 1994 and 1996.

[72] Some of the leading economists that the Mexican government consulted in order to define the country´s monetary policy.

Graph 7.1. Evolution of the Consumer Price Index in Mexico



Adapted from http://www.banxico.org.mx/graph/test/?s=SP1,CP154,1&period=Men&l=es

The negative effects of the crisis started to fade especially during the last couple of years of the 1990s. The country started to see a reduction in poverty levels, of around 7%, between 1996 and 1998. Then, there was a particularly evident decrease in the poverty levels between 1998 and 2000, of around 20% (Cortés *et al*, 2003; Székely and Rascón, 2005; World Bank, 2005). Also, inflation rates started to stabilise after 1997, which went from almost 18% in 1997 to 14% in 1999. After 2000, inflation dropped to a lower level, falling from 9% in 2000 to 5.4% in 2001 and to less than 4% of inflation in 2003 (Banxico, 2011).

The consequences of the 1995-1996 crisis are of particular importance in the analysis given that children in this sample were born during this period and lived in households that were affected by harsh macro-economic conditions. The next section examines the specific experience of the sample.

Income Experience of the Sample

The general income trend experienced by households in this sample is consistent with the macro-economic performance of the country. Mean OECD-equivalised weekly income in this sample went from 81.23 Mexican Pesos in 1997 to its lowest point, 56.58 Mexican Pesos, in March 1999. Then, it showed a stable increase up to 94.86 in September 2003[73]. Descriptive statistics for income expressed in both Mexican Pesos and logarithmic figures for the waves available in the panel are provided in Table 7.1.

Table 7.1. Mean, Maximum, and Minimum Household Income of the Sample; 1997-2003

OECD-equivalised household weekly income in 1997 prices, excluding top and bottom 1% of the sample		**1997-October**	**1998-October**	**1999-March**	**1999-November**	**2000-March**	**2000-November**	**2003-September**
Mexican Pesos	**Maximum**	525.00	406.82	246.95	373.95	383.51	498.62	547.53
	Mean	81.23	61.48	56.48	68.28	72.55	70.60	94.86
	Minimum	2.88	2.01	1.67	5.00	5.36	4.02	4.69
Logarithm	**Maximum**	6.26	6.01	5.51	5.92	5.95	6.21	6.31
	Mean	4.09	3.81	3.71	4.00	4.07	4.01	4.26
	Minimum	1.06	0.70	0.52	1.61	1.68	1.39	1.54
	Number of cases	1779	1663	1463	1670	1688	1635	1782
	Own calculations using Consumer Price Index for each time-point, available at Bank of Mexico´s website: www.banxico.org.mx							

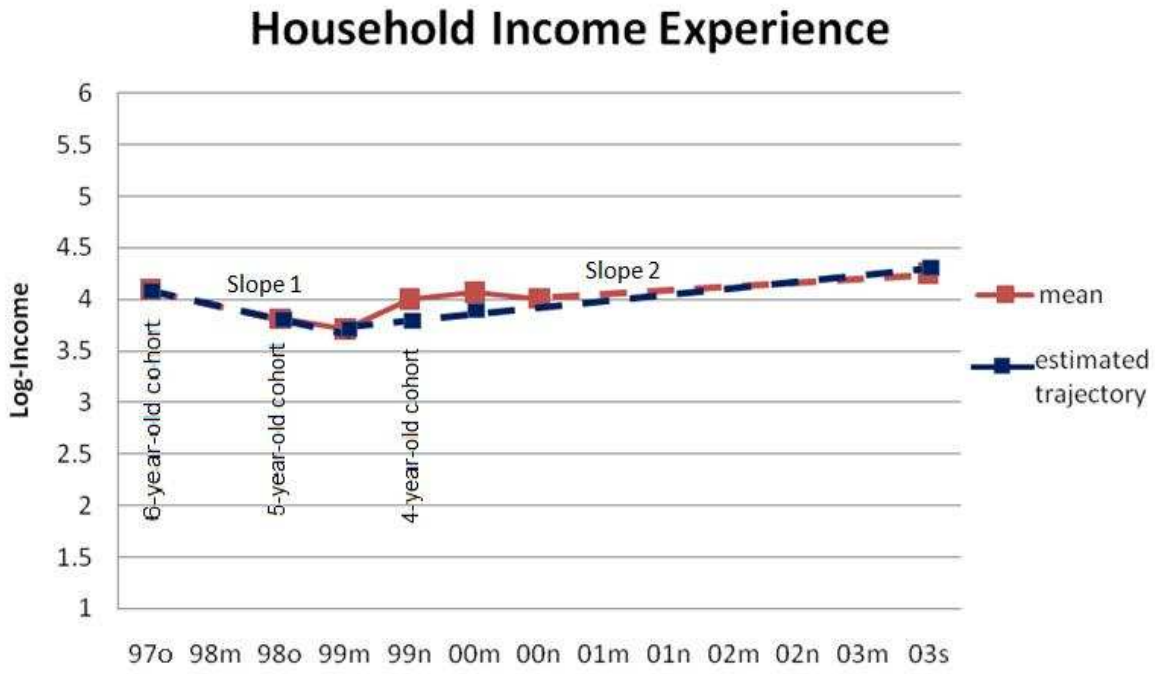
As the table above shows, aggregate figures for income in these households show that there was a slight decline after 1997 and a slow but steady recovery after the second half of 1999. Also, even though household income increases in real terms (1997 base) after the second half of 1999, it is not until 2003 when households reached the same level that they had in 1997. The pattern of this sample is consistent with what the World Bank calculated for rural Mexico: "rural wages, which fell with the 1995 crisis, had on average just recovered in 2003" (World Bank, 2005, p. 28).

The period included in this chapter shows particular characteristics as it corresponds to the immediate period after the profound crisis of 1995. Importantly, general trends differ for each cohort of children in this sample as they were born at different points throughout the post-crisis period. The overall income pattern for those who were aged 6 years (September 1996 – August 1997 cohort) when the indicators of well-being were assessed is of a declining income during their first 18 months of life followed by recovery. Average income trend for those aged 5 years (October 1997 – September 1998 cohort) in 2003 is of a slight decline during their first 6 months of life

[73] Figures are provided in 1997 prices using inflation rates for each period obtained from the Bank of Mexico.

followed by improvement. Finally, general household income trajectory for children with 4 years of age (October 1998 – November 1999 cohort) is an improving trend. Graph 7.2 shows the sample´s mean income experience from 1997 to 2003 (in 1997 prices), including both observed (solid lines) and estimated (dashed lines) values. Also, starting points for each cohort are indicated in the graph: 1997 for the 6-year-olds; 1998 for the 5-year-olds; and 1999 for the 4-year-olds.

Graph 7.2. Household Mean Income Trajectory of the Sample, 1997-2003



Source: own elaboration

A descriptive perspective of the income trajectories of the sample casts some light on the poverty experience of the children in this sample. This information serves as background for defining the theoretical model for the analysis, which is presented next.

The Theoretical Model

As described in the Introduction of this thesis, there are various theoretical standings that help to understand child development and the ways in which poverty affects children. In this chapter, however, the focus lies on postulations derived from the Human Capital Investment (HCI) theory. Under the HCI framework (Becker, 1981), the quantity and quality of resources available in the household are, to great extent, explanatory of child development. Hence, child outcomes are the result of investments in health, education, motivation, social status, and other factors. "These

expenditures are determined not only by the abilities of children but also by the incomes, preferences, and fertility of parents as well as the public expenditures on education and other human capital of children" (Becker and Tomes, 1986, pp. S5-S6).

Under the HCI perspective, parental investments in children could take various material forms, such as nutrition, healthcare, books, or access to cultural and educative events. Also, investments on children could be in non-material forms "including skills and abilities, personality, appearance, reputation, and appropriate credentials" (Becker and Tomes, 1986, p. S6). The ENCASEH/ENCEL does not allow us to examine specific ways in which household resources were invested on children. However, empirical evidence elsewhere (Dearing, McCartney, and Taylor, 2001; Strohschein, 2005; Wagmiller *et al*, 2006) has found that improvements in the material surroundings of the child are associated with better indicators of well-being. Conversely, deterioration in household material circumstances has been found to be associated with negative consequences for children. Following the assumptions from the HCI theory, increases in household resources would facilitate larger investments in children and consequently better outcomes. Conversely, decreases in household income would hinder investments in children.

A key assumption of the models in this chapter is that low income undermines the capacity of households to provide nutrition, education, healthcare, and other investments in children. As argued elsewhere (Bennett, 2008; Brooks-Gunn and Duncan, 1997; Lewit, Terman, and Behrman, 1997), income is not sufficient but is necessary for providing goods and services that are beneficial for children.

Building on existing literature and under the assumption that income reflects to some extent the resources available for children, the overall level of household material circumstances in this chapter is measured through income. The models measure the extent overall trajectories of household income over time are associated with child outcomes at pre-school age.

Household income is the indicator that best grasps the material aspect of poverty experience of children[74] in a longitudinal way for two reasons. Firstly, the sample was drawn at the community level according to an index that includes indicators related to quality of housing, access to public

[74] Some authors favour a multi-dimensional perspective for understanding poverty over income (see for example Alkire and Foster, 2007; Boltvinik, 1999). However, income is still widely used as a proxy for poverty, especially in longitudinal examinations (See Literature Review Chapter). An evaluation whether income is the best approach for measuring poverty is indeed an interesting debate but beyond the scope of this thesis. Recommended readings on this topic are: Alcock (1993), Lister (2004), Piachaud (1987), and Ruggeri, Saith, and Stewart (2003).

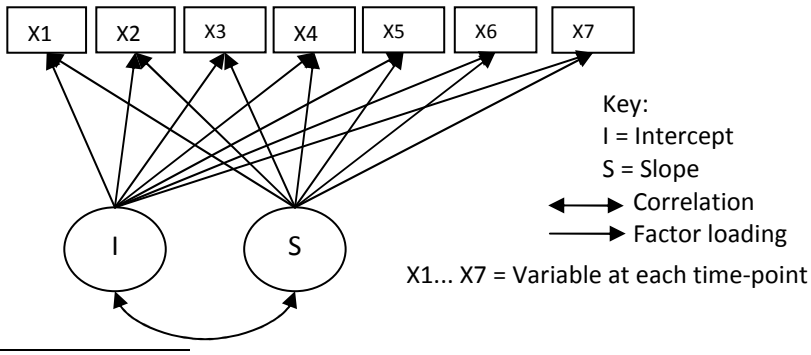
services, education levels, and occupation. Therefore, all of the households in the sample share relatively similar characteristics of their material circumstances. Given that the analysis looks at the effects of individual poverty trajectories on children, it is necessary to utilise a variable that maximises particular differences, such as household income. Similarly, other authors have preferred to use "continuous measures of household income and income change, thereby relaxing the assumption that it is the divide between poor and nonpoor and only large income drops that affect (children)" (Strohschein, 2005, p. 362). Secondly, household income is the indicator with the largest variation not only across the sample but also along the panel. Among the indicators contained in the questionnaire that addressed material characteristics, household income is both intuitively and empirically[75] the one that shows most changes from one panel wave to another. Consistent with previous chapters, the models use a variable for household income that was first equivalised using the OECD scale and then transformed into logarithm to normalise the distribution.

In order to explore whether different poverty experiences over time are associated with indicators of child well-being at age 4-6 years, the analysis is conducted in two stages. The first stage is to examine the longitudinal experience of household income over the period 1997-2003. The second stage is to evaluate whether these experiences are associated with indicators of child well-being in 2003. These stages are detailed next.

Stage 1: Capturing Longitudinal Household Income

The overall household income experience from 1997 to 2003 is explored through Growth Models (GMs). GMs examine the development of a variable over time by using measurements of an indicator at various points in time to calculate its starting point (intercept; I in the diagram) and its rate of change (slope; S in the diagram). The intercept and the slope are latent variables that mark a trajectory that is common for a population. A generic GM is visually represented as Figure 7.1.

Figure 7.1. Generic Growth Model

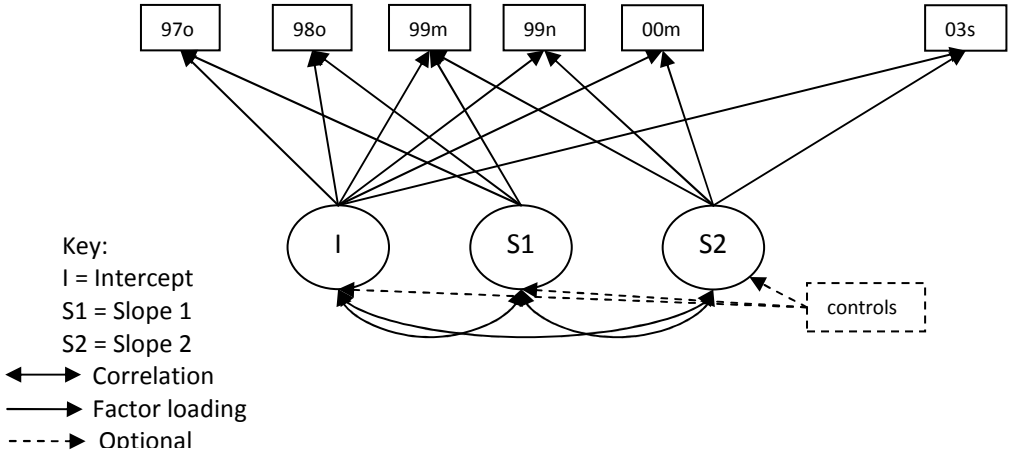


[75] Income is the indicator of household material circumstances that tends to have the largest variation over time. Please refer to Annex 1, Descriptive Statistics.

GMs have numerous advantages for assessing the longitudinal trajectory of an indicator over time. One, they allow the inclusion of equidistant and non-equidistant time-points. In other words, instead of treating the lack of information in certain time-points as missing data, the growth curve is estimated according to the available time points. Two, the growth curve could be estimated to follow a linear, quadratic, or any other equation that is assumed or empirically demonstrated to best fit the data. Three, GMs allow the examination of the effects of indicators that do not change over time on indicators that do. Finally, GMs possess all of the other advantages of SEM: the capacity to use multiple indicators, to include of both observed and latent variables, and to account for correlations between errors.

The Growth Models developed in this chapter take into account the context in which this sample rests on the overall tendency derived from the effects of the 1995-1996 crisis. Known as piece-wise modelling, the longitudinal experience of household income is modelled through two slopes that mark key time-points in this sample: one that measures the overall decline from 1997 to mid-1999 and another one that measures the generally observed recovery until 2003[76]. This is visualised in Figure 7.2.

Figure 7.2. Piece-wise Growth Curve Model for Household Income



97o= 1997 October; 98o = 1998 October; 99m = 1999 March; 99n = 1999 November; 00m = 2000 March; 03s = 2003 September

Controls: ethnicity and Oportunidades recipiency.

[76] Mean household income in this sample in the recovery period is not entirely linear as it goes up from March 1999 to March 2000, then slightly down until November2000, and then up again until 2003. However, the change downwards in November 2000 is almost negligible and could be ignored because the general trend until 2003 is upwards. Other possibilities for modelling household income over time were tested: logarithmic, quadratic, and cubic. Results are not provided here but are available upon request from the author. The combination of two linear slopes not only shows the best fit statistics but is also supported by the contextual explanation of the crisis.

Once the trajectory of household income is modelled, it is linked with the indicators of child well-being. This is detailed next.

Stage 2: Effects of Longitudinal Income Experiences on Children

The second stage of the analysis evaluates whether different household income trajectories are associated with differences in child well-being at age 4-6 years. This is conducted by associating the indicators of child well-being and the Growth Models of household income. That is, each of the four latent variables that comprise the measurement model of child well-being (physical health, cognitive ability, motor co-ordination, and emotional competence) are regressed on intercepts and slopes of the Growth Models of household income.

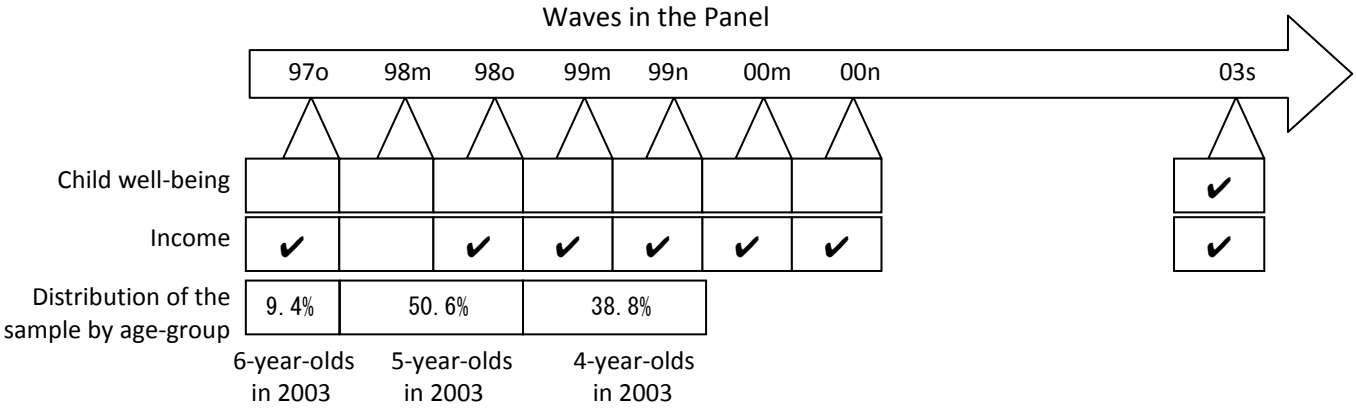
The analysis of the GMs is based on two critical points. On the one hand, it is embedded in the historical context between 1997 and 2003. Given that Growth Models are founded on the mean structure of an indicator, the poverty experience of the sample is understood within the overall pattern of household income during this period. On the other hand, the investigation relies on one of the key assumptions developed throughout this thesis: that the early years are crucial for later indicators of child well-being. Consequently, the context in which this sample is nested is of vital importance. The period in which this sample lies was one of major socio-economic changes and therefore the poverty experience of children in this sample differs according to when they were born. While some children were born just after the crisis hit the country, others were born by the start of the recovery period. Therefore, the examination is conducted by cohorts to take into account these contextual differences.

A note of caution with regard to the sample needs to be mentioned. As Figure 7.3 shows, data available for each cohort is different. Given the design of the panel[77], around 10% of the children in the sample were born around the first wave of the panel (October 1997); around 50% were born between then and the third wave (October 1998); and around 39% were born in the fourth and fifth waves (by November 1999). The panel contains income information from 1997 to 2000 and for 2003. Therefore, longitudinal information about household income depends on when children were

[77] The well-being tests were administered in 2003 to children aged 2 to 6 years. Therefore, the panel contains indicators of well-being of those who just turned 6 years. Those aged 2 and 3 years in 2003 could not be included in this study because the survey was not administered in 2001 and 2002, and therefore these age-groups contain no socio-economic information over their lives. A detailed explanation about the data is presented in the Methodology chapter.

born; the older they were when the indicators of well-being were assessed the more income time-points available. However, the truncation in the panel means that: (a) sample size for the oldest cohort is considerably smaller (178 cases) than for the 5 and 4 year-olds (947 and 745, respectively); and (b) data points for the 4-year-olds are scarcer than for the other two groups.

Figure 7.3. Income Data Available in the Panel



Key: 97o = October 1997; 98m = March 1998; 98o = October 1998; 99m = March 1999; 99n = November 1999; 00m = March 2000; 00n = November 2000; 03s = September 2003
✔ data available

An analysis by cohort adjusts the data available for household income in the ENCASEH-ENCEL to the child´s life-experience. These models look at the household income trajectory from around the time the child was born until he or she reached 4-6 years of age. For all cohorts, the models examine whether the indicators of well-being are associated with the level of household income around the time the child was born (captured by the intercept). The effects of changes in household income are captured by the slopes. For the 6-year-old cohort, the models examine the extent to which overall declining slope from October 1997 to mid-1999 and the general recovery slope after mid-1999 are associated with indicators of well-being in September 2003 (Figure 7.4). For the 5-year-olds, the models look at the effects of the declining slope from 1998 to mid-1999 and the recovery slope from that point onwards on indicators of well-being in 2003 (Figure 7.5). For the 4-year-old cohort, indicators of well-being are examined through a sole slope, from mid-1999 to 2003, which reflects their life-time experience (Figure 7.6).

Figure 7.4. Modelling the Effects of Income Life-Long Experience on Children; 6-year-old Cohort

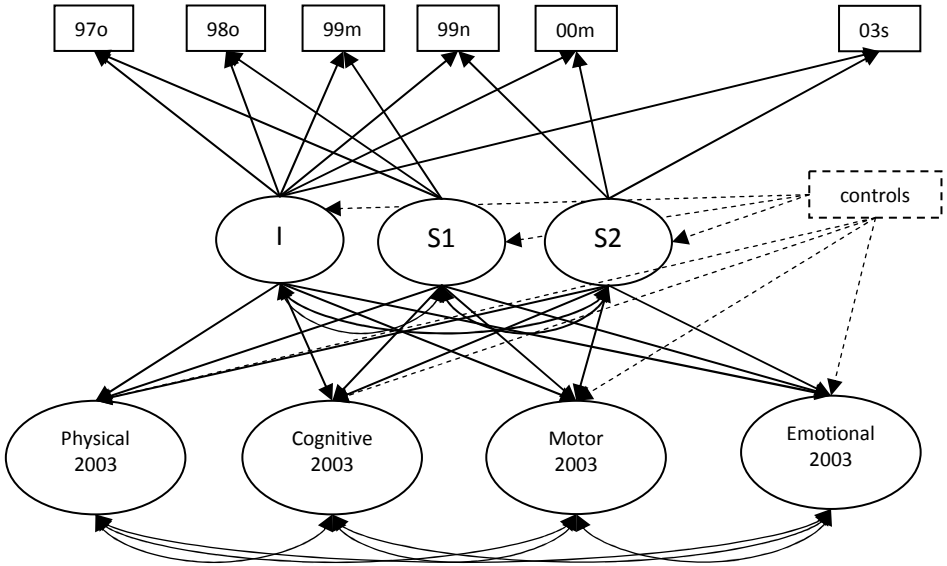


Figure 7.5. Modelling the Effects of Income Life-Long Experience on Children; 5-year-old Cohort

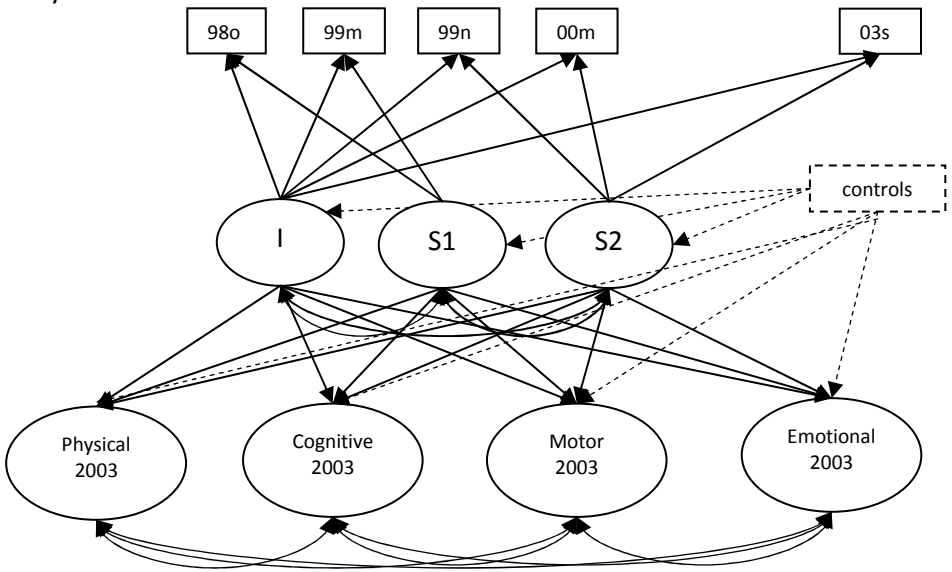
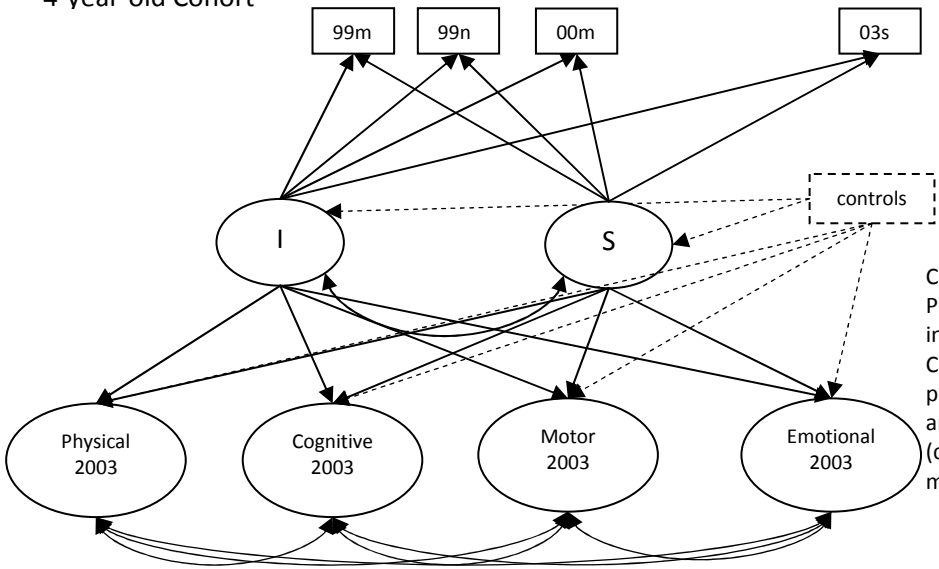


Figure 7.6. Modelling the Effects of Income Life-Long Experience on Children; 4-year-old Cohort



Key:

Correlation

Path effect / Factor loading

Regression coefficients of controls

97o = 1997 October; 98o = 1998 October;
99m = 1999 March; 99n = 1999 November;
00m = 2000 March; 03s = 2003 September

Controls on intercepts and slopes:
PROGRESA- Oportunidades recipiency and indigenous background.
Controls on child well-being: child gender, proportion of children in the household, and maternal age and level of education. (child age is not included because separate models are run for each cohort)

The models include the same set of socio-demographic controls that have been used previously in the thesis: The measurement model of child well-being is controlled for child gender, indigenous background, proportion of children in the household, maternal age and maternal level of education. However, child age is no longer included as a control given that the models are run separately for each cohort. Furthermore, the intercepts and the slopes are controlled for participation in PROGRESA-Oportunidades and indigenous background. These variables have been found to be associated with important differences in the material circumstances of households, both previously in this thesis and elsewhere. For example, Burchinal *et al* (2000), Dearing, McCartney, and Taylor (2001), Hill and Upchurch (1995), and McDonough, Sacker, and Wiggins (2005) have used similar sets of controls to look at household income´s starting point and rate of change.

The analysis compares unconditional and conditional versions of the models. In other words, it compares models without and with the controls, to evaluate the extent to which the latter influence the overall household income trajectories. This helps to take into consideration possible interactions between socio-demographic characteristics and longitudinal experience of household income[78]. The next section provides the results.

Results

This section presents the empirical results of the association between household overall income trajectories and indicators of child well-being at age 4-6 years. First, the household income experience between 1997 and 2003 is presented. Then, an examination of the relationship between overall household income trajectories and indicators of child well-being is provided.

Stage 1: Capturing Longitudinal Household Income

As mentioned before, the Growth Model of household income was estimated to be a combination of two linear trajectories: a declining one from 1997 to mid-1999 and an improving one from mid-1999 to 2003. Two versions of the model were examined to scrutinise possible influences of socio-demographic characteristics on the intercept and the slopes. Table 7.2 compares the model without controls (un-conditional model) with the model where the intercept and the slopes are controlled for participation in PROGRESA-Oportunidades and indigenous background (conditional model). The table includes tests of model fit for the Growth Models of household income for the entire sample; means for intercept and slopes; and effects of controls on the intercept and slopes.

[78] Correlations between these and other socio-demographic controls are provided in Annex 3.

Table7.2. Results for Piece-wise Modelling of Household Income Trajectory 1997-2003; Entire Sample

	A. Linear + Linear (Base Model) without controls	**B. Linear + Linear + Controls (Conditional)** Controls on Intercept and Slopes: participation in PROGRESA-Oportunidades and indigenous background.
Number of cases	1869	1870
Chi Square (df)	13.521 (13)	65.263 (19)
CFI	.999	.952
TLI	.999	.933
RMSEA	.005	.036
	Coefficients (Significance Level)	
Mean Intercept	4.083 (.000)	4.466 (.000)
Mean Slope 1	-.250 (.000)	-.302 (.000)
Mean Slope 2	.597 (.000)	.565 (.000)
Correlation Intercept with Slope 1	N/C	N/C
Variance Intercept	.161 (.000)	.123 (.000)
Variance Slope 1	.000+	.000+
Variance Slope 2	.104 (.000)	.095 (.000)
Correlation Intercept with Slope 2	-.611 (.000)	-.691 (.000)
Correlation Slope 1 with Slope 2	N/A	N/A
Effects of controls on Intercept		PROGRESA-Oportunidades = -.362 (.000) Indigenous background = -.320 (.000)
Effects of controls on Slope 1		PROGRESA-Oportunidades = 1.00 (.000) Indigenous background = -.029 (.960)
Effects of controls on Slope 2		PROGRESA-Oportunidades = .111 (.240) Indigenous background = -.105(.259)

Means for intercept and slopes are un-standardised values. Correlations between intercept and slope 2 are standardised values. Effects of controls on the intercept and slopes are standardised regression coefficients. + Variance fixed at 0 for Slope 1; this is common practice in piece-wise modelling (Muthén and Muthén, 2007, 2011). N/C = Not Computed because the variance of the Slope 1 was fixed as 0 and therefore correlations with the intercept and Slope 2 cannot be computed.

Tests of model fit show that both models are robust, although the base model shows a better fit as usually occurs when models do not have controls. While the base model shows a CFI of .999, a TLI of .999, and a RMSEA of .005, the model with controls shows a CFI of .952, a TLI of .933, and a RMSEA of .036. Importantly, the mean structure of the intercept and the slopes do not present large differences between the conditional and the base models. Mean intercept is 4.1 for the base model 4.5 for the model with controls and; mean for Slope 1 is -.25 for the base model and -.30 for the model with controls; and mean for Slope 2 is almost .60 for the base model and .57 for the model with controls. Furthermore, the variances of the intercept and the slopes are significantly different from zero ($p < .01$), which means that there is variation in the household income trajectories within the sample.

An examination of the effects of the controls on the intercepts and the slopes provides a clearer picture of the overall income trajectories of these households. With regard to the controls, receiving PROGRESA-Oportunidades is associated with an effect of around -.36 ($p < .01$) points in the SD of the intercept of household income, reflecting that those who were originally poorer received the cash benefit. PROGRESA-Oportunidades also has a positive effect on Slope 1 (1; $p < .01$), meaning that those who received the benefit had a higher slope of around 1 Standard Deviation during the post-crisis period than those who did not. However, the cash transfer is not statistically significantly associated with Slope 2. This suggests that the cash benefit did not affect income change in the recovery period (mid-1999 to 2003) but it had important effects on income changes during the first slope (1997 to mid-1999), meaning that it served as a buffer during the period that followed the crisis.

Finally, ethnicity is also associated with differences in the intercept but not with any of the slopes: mean income of indigenous households was -.3 ($p < .01$) points lower in the SD than income of non-indigenous households. The fact that ethnicity is not significantly associated with changes in household income suggests that the whole sample experienced income changes similarly regardless of their ethnic background. At least in this sample, indigenous households did not suffer from a different, usually expected to be worse, economic dynamic. It is important to note that the association between ethnicity and income change (slopes) may be overshadowed by the fact that the sample is comprised only by poor and extremely poor households.

A Growth Model for the entire series is helpful in providing a general overview of the sample during the period 1997-2003. However, an analysis of household income by cohort puts in manifest the different trajectories that each group of children experienced. As the base models in Table 7.3 show, the 6-year-old cohort had the highest intercept (4.1), followed by the 5-year-old cohort (3.9) and the 4-year-old cohort (3.8). With regard to Slope 1, which measures an overall declining trend of household income after the crisis, the 6-year-old cohort suffered a steeper slope than the 5-year-old cohort, whose means are -.29 and -.19, respectively. With regard to Slope 2, the 6-year-olds had a mean increase in household income of .27; the 5-year-olds had a mean increase in household income of .33; and the youngest cohort had a mean increase in household income of .33 (all significant at .01). These overall trajectories indicate the life-long income experience of the sample according to when they were born: while the older cohorts were born in a general environment of declining incomes, the youngest cohort was born in more favourable conditions.

The coefficients of the controls on the intercept and the slope also provide information on what is driving the income trajectories. Table 7.3 includes as well results for the Conditional Model, which includes PROGRESA-Oportunidades and indigenous background as controls for the intercept and the slopes. Firstly, initial income and rate of change display a similar trend to the figures in the Base Model. That is, mean intercepts for the 6-year-old, 5-year-old, and 4-year-old cohorts are around 4.6, 4.2, and 4.3 respectively. Secondly, average income change is relatively similar y both models. The two older cohorts exhibit declining incomes for the first slope (1997 to mid-1999): -.34 for the 6-year-olds and -.27 for the 5-year-olds. Also, the three cohorts exhibit improving income trends for the second slope (mid-1999 to 2003): .26 for the 6-year-olds; .33 for the 5-year-olds; and .12 for the 4-year-olds.

With regard to the coefficients of the controls on the intercept, both receiving PROGRESA-Oportunidades and indigenous background are associated with originally having lower intercepts (all significant at .01). For the 6-year-olds, PROGRESA is associated with -.44 lower intercept and indigenous background is associated with -.43 lower intercept of household income. For the 5-year-olds, PROGRESA is associated with -.27 lower intercept and indigenous background is associated with -.32 lower intercept. Finally, for the 4-year-olds, PROGRESA is associated with lower -.49 lower intercept and indigenous background is associated with -.47 lower intercept for household income. The significant coefficients of these two variables suggest that households with lower income and indigenous households were more likely to receive the cash transfer. This is consistent with results from previous models in this thesis.

The slopes, however, are in most cases not significantly influenced by the controls. An examination by cohorts throws some light in relation to the effect of PROGRESA-Oportunidades. For household change in the post-crisis period (Slope 1), the cash benefit has a positive effect only for the 5-year-olds (1, $p < .01$). Logically, this indicator could not be explanatory for the other cohorts: there is no Slope 1 for the 4-year-olds as they were born after the end of this period and it is not significant for the 6-year-olds as they were born before PROGRESA-Oportunidades started to be implemented. Nevertheless, the effect of the cash transfer on the 5-year-olds reflects its buffering effect for helping household income to not fall deeper in the period after the crisis. For household income change from mid-1999 to 2003, receiving the cash transfer is statistically significant for the 4-year-old cohort. For this cohort, the overall income of those who received the cash benefit was .93 SD ($p < .01$) above those who did not receive the programme. Ethnicity is not associated with income changes between 1997 and 2003 as there are no statistically significant effects of indigenous

background on any of the slopes. In other words, there is no difference in the trajectory of household income between indigenous and non-indigenous households. This suggests that changes in household income over the period 1997-2003 were probably more related to other characteristics, such as the macro-economic circumstances of the country, than to ethnicity *per se*. The income trajectories for each cohort are summarised in Table 7.3.

Table 7.3. Results for Piece-wise Modelling of Household Income Trajectory by Cohort

		6-year-olds	5-year-olds	4-year-olds
	Number of cases	178	947	745
A. Linear + Linear (Base Model) without controls	**Chi Square (df)**	17.889 (14)	34.831 (14)	8.037 (6)
	CFI & TLI	.914; .908	.931; .927	.977; .977
	RMSEA	.040	.040	.021
		Coefficients (Significance Level)		
	Mean for Intercept	4.121 (.000)	3.868 (.000)	3.783 (.000)
	Mean for Slope 1	-.287 (.000)	-.185 (.000)	N/A
	Mean for Slope 2	.273(.000)	.333 (.000)	.325 (.000)
	Variance for Intercept	.148 (.000)	.149 (.000)	.102
	Variance for Slope 1	.000+	.000+	N/A
	Variance for Slope 2	.027 (.000)	.025 (.000)	.000+
	Correlation Intercept with Slope 1	N/C	N/C	N/A
	Correlation Intercept with Slope 2	-.597 (.000)	-.601 (.000)	N/C
	Correlation Slope 1 with Slope 2	N/C	N/C	N/A
B. Linear + Linear + Controls (Conditional) Controls on intercept and slopes: participation in PROGRESA-Oportunidades (ops) and indigenous background (ind).	**Chi Square (df)**	33.096 (20)	59.896 (20)	18.798 (10)
	CFI & TLI	.880; .838	.915; .885	.963; .948
	RMSEA	.061	.046	.034
		Coefficients (Significance Level)		
	Mean for Intercept	4.601 (.000)	4.173 (.000)	4.251 (.000)
	Mean for Slope 1	-.336 (.021)	-.272 (.000)	N/A
	Mean for Slope 2	.260(.040)	.334 (.000)	.123 (.046)
	Variance for Intercept	.086 (.000)	.119 (.000)	.062 (.000)
	Variance for Slope 1	.000+	.000+	N/A
	Variance for Slope 2	.022(.021)	.021(.000)	.000+
	Correlation Intercept with Slope 1	N/C	N/C	N/A
	Correlation Intercept with Slope 2	-.692 (.000)	-.691 (.001)	N/C
	Correlation Slope 1 with Slope 2	N/C	N/C	N/A
	Effects of controls on Intercept	ops: -.436 (.001) ind: -.430 (.001)	ops: -.273 (.000) ind: -.317 (.000)	ops: -.491 (.000) ind: -.471 (.000)
	Effects of controls on Slope 1	ops: .852 (.263) ind: -.651 (.548)	ops: 1.00 (.000) ind: -.155 (.720)	N/A
	Effects of controls on Slope 2	ops: .005 (.998) ind: .149 (.591)	ops: .038 (.816) ind: -.109 (.507)	ops: .930 (.000) ind: .233 (.370)

Means for intercept and slopes are un-standardised values. Correlations between intercept and slope 2 are standardised values. Effects of controls on the intercept and slopes are standardised regression coefficients.
N/A = Not Available because 4-year-olds were born around the start of the second slope.
+ Variance fixed at 0; this is common practice in piece-wise modelling (Muthén and Muthén, 2007, 2011).
N/C = Not Computed because the variance of the Slope 1 was fixed as 0 and therefore correlations with the intercept and Slope 2 cannot be computed. ops = PROGRESA-Oportunidades. ind = indigenous background.

In sum, general trends indicate that those who were aged 6 in 2003 faced the aftermath of the 1995 crisis; consequently, children in this cohort were born into generally declining household incomes. The next cohort, aged 5 in 2003, generally faced an overall decline followed by a general increase in household income from mid-1999 to 2003. Finally, the cohort of children aged 4 years in 2003 were generally born into an overall trend of raising household income. Based on the assumption that the first few years play a crucial role in child development (Illig, 1998; Moore, 2006; Smith, Brooks-Gunn, and Klebanov, 1997), the variation in these trajectories is hypothesised to be of particular importance.

Before proceeding to examine the association between overall household income trajectories and the indicators of child well-being, it is necessary to define which GM best suits the analysis. The Base Model and the Conditional Model show solid fit statistics, with the exception of Conditional Model for the oldest cohort, which has slightly worse fit statistics possibly due to a small sample size. In addition, the mean structure of the intercepts and the slopes for the three cohorts is consistent in both types of modelling (Base and Conditional). However, the addition of controls implies that the model gains complexity and conceptual sophistication. Furthermore, the controls have significant explanatory power on the intercept. For these reasons and to provide an analysis that is consistent with the other chapters in this thesis, the Conditional Model will be used to explore the effects of overall household income trajectories on child outcomes. This is conducted next.

Stage 2: Effects of Longitudinal Income Experiences on Children

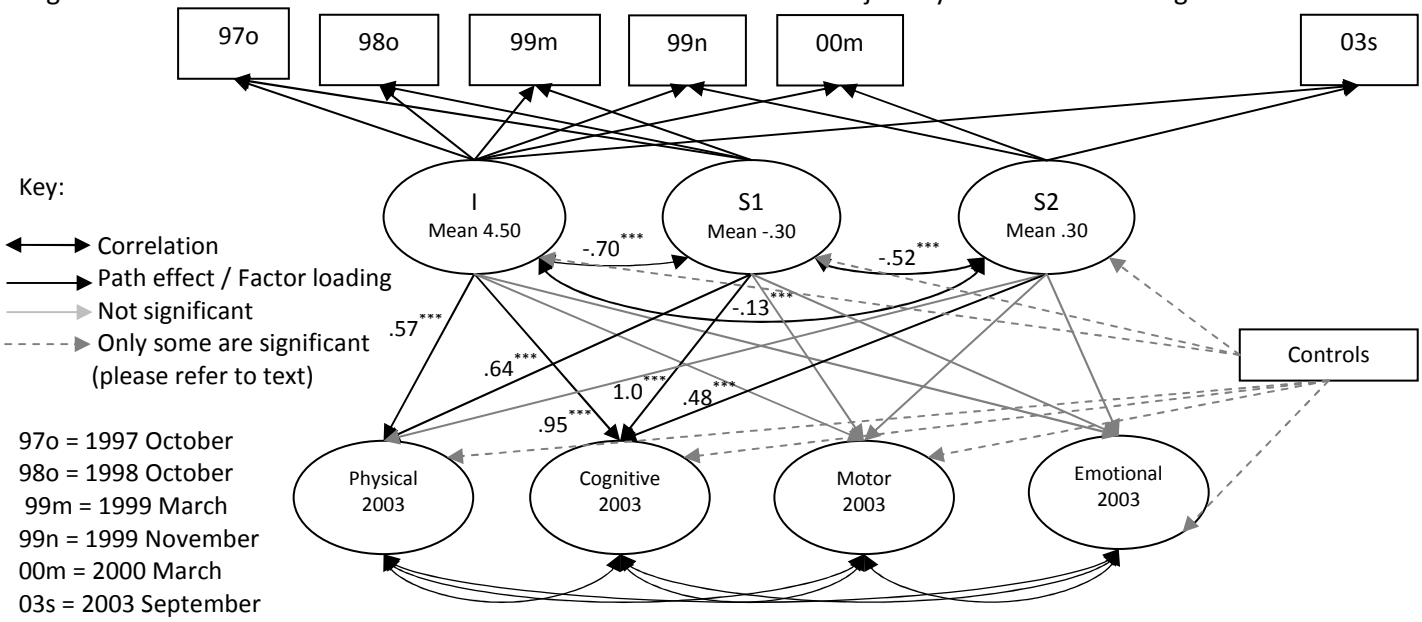
This section examines the ways in which overall household income trajectory, measured by the Conditional Growth Model (GM), is associated with dimensions of child well-being at age 4-6 years. It evaluates whether average starting point (intercept) and overall rate of change (slopes) of household income have statistically significant effects on child outcomes. For each cohort, each of the four domains of well-being is regressed on their respective intercept and slopes. Also, the intercepts and slopes are regressed on PROGRESA-Oportunidades recipiency and indigenous background. Results are provided for each cohort in a descriptive way through a SEM diagram.

The interpretation of the effects of household income on child well-being, however, needs to take into consideration that household income is given in natural logarithmic figures. Natural logarithmic figures represent the exponent by which the constant *e* (2.72) needs to be raised to produce the original value. Logarithmic values are a smaller scale of original values; each logarithmic

unit is set on the base *e*. Therefore, the effects of log-income on child well-being are not linear even though the regression function has been set as linear. Hence, the interpretation of coefficients in a regression model where the predictors are given in logarithmic units but outcome variables are given in their original scale is: For a coefficient with a value *x*, the expected effect on the outcome variable is the product of *x* by the logarithm of a supposed change in the predictor. For example, the expected effect of a 10% increase in household income on a domain of child well-being would be the product of multiplying the un-standardised coefficient yielded on that domain by log(1.10). Therefore, results are also provided in tables with un-standardised coefficients, expected effects if initial household income increased by 10%, and expected effects of mean rate of income change. Complete un-standardised solutions and standard errors are provided in Annex 4.

6-year-olds

Figure 7.4-R. Results for 6-Year-Olds: Effects of Household Income Trajectory on Child Well-Being



Standardised coefficients. Only significant are shown. *** significant at .01.
ChiSq = 189.388 (df = 109) CFI = .833 TLI = .850 RMSEA = .06
Controls on Intercept and Slopes: PROGRESA-Oportunidades and indigenous background
Controls on child well-being: child gender, ethnicity, proportion of children in the household, maternal age, maternal education

Table 7.4. Effects of Intercept and Slopes on 6-Year-Old Cohort; Un-Standardised Coefficients

	Intercept		**Slope 1**		**Slope 2**	
	Un-standardised Coefficient (b)	**(b) x log(1.10)**	**Un-standardised Coefficient (b)**	**(b) x log(.75)**	**Un-standardised Coefficient (b)**	**(b) x log(1.35)**
Physical	0.622***	0.026	0.830	-0.104		
Cognitive	0.891***	0.037	1.122	-0.140	0.668	0.087
Motor						
Emotional						
Only significant effects are shown. *** significant at .01 N = 158						

For the 6-year-old cohort (Figure 7.4-R), the intercept is positively associated with the physical health and cognitive dimensions of well-being. In other words, higher levels of initial household income are associated with better outcomes in the nutritional status of children and their performance in the cognitive ability tests. Specifically, an increase in household income of 2.72 times (1 unit increase in logarithmic income) around the time of birth would be associated with a gain of .57 points of the Standard Deviation (SD) of physical health and with an increase in .95 points of the SD of cognitive ability at age 6 years, compared to the average child in this cohort. Another

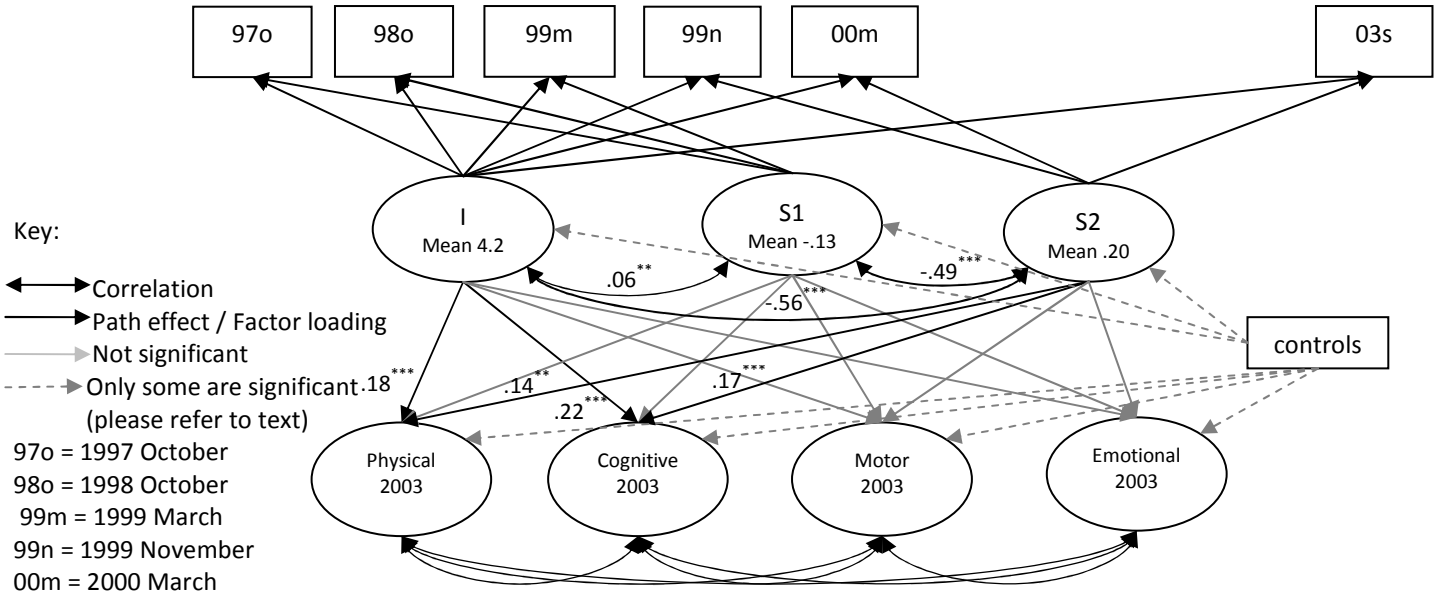
interpretation would be that a 10% increase in household income would represent a gain of 2.6% in physical health and of 3.7% in cognitive ability (Table 7.4).

The slopes are also positively associated with physical health and cognitive ability. Generally, positive changes in household income are expected to be reflected in better outcomes for children and declines in household income are expected to be reflected in worse outcomes for children. Each unit that household income is reduced during the period between 1997 and March 1999 (Slope 1), is associated with a reduction of .64 of a SD for each of the physical domain and with a reduction of 1 SD of the cognitive domain. In other words, as Table 7.4 indicates, an average decline in household income of around 25% ($1-exp^{-.30}$) would be associated with worse physical health by 10% and worse cognitive ability by around 14%.

Slope 2, which represents mean household change from mid-1999 to 2003, proves to be associated in a statistically significant way with cognitive ability at age 6 years, with a standardised coefficient of .48 (Figure 7.4-R). In average, mean increase of household income was of 35% ($exp^{.30}$); this would be expected to be associated with an improvement of 8.7% in cognitive ability (Table 7.4).

5-year-olds

Figure 7.5-R. Results for 5-Year-Olds: Effects of Household Income Trajectory on Child Well-Being



Standardised coefficients. Only significant are shown. *** significant at .01. ** significant at .05.
Even though the theoretical model for the 5-year-olds starts on 1998; income for 1997 had to be included as MPlus needs at least 3 time-points to calculate a slope.
ChiSq = 1094.02 (df = 337) CFI = .818 TLI = .853 RMSEA = .050
Controls on Intercept and Slopes: PROGRESA-Oportunidades and indigenous background
Controls on child well-being: child gender, ethnicity, proportion of children in the household, maternal age, maternal education

Table 7.5. Effects of Intercept and Slopes on 5-Year-Old Cohort; Un-Standardised Coefficients

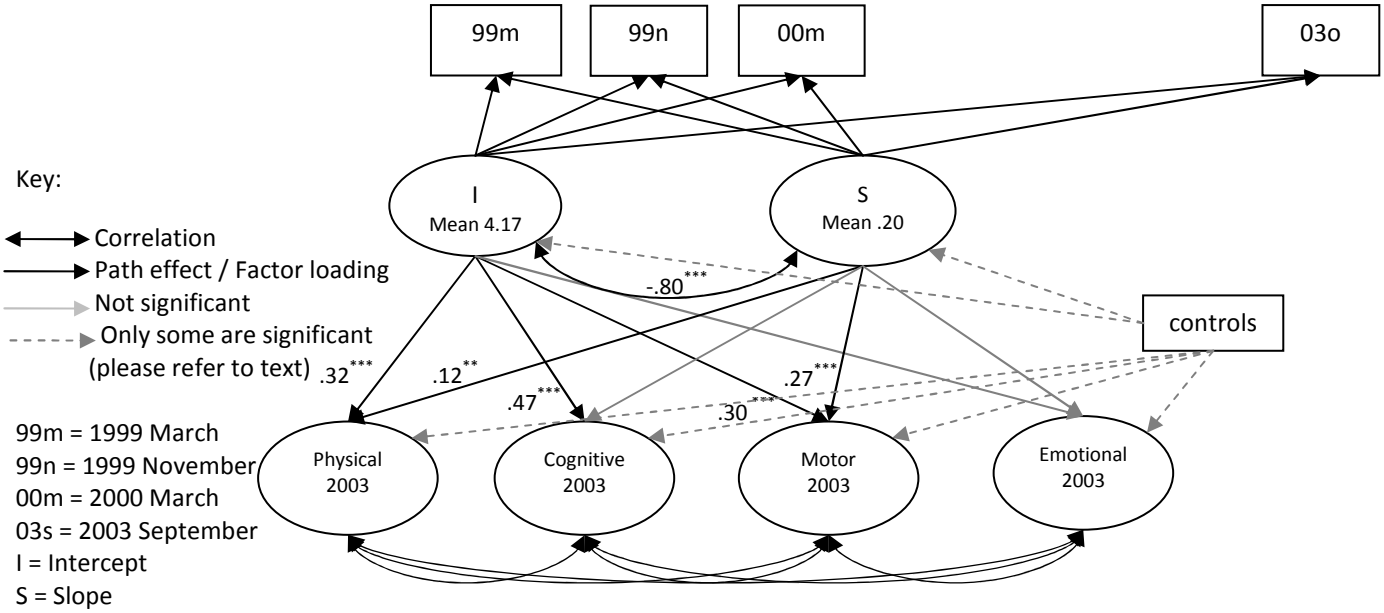
	Intercept		**Slope 1**		**Slope 2**	
	Un-standardised Coefficient (b)	**(b) x log(1.10)**	**Un-standardised Coefficient (b)**	**(b) x log(.88)**	**Un-standardised Coefficient (b)**	**(b) x log(1.22)**
Physical	.338***	.014			.261**	.022
Cognitive	.250***	.009			.203***	.018
Motor						
Emotional						
Only significant effects are shown. *** significant at .01 ** significant at .05 N = 870						

For the 5-year-old cohort, the intercept is associated with differences in the physical and cognitive domains. As Figure 7.5-R shows, each point increase in initial household log-income (2.72 times the raw figure of income in Mexican pesos) refers to a gain of .18 and .22 points in the SD of physical health cognitive ability, respectively. Differently expressed (Table 7.5), a 10% increase in household income around the time of birth would expect a gain of 1.4% in physical health and of almost 1% in cognitive ability at age 5 years.

Contrary to hypothesised, the slopes are not always associated with the domains of well-being. Slope 1, which reflects the overall change in household income from 1997 to mid-1999 is not statistically associated with any of the domains of well-being at age 5 years. Nevertheless, Slope 2, which reflects an overall increasing trend of household income between mid-1999 and 2003, is significantly associated with physical health and cognitive ability. As Figure 7.5-R illustrates, each point increase in log-income from mid-1999 to 2003 is associated with an increase of .14 and .17 points of the SD of physical health and cognitive ability, respectively. That is, the mean experience of household income for this cohort was of an around 22% ($exp^{.20}$) increase from mid-1999 to 2003. This average improvement in household income would account for better physical and cognitive well-being by 2.2% and 1.8%, correspondingly (Table 7.5).

4-year-olds

Figure 7.6-R. Results for 4-Year-Olds: Effects of Household Income Trajectory on Child Well-Being



Standardised coefficients. Only significant are shown. *** significant at .01. ** Significant at .05
ChiSq = 485.044 (df = 259) CFI = .930 TLI = .945 RMSEA = .034
Controls on Intercept and Slopes: PROGRESA-Oportunidades and indigenous background
Controls on child well-being: child gender, ethnicity, proportion of children in the household, maternal age, maternal education

Table 7.6. Effects of Intercept and Slopes on 4-Year-Old Cohort; Un-Standardised Coefficients

	Intercept		**Slope**	
	Un-standardised Coefficient (b)	**(b) x log(1.10)**	**Un-standardised Coefficient (b)**	**(b) x log(1.22)**
Physical	1.267***	0.052	1.339**	.116
Cognitive	.957***	0.040		
Motor	.757***	0.031	1.886***	.129
Emotional				
Only significant effects are shown. *** significant at .01 ** significant at .05 N =655				

The association between the intercept and the domains of well-being for the 4-year-old cohort are consistent with the two other cohorts: higher initial levels of household income are generally associated with better child outcomes. Specifically, as Figure 7.6-R illustrates, an increase in household income around the time of birth of 2.72 times (1 point increase in logarithmic income of the intercept) would account for a gain of .32 points in the SD of physical health, .47 points in the SD of cognitive ability, and .30 points in the SD of motor co-ordination. Alternatively, a 10% increase

in initial household income would represent an improvement of 5.2% in physical health, of 4% in cognitive ability, and of 3.1% in motor co-ordination (Table 7.6).

The rate of change of household income from mid-1999 to 2003 (Slope) is also positively associated with two domains of well-being. As shown in Figure 7.6-R, each point increase in household income is associated with an improvement of .12 points in the SD of physical health and .27 points in the SD of motor co-ordination. Using the mean rate of household income improvement, which was an average of .20 for this cohort, it is possible to estimate that an average increase in household income of 22% ($exp^{.20}$) would represent 11.6% better physical health and 12.9% better motor co-ordination at age 4 years (Table 7.6).

Growth Models provide some understanding in terms of how general trends in household income are associated with indicators of child well-being at pre-school age. Generally, results from the three cohorts show that household income around the time of birth is positively associated with child outcomes at 4-6 years of age. With regard to income changes, there are mixed results. Slope 1, which indicates generally declining household incomes, is associated with some domains of well-being for the 6-year-olds but is not associated in a statistically significant way for the 5-year-olds. Nevertheless, an important finding emerges with regard to the association between Slope 2 and the domains of well-being. Slope 2, which marks an overall improving trend in income between mid-1999 and 2003, is positively associated with some domains of child well-being for the three groups of children. This could suggest that improving incomes may have a positive impact on children. The results of all cohorts are examined next in more detail.

General Findings

This section describes the findings, for all cohorts, related to the association between the Growth Models of household income and dimensions of child well-being. First, this section explores how results relate to the hypotheses established in the theoretical setting of this chapter. Then, it includes observations about findings that supplement the hypotheses.

Findings Related to the Hypotheses

The first hypothesis states:

- Initial level of household income is associated with differences in well-being for all cohorts.

Initial level of household income was measured through intercepts that refer to income levels around the time of birth for the 6, 5, and 4-year-old cohorts. The 6-year-old cohort was born around the first wave of the panel, the 5-year-old cohort was born around the third wave of the panel, and the 4-year-old cohort was born around the fifth wave of the panel. For the three groups, results indicate that initial level of household income was positively associated with physical health and cognitive ability. In addition, initial household income was also significantly associated with motor co-ordination for the 4-year-olds.

By looking at the regression coefficients of the dimensions of child well-being on the intercepts, results suggest that higher levels of initial income are generally beneficial for children. These findings are consistent with the results of Chapter 4 and Chapter 5, which explored through MIMIC Models the association between household poverty at around the time of birth and the same indicators of well-being. Also, results in this chapter are aligned with the findings in previous research (Dearing, McCartney, and Taylor, 2001; Strohschein, 2005), where the intercept was also found to be associated in a statistically significant way with differences in mental health indicators.

The finding that initial household income helps to understand, in a statistically significant way, differences in indicators of well-being at age 4-6 years is a crucial one. The fact that children´s "starting point" with regard to their household income is significantly associated with child outcomes at pre-school age implies that there is a well-being gap even before entering other

structures that may accelerate social stratification. For instance, the study of Sacker, Schoon, and Bartley (2002) in the United Kingdom found that educational achievement and psychological adjustment were increasingly associated with school composition as children grew older, particularly during adolescence. In Latin America, one of the social structures that has been found to re-create instead of reduce social gaps is in fact the schooling system (Reimers, 2001). Future implications could also emerge; the scenario depicted by Duncan *et al* is not an optimistic one: "income poverty has a strong association with a low level of preschool ability, which is associated with low test scores later in childhood as well as grade failure, school disengagement, and dropping out of school, even when controls for family characteristics such as maternal schooling, household structure, and welfare receipt are included" (1998, p. 420).

As mentioned before in this thesis, child development is the product of numerous material and non-material elements (Berk, 2007) beyond the scope of income. A main limitation of the analysis conducted in this thesis is that the ENCASEH/ENCEL contains no information about parenting, the nutritional intake of children, or the cognitive stimulation in the household. Hence, the "true" effects of income could be smaller had they been mediated by these elements. Nevertheless, results from these models support what has been found previously with regard to income: "family income can substantially influence child and adolescent well-being" (Brooks-Gunn and Duncan, 1997, p. 67). The level of household income is significant for child development, as Strohschein argues, because

> Household income operates both directly and indirectly on child development. Advantaged households can use their resources to situate themselves in safe neighborhoods [sic], send their children to better-quality schools, and purchase goods and services that engage their children both socially and cognitively. In contrast, poor households spend a greater proportion of their income meeting the basic needs of shelter, food, and clothing, and are thus limited in their ability to provide their children with a similarly stimulating and secure environment. Indirectly, economic hardship can negatively affect the wellbeing of parents, putting children at risk by changing the quality of the parent-child relationship through punitive or neglectful parenting practice (2005, p. 360).

In other pieces of research, income has been found to be associated with some of the elements that influence child development, such as nutrition, education, healthcare, and quality parenting. For example, Lugo-Gil and Tamis-LeMonda (2008) found that higher income was associated with better parenting, both of which in turn were positively correlated with child mental development at ages 14, 24, and 36 months. Similarly, Lee *et al* (2009) concluded that higher income was associated with lower parental depression and better parenting in terms of communication, involvement, confidence, and relational frustration.

The specific ways in which income was invested on children or whether income was associated with quality of parenting cannot be tested using this database. However, results from previous research and from the models in this chapter help to set a platform for future lines of investigation with regard to the associations between household income and child well-being. Importantly, the significant associations between household income and certain child outcomes are particularly distinctive in this sample, given that it is comprised only by households living in poor rural communities. Firstly, results here highlight the benefits that utilising a conceptualisation of poverty as a continuum and not as a dichotomous state bring. And secondly, these findings reinforce the argument that the level of poverty in which the child was born into matters for child outcomes at pre-school age, even after considering changes in household income over time.

The second hypothesis states:

- Improving household income is associated with better indicators of well-being and declining household income is associated with worse indicators of well-being.

Generally, positive trends of household income are associated with better indicators of child well-being. Slope 2, which measures an average improving trend in income between 1997 and mid-1999, is positively associated with some domains of child well-being for all cohorts of children. Specifically, an improving income trend is associated with better physical health, and motor co-ordination for the 4-year-olds; with better physical health and cognitive ability for the 5-year-olds; and with better cognitive ability for the 6-year-olds. The reasons why generally improving incomes are associated with different dimensions of well-being for different cohorts escape the capacity of the models. Nonetheless, an attempt to disentangle these findings is based on two observations. One, Slope 2 marks the same trajectory for all cohorts: from mid-1999 to late-2003. And two, the start of Slope 2 represents different moments for each cohort: around the time of birth for the 4-year-old cohort; around age 1 year for the 5-year-old cohort; and around age 2 for the 6-year-old cohort.

Taking these two elements into consideration, the differences in the association between Slope 2 and the dimensions of child well-being is perhaps related to the way in which child development takes place: if different dimensions of well-being develop at different rates, changes in household income would appear to be significantly associated with them at different ages. That is, if disparities in motor co-ordination are the greatest around age 4 years but fade away around age 5

years, changes in household income would matter for the former age-group but not for the latter. Also, if disparities in physical health are more obvious between ages 4 and 5 years than at age 6 years, improvements in household income would be associated with physical health at younger age rather than later. Additionally, if disparities in cognitive ability emerge around the age of 5 years, changes in household income would be associated with performance in the cognitive tests at ages 5 and 6 years but not at age 4.

With regard to the association between negative trends of household income (Slope 1) and the indicators of well-being, it is only statistically significant for the 6-year-olds and not for the 5-year-olds. Specifically, Slope 1, which denotes an overall declining income trend between 1997 and mid-1999, appears to result in worse outcomes in the physical and cognitive domains for the oldest cohort. Perhaps, the effects of declining incomes are manifested in outcomes for the 6-year-olds and not for the 5-year-olds because the negative trend lasted longer for the former group (their first 2 years of life) than for the latter (their first 1 year in life).

Findings in these models are somewhat similar to what Dearing, McCartney, and Taylor found: "for children in poverty, decreases in income-to-needs were associated with worse outcomes and increases were associated with better outcomes" (2001, p. 1779). Consistently, Strohschein (2005) found that increases in household income are correlated with improvements in child mental health. Bearing previous research in mind along with findings from these models and even though the purposes of this thesis do not include the elaboration of policy recommendations, the association between income changes and indicators of child well-being at pre-school age could raise important implications with regard to early childhood intervention programmes or cash transfer programmes like Oportunidades.

The third hypothesis states:

- Subsequent improvements in household income counteract the negative effects of declining household income on children.

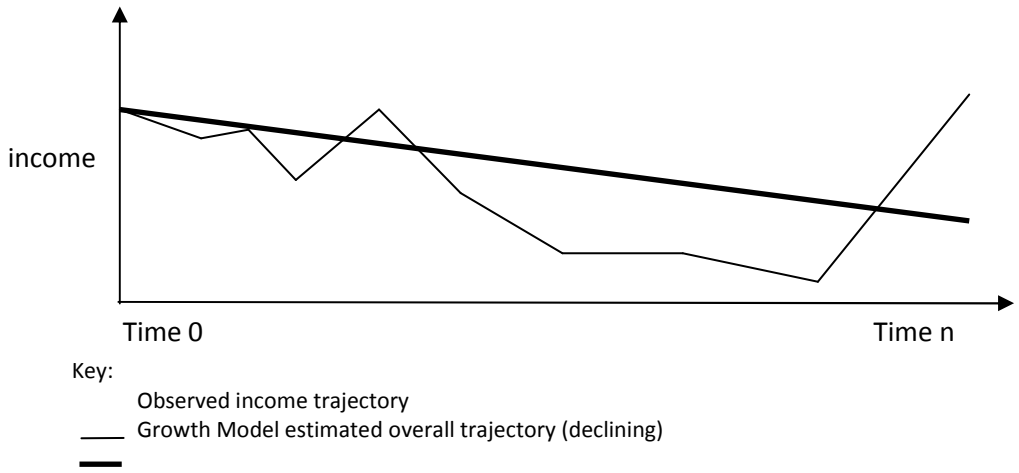
There is inconclusive evidence about this hypothesis. Results for the oldest cohort indicate that Slope 1, which marks an overall declining trend in household income, is associated with the physical and cognitive domains of child well-being in a statistically significant way. Also, Slope 2, which indicates an overall improving trend of household income, is associated with the cognitive dimension of well-being. Given that the latter slope refers to the recovery period after the crisis,

one could suggest that improvements in the overall trend of household income counteract to some extent the negative effects on cognitive ability experienced previously.

However, Slope 1 is not associated in a statistically significant way with any of the dimensions of well-being for the 5-year-old cohort. Therefore, it is not possible to be certain of whether the positive association between Slope 2, which marks an overall improving trend, and the indicators of well-being counteracts the negative effects of the previous period. However, it is important to highlight that improvements in household income were found to be generally associated with better outcomes for children regardless of the previous experience of household income (generally declining for the 5 and 6-year-olds and just starting for the 4-year-olds).

Results help illuminate the ways in which longitudinal income experiences are associated with some child outcomes at pre-school age. However, findings here need to be read with caution as the data contains three main limitations. Firstly, the period of time included in this panel consists only of 6 years (1997-2003). It would be necessary to explore whether income changes in a longer period of time are still associated with indicators of well-being. Secondly, the sample only consists of low-income households and therefore variability in household income is relatively small. It would be necessary to explore whether steeper income changes within the same period of time are associated with child well-being. And thirdly, GMs utilise mean figures to calculate overall trajectories but does not capture sequences of income change. Take for example Figure 7.7: The "up and down" movements in household income are smoothed out in the GM, which indicates a generally declining trajectory between time 0 and time n. Therefore, GMs help to assess the association of the overall trend of household income on children but it is not possible to evaluate whether specific sequences of change are related to the well-being indicators.

Figure 7.7. Declining Overall Income Trend with Income Changes Between 1999 and 2003.



Other Findings

The models show consistent results on issues parallel to the hypotheses. Firstly, there are important findings related to the relationship between initial income level and subsequent income experience. For the three cohorts, the intercept is negatively correlated with the slopes. In other words, higher levels of initial income are associated with deeper declines over time. This suggests that households with relatively higher income were expected to be affected by the 1995 crisis in a harsher way than households in the lower end of the income distribution. These results could be derived from a floor-effect, given that the households in this sample have considerably low incomes. These kind of ceiling effects have been found elsewhere: "due in part to 'ceiling or floor'/ 'regression to the mean' effects, such that if a child starts high, he or she has more room to drop, while those who start low do not" (Yang and Schaninger, 2010, p. 235).

Another point of coincidence is related to the explanatory power of the controls on income experience. The effects of the controls are similar to that in previous chapters. PROGRESA-Oportunidades is somewhat associated with the income trends. As Table 7.3 showed, the effect of the programme on Slope 1 for the 5-year-old cohort is considerably important. Households that received the cash transfer had an income of 1 SD ($p < .01$) above of those who did not. Also, the cash benefit had a positive effect on income change for the 4-year-old cohort. In this cohort, children who lived in households that received the cash transfer increased their income in .93 points of a SD compared to those who did not. This reveals the buffering effect that the programme had on household income in the period after the crisis, suggesting that the cash benefit was positive for household income.

Ethnicity has a similar association with the income experiences. As expected, indigenous households had lower initial level of household income than non-indigenous households. However, indigenous background is not significantly associated with income changes (slopes) of this sample between 1997 and 2003. Thus, results indicate that indigenous and non-indigenous households faced the same overall income trajectory between 1997 and 2003 as there are no statistically significant differences in longitudinal income during this period between the two groups. This suggests that indigenous and non-indigenous households were equally affected after the crisis and that income changes are related to other socio-demographic characteristics or to structural issues and not to ethnicity *per se*.

Finally, the regression coefficients of the socio-demographic controls on the domains of child well-being are similar to results in other chapters in this thesis. Table 7.7 summarises the effects of gender, indigenous background, proportion of children in the household, maternal education level and maternal age on physical health, cognitive ability, motor co-ordination, and emotional competence for each cohort.

Table 7.7. Effects of Socio-Demographic Controls on Child Well-Being for Each Cohort

Control / Cohort	**6-year-olds** N = 158	**5-year-olds** N = 870	**4-year-olds** N = 655
Gender	Physical: Cognitive: Motor: Emotional:	Physical: Cognitive: Motor: Emotional:	Physical: Cognitive: Motor: Emotional:
Indigenous background	Physical: -.225* Cognitive: -.411*** Motor: Emotional:	Physical: -.125*** Cognitive: -.206*** Motor: -.114** Emotional:	Physical: -.181*** Cognitive: -.252*** Motor: -.225*** Emotional:
Proportion of children in the household	Physical: Cognitive: -.144* Motor: Emotional:	Physical: -.132** Cognitive : -.210*** Motor: Emotional:	Physical: -.131*** Cognitive: -.152*** Motor: -.122** Emotional :
Maternal education level	Physical: .263** Cognitive: .336*** Motor: Emotional:	Physical: .235*** Cognitive: .392*** Motor: .121** Emotional :	Physical: .254*** Cognitive: .382*** Motor: .161*** Emotional:
Maternal age	Physical: .292** Cognitive: Motor: Emotional:	Physical : .127** Cognitive : .091** Motor: Emotional:	Physical : .127*** Cognitive: .121*** Motor: .104* Emotional : .095*
Standardised coefficients. Only significant are shown. ***significant at .01 **significant at .05 * significant at .10			

Results in table 7.7 indicate that there are no statistically significant differences between boys and girls in any of the domains of well-being. Ethnicity is associated with differences in physical health and cognitive ability between indigenous and non-indigenous children for the three cohorts. Indigenous children tend to have lower physical health (-.181 for the 4-year-olds, p <.01; -.125 for the 5-year-olds, p<.01; and -.225 for the 6-year-olds, p<.10) and lower scores in the cognitive ability tests (-.252 for the 4-year-olds; -.206 for the 5-year-olds; and -.411 for the 6-year-olds; all significant at .01) than non-indigenous children. Also, indigenous background is associated with lower motor co-ordination for the two youngest cohorts (-.225 for the 4-year-olds, p<.01 and -.114 for the 5-year-olds, p<.10).

Proportion of children in the household is associated with lower physical health (-.131, p<.01), lower cognitive ability (-.152, p<.01) and lower motor co-ordination (-.122, p<.05) for the 4-year-olds. Also, this control is associated with lower physical health (-.132, p<.05) and lower cognitive ability(-.210, p<.01) for the 5-year-olds. Finally, it is associated with lower cognitive ability (-.144, p<.10) for the oldest cohort.

Maternal education level and maternal age are generally associated in a positive way with the domains of child well-being. However, the effects are more obvious for the youngest cohort than for the others, given that they are associated with more domains of well-being and with higher statistically significance for the 4-year-olds than for the other two groups, especially the 6-year-olds. For the 4-year-olds, each year of maternal education is associated with .254 of the SD of physical health, with .382 of the SD of cognitive ability, and with .161 of the SD of motor co-ordination (all significant at .01). For the 5-year-olds, each year of maternal education bears a regression coefficient of .235 (p<.01) for physical health, of .392 (p<.01) for cognitive ability, and of .121 (p<.05) for motor co-ordination. Finally, maternal education is positively associated with physical health (.263, p <.05) and cognitive ability (.336, p<.01) for the 6-year-olds.

With regard to maternal age, each year is associated with .127 (p<.01) of physical health, .121 (p<.01) of cognitive ability, .104 (p<.10) of motor co-ordination, and .095 (p<.10) of emotional competence for the 4-year-olds. For the 5-year-olds, maternal age bears a coefficient of .127 of physical health and .091 of cognitive ability (both significant at .05). For the 6-year-olds, maternal age bears a coefficient of .292 (p<.05) of physical health.

Conclusions

This chapter explored the extent to which different longitudinal experiences of household income are associated with child well-being at pre-school age. Given that "children´s poverty histories are dynamic and heterogeneous, it may be inappropriate to characterize [sic] a child´s poverty history with a measure of poverty status based on a short-term observation of income" (Korenman and Miller, 1997, p. 70). Using longitudinal data for household income between 1997

and 2003, this chapter aimed to contribute an understanding of how poverty history is associated with child outcomes. Growth Models (GM) were used to capture the association between household income around the time of birth (intercept), overall trajectory of income change over time (slope), and four dimensions of child well-being.

The analysis is embedded in the historical context of the sample, particularly in the period after the 1995 Mexican financial crisis. Through piece-wise modelling, the GMs included two slopes that correspond to the two overall trends that were observed in this period: a declining one after the 1995 crisis, and an improving one after mid-1999. Results for all cohorts show that, generally, initial level of household income is positively associated with indicators of child well-being at pre-school age. Given that the household income experience is adjusted to the child´s life, it is possible to argue that the level of poverty in which a child is born into matters for child outcomes. Furthermore, results indicate that overall improving trajectories of household income are expected to benefit children.

Further work could be done to unpack the sets of interactions between long-term household income and other socio-economic variables that shape child development. Perhaps, the association between income experience over time, socio-demographic characteristics, and indicators of well-being should be read as a set of continuous interactions between them. What McDonough, Sacker, and Wiggins argue for health indicators could be transposed to cognitive or emotional outcomes: "the effects of poverty history on long-term patterns of health are complex because they act in concert with race, education and age to anchor health trajectories at different starting levels of health across poverty classes" (2005, p. 1804). Therefore, the models presented in this chapter could be enriched by using another longitudinal database that would allow the inclusion of other material and non-material elements, the interaction between them over time, and a classification of poverty experiences according to the behaviour of these elements in a longitudinal perspective.

CHAPTER 8

Summary and Conclusions

The early years are a period when children gain critical physical, cognitive, and socio-emotional capacities. Therefore, household poverty may interfere with the developmental processes: one could argue that when resources are limited, it would be harder to provide children with nutritional, educative, social, and nurturing resources that are necessary for ensuring a child´s physiological, cognitive, and emotional well-being. The negative effects of poverty on children have been extensively documented (see Literature Review). However, some gaps in our knowledge about the relationship between household poverty and indicators of child well-being during the pre-school years were identified.

Towards that end, this thesis aimed to address these insufficiencies by examining the effects of household poverty on children. The study was driven by the following research questions: How is child well-being conceptualised and measured? Is depth of poverty associated with indicators of child well-being at age 4-6 years? Is timing of poverty associated with indicators of child well-being at age 4-6 years? Finally, are overall household poverty trajectories associated with child developmental indicators at age 4-6 years?

Borrowing from economic and developmental theories, a quantitative examination was conducted to evaluate whether the depth, timing, and longitudinal experience of household poverty are associated with indicators of child well-being at pre-school age. The study used data of around 2,000 children from birth to age 4-6 years who were living in poor and extremely poor rural communities in Mexico. Data was obtained from the National Survey of Socio-Economic Characteristics of the Households and the Household Evaluation Surveys (abbreviated ENCASEH/ENCEL from their names in Spanish) 1997-2003. With the aid of Structural Equation Modelling (SEM), the analytic strategy consisted of model testing. Specifically, the examination was conducted through Measurement Models, Multiple Indicator Multiple Cause (MIMIC) models, and Growth Models.

The first three chapters of the thesis set the theoretical and empirical context of the examination, presented the research questions, and explained the methodological strategies that addressed them. Specifically, Chapter 1 introduced the study, offered an overview of child poverty

in Mexico, and elaborated on the importance of the topic. Chapter 2 reviewed literature that has explored the effects of poverty on children in a quantitative way. The theoretical and methodological approximations as well as the findings of these studies were used to pave the road for this research project. Chapter 3 described the data and the methodology, and offered an overview of SEM and the types of models used in the thesis.

The empirical examination of the effects of poverty on children was developed in Chapters 4 to 7. Chapter 4 explored the conceptualisation and measurement of child well-being. It established the measurement model of child well-being that was used as the outcome indicators in subsequent the chapters. Chapters 5, 6, and 7 addressed the issues of whether depth and longitudinal experience of poverty is associated with child well-being at ages 4-6 years. However, each of them offered a different approach for addressing the research questions. Chapters 5 and 6 examined whether timing of poverty is associated with child well-being. The former explored the effects of poverty around the time of birth while the latter included different time-points in the child´s life. Chapter 7 took into consideration overall trends of household income in finding the association between longitudinal household income and the indicators of well-being.

This chapter presents the conclusions and a discussion of the key points that emerge from the analysis conducted throughout the thesis. The first section of this chapter examines the main findings across chapters that are related to the research questions. The second section reviews some lessons derived from the analysis. The third section includes some reflections on methodological issues that emerge after conducting this thesis. The fourth part discusses the contributions and limitations of this thesis. The last section of this chapter illuminates possible pathways for future research.

Answering the Research Questions: Effects of Poverty on Child Well-being

This section identifies the findings with regard to the effects of poverty on children that regularly come out as significant across chapters. In particular, it looks at those issues related to the research questions.

How is child well-being conceptualised and measured?

The notion of child well-being has evolved from the perspectives found in early Greek and Roman manuscripts to a current perception that positions the child as an agent in society. In this process, the role of international institutions, non-governmental organisations, governmental agencies, medical and child development professionals, and scholars has been crucial. Today, the definitions developed by these actors are centred in four main areas: physical health, cognitive ability, motor co-ordination, and emotional competence. Theoretically, these four areas comprehend some of the most important aspects of the developmental processes that take place during the pre-school ages.

Empirically, child well-being has often been measured though independent indicators such as height-for-age or scores in Mathematics or vocabulary tests. Slowly, the measurement of child well-being has moved towards a comprehensive approach and has included various indicators at the same time. However, most of the existing instruments that assess child well-being do not seem to take into consideration elements such as happiness or citizenship. There is still a gap between the theoretical foundations and the measurement of child well-being (Pollard and Lee, 2002; Roelen, Gassmann, and de Neubourg, 2009).

Is depth of poverty associated with indicators of well-being at age 4-6 years?

This question was explored throughout the thesis, particularly in Chapters 5, 6, and 7. The short answer to this question is: yes, depth of poverty is associated with differences in well-being indicators at 4-6 years of age. Evidence from the various models developed throughout the thesis suggests that deeper levels of household poverty are associated with worse indicators of well-being at pre-school age. Reciprocally, higher levels of household material circumstances are generally associated with better indicators of child well-being. Importantly, results are not only consistent across chapters but also with the findings from previous research in this topic (see Literature Review Chapter).

A more elaborate answer includes the following issues. Firstly, the analysis only looks at households living in communities identified as poor or extremely poor in rural Mexico. Therefore, the socio-economic surroundings in which these children were born and raised are relatively similar. Consequently, the elements that were found to be associated with the indicators of child well-being are found at the household level. Specifically, household income, consumer durables, and

occupation were consistently associated with indicators of physical health, cognitive ability, and motor co-ordination at 4-6 years of age.

Related to the way in which depth of poverty changes people´s lives, Townsend argued that

> There seems to be not just a continuum of deprivation in accordance with ranked income (or total resources). Below an approximate threshold of income, deprivation seems to intensify, accelerate or multiply disproportionately. It is as if people strive to conform with what is expected of them when income shrinks (they economise in what they do but still undertake the same activities) but once it shrinks below a particular level they withdraw (or withdraw their children) from fulfilling certain social obligations or well-established customs or activities. They no longer meet friends, children are occasionally absent from school, heating is turned off, conventional diets are no longer regularly observed, visitors are not longer invited into the home, ill-health and disability become more common. It is not claimed that the existence of such a threshold has yet been systematically demonstrated. (1985, p. 662).

An evaluation of whether households in this sample met friends, had visitors, or used heating was beyond the purposes of this research project. Perhaps, Townsend referred to a situation of deeper levels of poverty than the ones observed in this sample. However, results in this thesis indicate that even within a sample comprised of poor and extremely poor households, there is variation in the level of household income, agricultural and non-agricultural durables, quality of housing, occupation and education levels, and other indicators of household material circumstances. In addition, this variation was found to be associated with indicators of child well-being: the lower the level of household material circumstances (more severe levels of poverty) the higher likelihood of the child to suffer from stunting, to have an unhealthy weight-for-age, and to perform worse in cognitive and motor ability tests.

The results of the models developed in this thesis indicate that depth of poverty is associated in a statistically significant way with indicators of child well-being regardless of the poverty measurement used: household income, consumer durables, or occupation. In Chapter 5, the dimension of household material circumstances that proved to be associated with indicators of cognitive ability at age 4-6 years was non-agricultural means, which included income and occupation. In Chapter 6, the largest explanatory power came from household durables but household income was also significantly associated with the indicators of well-being at age 4-6 years. In Chapter 7, overall level of household income was also positively associated with child well-being. In sum, even though some indicators may be more appropriate than others for assessing household poverty, there seems to be sufficient evidence to argue that poverty is not a dichotomous state but a continuum. Importantly, differences within this continuum matter for child physical, cognitive, and dexterity development.

The results in this thesis suggest that the material aspect of household poverty (namely income, durables, and housing) remains significant even after controlling for other non-material aspects. Consistent with findings elsewhere (Blau, 1999; Campbell, 2007; Mayer, 1997a; Violato *et al*, 2010; Yeung, Linver, and Brooks-Gunn, 2002), results in this thesis indicate that maternal age and level of education, household composition, and ethnicity are associated with indicators of physical, cognitive, and motor well-being. Nevertheless, degree of material poverty (income, durables, housing) remains associated in a statistically significant way with physical and cognitive development during the pre-school years. As Duncan stated, "advantages provided by higher incomes are presumed to persist even after accounting for the effects of other characteristics" (1991, p. 23). A possible line of thought is that income is important for child well-being to the extent to which it allows parents to provide more and better nutritional, cognitive, and emotional resources to children.

Finally, results across chapters also show consistency in the areas of child well-being in which the effects of poverty are manifested. The effects of poverty on children are mainly observed on the cognitive ability indicators: vocabulary recognition and memory. Possibly, the effects of poverty on children are the largest on cognitive ability given that "during the first five years, the brain is highly plastic – especially open to growth" (Berk, 2007, p. 22). Hence, the brain and cognitive development are more vulnerable to changes in household material circumstances particularly in those years. A possible account is that poverty would affect cognitive development if the nutritional intake or the cognitive stimulation of the child were reduced as a consequence of loss of income or employment.

Depth of poverty is also significantly associated with the physical health of children in this sample. Results indicate that deeper levels of poverty are associated with higher probabilities of child stunting and obesity. This combination of indicators resembles a situation not of under-nourishment but of mal-nourishment: it is not that children do not have sufficient food to eat but that they eat low quality food. This situation mirrors the nutritional status of the Mexican population. According to recent studies (OECD, 2011; FAO, 2011; WHO, 2011), Mexico has one of the highest rates of adult obesity and the highest prevalence of child obesity in the world. This has been argued to be a common situation in transition economies, where low-income households purchase high-fat but low nutritional value products (Fernald and Neufeld, 2007; WHO, 2011). Finally, household material circumstances were also associated with motor co-ordination. Deeper

levels of poverty were found to be associated with lower dexterity and a delay in physical growth and cognitive ability, suggesting that poverty halts the developmental process of children.

Is timing of poverty associated with indicators of child well-being at age 4-6 years?

The question of timing of poverty was addressed in Chapters 5 and 6. In the former, the examination of timing was concentrated on household conditions around the time of the child´s birth. In the latter, various time-points that are assumed to be important in the developmental process of children were incorporated into the analysis. Both chapters also looked at the effects of concurrent household material circumstances on the indicators of well-being.

According to medical findings, a large proportion of brain maturity and the development of the nervous and the lymphatic systems take place during the first year of life. Hence, poverty could interfere with these processes and have lingering effects that are visible later. In fact, results from Chapters 5 and 6 show that household material circumstances around the time of birth is significantly associated with cognitive ability at age 4-6 years. Higher levels of household income and better occupational status around the time of the child´s birth were associated with better memory and vocabulary skills.

Results from various models tested in Chapter 6 indicated that household income at other time-points is also important for child development. Specifically, household income at age 18 months was consistently found to be associated with cognitive ability. This could be related to the fact that language acquisition normally takes places between 12 and 18 months of age. A possible line of thought is that children living in households with lower income could be more likely to have fewer books and learning toys and less access to cognitively stimulating environments. Consequently, limitation in resources implied lower capabilities for children to learn.

Concurrent level of material circumstances was also consistently found to be associated with child well-being. Results from the models in Chapters 5 and 6 showed that household income and level of consumer durables at the time of well-being assessment are associated with physical health, cognitive ability, and motor co-ordination even after controlling for household material circumstances in the past. An important limitation of the dataset is that there is only one measurement of well-being indicators in 2003, when children were aged 4 to 6 years. Therefore, it is impossible to evaluate whether the relationship between concurrent household material circumstances and well-being is sustained at other moments in the child´s life. Nevertheless, the

fact that the models showed a large correlation between past and present material circumstances suggests that concurrent material circumstances and child well-being would be associated regardless of when they were measured.

Importantly, the time-points that proved to be associated with child well-being at age 4-6 years are significant even after controlling for ethnicity, maternal education level, household composition, and other socio-demographic characteristics. On the one hand, this indicates that the material side of poverty remains important in shaping child development. On the other hand, the fact that the controls are time-invariant but household income was measured at various time-points corroborates that timing of the latter is important for indicators of child well-being.

Are overall household poverty trajectories associated with child outcomes at age 4-6 years?

While the previous research question explored the effects of household poverty at specific time-points, this question evaluates whether the overall longitudinal household poverty experience is associated with indicators of child well-being at pre-school age. Chapter 7 explored this point by developing Growth Models that included the initial point of household income (around the child´s birth) and rate of change of income over time.

Results from Chapter 7 indicate that the household income experience over the child´s life is associated with indicators of well-being at age 4-6 years. Growth Models showed that children who were born in households with higher incomes showed higher levels of physical, cognitive, and motor indicators of well-being than those who were born in households with lower levels of income. Furthermore, subsequent changes in household income are also significantly associated with the well-being of children at age 4-6 years. Particularly, improving household incomes would be reflected in better indicators of physical health, cognitive ability, and motor co-ordination. Conversely, a reduction in household income over the child´s life is associated with worse developmental indicators at age 4-6 years.

It could be argued that households may plan ahead and adjust to income changes. However, despite the planning that may smooth income drops, results in this thesis suggest that reductions in household income generally affect children negatively and improvements in household income are generally beneficial for children. Townsend (1985) argued that people change their behaviour as a result of reductions in income. It is not possible to test whether people in this sample

changed their consumption or habits as a result of income changes, given the data available in the ENCASEH/ENCEL. However, one could speculate that changes in household income could imply changes in the availability and quality of resources to invest in children. For example, reduction in household income might lead parents to stop performing actions that would be beneficial for children, to reduce the amount of time spent with the child, to change their parenting style to a more stressful or ambiguous one, or to reduce the nutritional, health, and educative resources available for children. These are certainly lines for possible future investigation.

Socio-demographic controls

The explanatory power (regression coefficient and significance level) of the socio-demographic controls included in the analysis was consistent across chapters. Child gender predicts differences in cognitive ability: boys have a slight advantage over girls in the tests of cognitive ability, which may denote differences in the cognitive stimulation and educative resources that boys and girls receive. Household composition was also found to be associated with child outcomes at pre-school age. Children living in households with a larger child to adult ratio were more likely to be stunted, to have an unhealthy weight-for-age, to have lower scores of vocabulary recognition and memory, and to perform worse in certain co-ordination skills.

Maternal education and maternal age were also found to be significantly associated with child outcomes at pre-school age. As previous research has also found, maternal age and level of education are positively associated with child well-being. A possible explanation is that as mothers age and acquire more education, they gain maturity in raising children and in making decisions that are beneficial for the physiological, cognitive, and emotional development of their children.

The socio-demographic characteristic that was found to have the largest and most consistent impact on child outcomes is ethnicity. Indigenous children manifested worse outcomes for health, cognitive, and motor co-ordination than did non-indigenous children. Also, indigenous households had lower income, fewer durables, and worse quality of housing than non-indigenous households. Extensive research has found that indigenous groups in Latin America (CDI, 2011; Hall and Patrinos, 2004; INEGI, 2011) live in the poorest and most marginal areas, tend to have the lowest levels of education and income, and are more likely to suffer from unemployment and health problems.

Socio-demographic characteristics were sometimes associated with the indicators of child well-being in a stronger way than household income or other dimensions of household material

circumstances. Particularly, ethnicity appeared to be associated in a statistically significant way in all of the models developed in this thesis. The indigenous/non-indigenous gap seems to be an important and persistent determinant of child well-being in Mexico. As Fernald and Neufeld state: "In Mexico, communities with largely indigenous populations are often more isolated, and have fewer community and health resources than non-indigenous populations. Furthermore, language barriers may limit the use of available resources as [sic] many individuals, particularly in the poor, rural communities in southern Mexico" (2007, p. 629). Indigenous groups in Mexico tend to face the largest barriers to access health and educative services as well as employment opportunities. This is certainly a matter of concern that raises important policy issues.

Main Lessons

It is relevant to mention that results from the models developed throughout the thesis showed slight differences. For example, there were variations with regard to the specific coefficients of each variable of household material circumstances on the dimensions of child well-being. However, there are substantial issues that are consistent across chapters.

Firstly, results serve as a reminder that "the poor" are not a homogenous group. Lister has argued that media, public discourse, and societies often identify people living in poverty as "the other", in "a dualistic process of differentiation and demarcation, by which the line is drawn between 'us' and `them'" (2004, p. 101). Results in this thesis suggest that there is no "other" given that, even within a sample drawn from poor and extremely poor communities, it is possible to see differences in the material circumstances of households. Thus, it would be inappropriate to treat people living in poverty as a homogeneous group. Importantly, differences in household income, durables, quality of housing, and level of occupation influence child development in a significant way.

Secondly, the results raise important issue for policymaking. Given that the sample is comprised of only households in poor and extremely poor rural communities, differences at the household level (such as income, durables, and quality of housing) are crucial. As argued elsewhere, changes in household material resources seem to represent a larger impact for the well-being of families and children than income differences in richer communities. For example, Strelitz and Lister have argued "that `below a certain level', money really does matter" (2008, p. 1). In other words, 20

Mexican pesos[79] in household weekly income signify more for the poorest households than for richer households.

Results (Chapter 7) indicate that increases in household income are beneficial for children and that decreases in household income have a negative impact on children. Taking as an example a scenario in which household income is increased, it is possible to hypothesise various consequences. Extra income does not necessarily imply better parenting or higher nutritional or educative investments in children. In fact, changes in household resources may adversely change parenting attitudes. However, income increases make it easier for parents who do want to provide better living conditions to children. As Bennett argues, "additional financial support is not sufficient – but it is essential" (2008; p. 121).

Despite the emphasis on poverty, this thesis does not deny the role of socio-demographic aspects in shaping child development. On the contrary, maternal education and age, household composition, and ethnicity were found to be associated with child well-being at pre-school age. Furthermore, even after the socio-demographic elements have been controlled for, household income proved to be significantly associated with indicators of child physical, cognitive, and dexterity well-being at age 4-6 years. Borrowing Mayer´s famous book title "What Money Can´t Buy" (1997a), results from this thesis reveal that Money Can Buy things. Household income may not *per se* be beneficial for the physiological and cognitive development of children. However, Money Can Buy nutritional food, cognitively stimulating toys and activities, safe housing, access to quality healthcare and education, and other elements that are beneficial for children. Even Mayer has found that even after controlling for "a child´s age and family size and parents´ education, age, and race, the effect of parental income on all household living conditions is large and statistically significant" (1997a, p. 107). As Piachaud argued, "what is of concern for the quality of children´s lives and opportunities is not low family incomes in themselves, but their consequences – for nutrition, stress, lack of stimulating childhood experiences, exclusion from social activities" (2001, p. 449).

The importance of household income and other material aspects in shaping child development is something that has been found in existing literature (see Literature Review Chapter). Primarily, the routes through which income affects children have been recognised to be nutrition, education, cognitive stimulation, quality of childcare, and safe environments. However, household income may have other instrumental benefits for children. Sometimes, academic and public

[79] Around £1 at 2011 exchange rates.

discourse has emphasised that non-material elements shape child well-being. However, this could distract attention from the importance that income and material aspects have in setting the opportunities available for parents and carers to raise children. It would only be necessary to see how bringing some pocket money to school, having an in-fashion pair of trainers or a brand new backpack, or going to the trendy teenage singer concert, marks differences in children. Leaving aside the multiple possible discussions about whether these things really matter for a person´s well-being or whether children should be allowed to follow popular trends, one could argue that Money Can Buy material elements attached to status and social acceptance.

Household income and material circumstances are associated with physical health, cognitive ability, and motor co-ordination indicators at age 4-6 years. Given that the analysis concentrates on differences at the household level, and that the socio-economic characteristics of the communities are relatively similar, it is possible to suggest that material changes within the household do matter for child development. Furthermore, the findings that increases in household income are associated with improvements in child well-being suggest that parents tend to provide more and better resources to children if more resources are available. Importantly, more and better resources could be manifested in better physical, cognitive, and motor co-ordination outcomes at pre-school age.

Finally, it is relevant to reflect on what remains unexplained. Firstly, unpacking the *true* effect of each explanatory variable is a hard task. For example, some of the socio-demographic controls included in the models in this thesis may in fact be mirroring socio-economic differences. This is especially the case of maternal education in Latin America, which is closely tied to ethnicity and income (Calvario and Granados, 2008; Hall and Patrinos, 2004). In many cases, various dimensions of poverty co-exist; i.e. low income, low levels of education, bad quality of housing, and unemployment. This makes it difficult to establish causal relationships between these elements and between these elements and the indicators of child well-being. The use of SEM in this thesis facilitated the inclusion of multiple relationships in the analysis. However, as Aber *et al* have stated about research on the effects of poverty on children, "perhaps more important is the lack of agreement on the set of controls that should be included in the modeling [sic] of this relationship in order to determine the 'true´ or net effect of poverty, independent of its cofactors" (1997, p. 463).

Secondly, there is an unsolved issue related to resilience of children. As some scholars (Masten, Best, and Garmezy, 1990; Boyden and Cooper, 2007; Schoon, 2006) have pointed out, issues remain unexplained in relation to why some children are able to flourish physically,

cognitively, and emotionally despite growing up in poverty. Specifically, even though the entire sample is comprised of children living in poor and extremely poor communities, a good proportion falls within healthy ranges in the indicators of well-being. In this sample (See Annex 1: Descriptive Statistics), around 70% of children have a healthy height-for-age, 92% have a healthy weight-for-age, 95% have a healthy BMI, and 85% do not have anaemia. Also, between 12% and 35% of the sample performed above average in the tests of cognitive ability. Also, more than 90% of children were able to perform motor skills, with the exception of skipping (80%). It would be interesting to explore what is behind the indicators of well-being despite the fact that children are living in relatively similar conditions of poverty.

As the previous paragraphs have described, the various chapters in this thesis showed consistent findings in relation to the association between household poverty and some indicators of child well-being at pre-school age. In order to crystallise the consistency of results, the next section offers an appraisal of the data and the methodology used.

Data and Methodology: A Final Evaluation

This section provides some reflections about the data and methodology used.

Data

A first issue that emerges in relation to data is the availability of panel surveys in Mexico. At the moment of writing, there are only two families of longitudinal surveys existing in the country. One panel is the Mexican Family Life Survey (MxFLS)[80]. This is a survey that includes variables related to household income, expenditure, health, nutrition, fertility, prenatal care, education, employment, migration and victimization at the household level; as well as health and educational facilities at the community level. The MxFLS also contains biometric information and results of the Raven Intelligence Test for all members in the household. The panel includes more than 8,000 households and is representative at the national and rural/urban levels. However, this effort is still in its early stages, given that only two waves have been produced: one released in 2004, and another one released in 2008.

[80] Further information available in http://www.ennvih-mxfls.org/

The other family of panels in Mexico is the evaluation surveys of PROGRESA-Oportunidades, which contains a rural (ENCASEH/ENCEL) and an urban (ENCELURB) series[81]. As the Methodology Chapter described, the ENCASEH/ENCEL include information about income, expenditures, food consumption, quality of housing, household durables, health practices, and education and employment indicators every six months between 1997 and 2003, as well as indicators of child well-being in 2003. Similarly, the ENCELURB was deployed in urban areas to assess similar kinds of information for Oportunidades recipients and for a control group. However, this survey has only been run in years 2002, 2003, and 2004. At present, the ENCASEH/ENCEL is the panel survey that covers the longest period of time (1997-2007). Also, it is the one that includes the most comprehensive indicators of child well-being at pre-school age. Therefore, it is the one that best suited the objectives of this thesis.

Secondary data certainly facilitates research, reduces costs and time, allows the analysis of large samples, and makes it possible to link findings with previous research that has also used the same data (Kiecolt and Nathan, 1985). However, the use of secondary data also presents some limitations. Primarily, data that has been previously collected may not necessarily match the research questions. This is particular relevant in Structural Equation Modelling. According to Kline (2005), the ideal steps would be to first establish the models and then to collect the data. This is related to the second point of reflection about the data. The ENCASEH/ENCEL was designed for purposes that are different from the research questions that drive this thesis. Hence, many of the elements that are theoretically assumed to influence child well-being have not been included due to data limitations. Particularly, it has not been possible to fully address the role of parenting *vis-a-vis* the physiological, cognitive, and emotional development of children during the pre-school years. This limitation seems to be a common problem in research, as Lugo-Gil and Tamis-LeMonda state, "with a few notable exceptions, studies that jointly consider the influences of parenting quality and economic resources on children´s outcomes are based on limited resources of one or the other construct" (2008, p. 1067).

A second issue that emerges about the data used in this thesis is the use of income as a measure of household poverty. The research questions that drive the analysis were addressed under the assumption that household income is a suitable indicator of the material circumstances in which child development is embedded. Chapter 5 utilised income along with other dimensions of household material circumstances (quality of housing, consumer durables, agricultural means, and

[81] Details about the ENCEL and ENCELURB are found in http://evaluacion.oportunidades.gob.mx:8010/index2.php?a=1024

occupation) to explore the association between poverty around the time of the child´s birth and indicators of well-being at 4-6 years of age. Chapter 6 and Chapter 7 utilised household income, but not the other dimensions of material circumstances, to examine whether timing and overall trajectories of poverty are associated with indicators of child well-being at pre-school age.

A debate about whether income is the best approach for measuring household poverty is beyond the scope of this thesis. However, this is a good opportunity to raise some questions about the benefits and difficulties of using income as an indicator of poverty. As Desai and Shah argued, "any attempt to measure poverty runs into some familiar questions. First is the problem of definition" (1988, p. 505). A common approach for defining 'poverty´ is to establish the cost of meeting certain goods and services that are understood to be necessary in life. This approach, identified as the Budget Standard by Piachaud (1987) and by Alcock (1993), is based on Van Praag, Hagenaars, and Van Weeren´s (1982) work, who established a poverty line based on the amount of income that people argued to be necessary for living a decent life. From this definition of poverty, income would seem to be an appropriate indicator for measuring someone´s capacity to acquire and maintain a certain life-style. Thus, Ringen (1988) argued that income is an indirect way of measuring direct living standards (i.e. food, housing, clothing).

The use of income in researching the association between poverty and child well-being is extensive (see Literature Review Chapter). Ruggeri, Saith, and Stewart (2003) identified three reasons why income has often been used to measure poverty: (a) income permits comparisons between individuals and can account for heterogeneity across a given population; (b) income is understood as a right that provides freedom to maximise someone´s utility; and (c) income is assumed to be a proxy for other aspects of welfare. Therefore, income facilitates the establishment of a threshold under which an individual or a household is identified as living in poverty and allows comparisons between groups. Also, utilising income as a proxy for poverty allows results in an examination like this to be comparable with existing research and with official figures.

Despite its widespread use, income as a measure of poverty has also been criticised. First, it has been argued that income reports may involve unintentional or intentional inaccuracies. Given that income measures primarily rely "on self-reported income in survey data, [this approach] tends to underestimate the incomes of the poorest people" (Figari *et al*, 2012). For example, a measurement of income at a single time-point may not reflect the overall income experience of a household over a longer period of time. Also, people may over or under-report their income if they

believe that their answer is tied to ulterior motives (such as defining their eligibility for a governmental programme).

Income has also been criticised by some scholars as a measure of poverty because it may not entirely capture certain living standards. According to Lister, "people may have a low standard of living for reasons other than current low income" (2004, p. 39). That is, if poverty is defined through a broader set of aspects that encompass quality of life, such as ethnically-rooted exclusion, human rights abuses, or lack of participation in social structures, then income would be an insufficient indicator for capturing whether someone is in a situation of poverty. Income measures are a good approximation to material poverty, but as Gilbert argued, "although these income-based measures generate social indicators that are concrete, plausible, and convenient to use, they fail to convey the experiential quality of poverty as a condition of life—living hungry, cold, unable to meet normal social expectations, and in dread of what the future holds" (2009, p. 738).

Using income as a measure of poverty in this thesis has certainly been challenging. Similarly to the work of other scholars (Desai and Shah, 1988; Tomlinson, Walker, and Williams, 2008), income was first conceived in this study as a dimension of poverty (Chapter 5). However, it was important to take into consideration the nature of the sample, which was drawn from communities identified as poor and extremely poor by the Mexican government. The official classification of communities into poor and extremely poor was based on aggregate figures of access to public services, housing characteristics, levels of education, income, and employment rates. Therefore, households in the sample shared relatively similar living conditions at the community level. However, descriptive statistics showed that income was the deprivation indicator with the largest variation between households in the sample and across waves of the panel (see Annex 1). Taking these issues into account, the analysis in subsequent chapters (Chapter 6 and Chapter 7) maximised differences within the sample by utilising income as a proxy for degree of poverty. Also, income was used as the main indicator for timing and trajectory of poverty over time.

The first challenge that emerged in the analysis was in terms of the accuracy of income measurements. The data used in this thesis is a good example of a hypothetical case where households could under-report their income, given that participants were aware that the first round of the panel survey was used to allocate PROGRESA-Oportunidades´ cash benefits and that subsequent rounds were used to evaluate and potentially expand the programme. Additionally, even though only 14% of the sample reported to conduct some informal self-employment activity,

reports of formal employment in pay-roll could have been seasonal depending on crops or irregular due to temporary contracts. In terms of employment and income, it seems that the rural-urban division in Latin America is not strictly defined: people may live in rural areas but do some of activity that is tied to the urban economy or some members of the household may migrate for the day and work urban centres. As Waters (1997) describes:

> [Self-employment] is regarded as an essentially urban phenomenon, and its analysis frequently invokes images of sprawling marketplaces, city thoroughfares choked by sidewalk kiosks, and ambulatory vendors offering thousands of different goods and services. Alternatively, the informal sector is said to be swelled by innumerable rural migrants, who have lost or abandoned their land and who are then transformed into permanent fixtures of urban society (Alarcon, 1987). Both concepts are limited, however, because they fail to account for large numbers of people who continue to reside and work in rural areas but also participate in the urban economy. Complex patterns of agricultural restructuring, changing international trade, land ownership, and evolving class structures have forced rural households to develop complex survival strategies that often bring them into close contact with urban centers. (Waters, 1997, p. 50).

Presumably, the complexity of activities carried out by households involves larger difficulties for obtaining precise income figures in the absence of paychecks or receipts that would confirm the information provided by the informants. Furthermore, it was necessary to account for temporality of income derived from informal self-employment (such as casually selling agricultural products or doing laundry for other people occasionally). This challenge was addressed by verifying the internal consistency and the external validity of the income figures. On the one hand, the internal validity of income figures was assessed by looking at patterns of reported income over time, individually for each of the 2,000 cases. On the other hand, the external validity of income figures was confirmed by comparing mean income of this sample with similar samples utilised in other pieces of research and with official figures for these localities at the national level.

A second challenge in the analysis was to evaluate whether household income captured the living standards of the sample. The group of households utilised in the analysis have previously been identified as living in poor and extremely poor rural communities in Mexico. When the panel survey started (in late 1997), around 60% of the households had dust floor, around 75% had non-durable roofing, and 63% did not have access to running water in their plot. Also around this time, only 28% of households had a stove, fewer than 14% had a refrigerator, and 45% had a television. With regard to livestock, around 15% reported having goats; 21% had cows, 70% had chicken, and 42% had pigs. Finally, only around 15% were formally employed in non-agricultural activities. This description hints at a situation in which households primarily seem to depend on agricultural activities and where costs of living are lower than in urban areas.

Some could picture a situation in which "the rural poor are not really that poor: very few go hungry, fewer still are homeless, and many enjoy easy access to nature and its abundance while benefiting from the tightly-knit social fabric that many rural settings provide" (Government of Canada, 2006, p. 1). If one regards the rural context in such way, questions about the suitability of income as an indicator of quality of life in rural communities may emerge. This idea, however, shows a partial reality of poor rural communities in Mexico. In Mexico, homelessness is less likely to appear in rural areas than in urban areas and around two thirds of the total housing stock in the country is self-built (CIDOC, 2004). However, a large proportion of households in rural areas may suffer from over-crowdedness, bad quality housing, and lack of water and sanitation services (CONAPO, 2011).

Perhaps income is not capturing the entirety of living conditions in rural settings: income does not capture employment instability or time spent commuting to the city, nor does it capture sanitary conditions, access to a varied nutritional basket, or the difficulties children face while walking to school. Despite this limitation, income still appears to be important in rural settings: even if households were assumed to consume their produce and build their own houses, income would be necessary for maintaining livestock and crops, paying energy and water bills, transportation, school-related costs, house maintenance, clothing, medical care, and leisure. Importantly, throughout the thesis, income was found to be associated with indicators of child well-being, after controlling for various other socio-economic characteristics.

A third challenge was related to the relationship between income and other indicators of socio-economic status. As some authors have pointed out (Aber *et al*, 1997; Brooks-Gunn, Duncan, and Maritato, 1997), measuring the *true* effects of income on indicators of well-being is a difficult task. Particularly, disassociating the effect of income from the effects of other socio-economic characteristics could be problematic because income and these other variables could be intimately correlated. In this sample, in fact, ethnicity and maternal levels of education were highly correlated with household income.

At very low levels of income, "there may exist `feedback loops´ operating in such a way that certain factors, originally conceived of as consequences of poverty, tend to exacerbate a poor person´s situation" (Whelan and Whelan, 1995, p. 46). For example, illness, low education, or limited work experience could be a consequence of poverty but could also result in low income. Furthermore, evidence suggests that the probability of living in poverty is, to large extent, associated

with previous episodes of poverty (Hulme and Shepherd, 2003; Rank and Hirschl, 2001; Walker, 1995). In a sample like the one used in this thesis, which was drawn from communities identified as poor and extremely poor, low levels of income coexist with low levels of education, high rates of informal self-employment, poor quality housing, low access to public services, and generally low living standards. Bearing in mind the characteristics of the sample, the analytic approach aimed to isolate the association between household income and the indicators of child well-being by including various socio-economic and demographic variables as controls.

Finally, a third issue related to data is the relevance of the tests included in the ENCEL to measure the well-being of Mexican children. On the one hand, indicators that measure physical health seem to be the least problematic of the four domains of well-being included in this thesis. Some may argue that the thresholds of healthy ranges for height, weight, and BMI do not necessarily correspond to children included in the sample of the ENCASEH/ENCEL because they have been established by international norms. However, reference growth tables for these health indicators are claimed to be based on extensive empirical findings. WHO growth charts have been developed by taking into account more than 8,400 children in Brazil, Ghana, India, Norway, Oman, and the United States. It has been found that, under equal health and socio-economic circumstances, human growth is relatively similar during the first five year in life (De Onis and Yip, 1996). Thus, the international norms of the WHO "describe `how children should grow', which is a prescriptive approach, not just descriptive" (WHO, 2011). So far, this is the best attempt to represent average human development that can serve as a reference. Even more, the growth reference tables established by the WHO have officially been set as the norms for action for the Health Ministry in Mexico (NOM-031-SSA2-1999). Hence, these indicators represent an accurate approach to measure physical health of children at pre-school age.

The appropriateness of using international tests for measuring cognitive ability, motor co-ordination, and emotional well-being in rural Mexico could be more debatable. The Woodcock-Johnson (WJ) and the Peabody Picture Vocabulary Tests (PPVT), which measure indicators of cognitive ability, have been adapted to Latin America. Thus, these tests have been conducted in Spanish and include vocabulary that is familiar in the context of the region. However, an important proportion of children (43%) in this sample are of indigenous background. Possibly, indigenous children have a disadvantage in the WJ and PPVT with regard to non-indigenous children given that Spanish is not their main language. With regard to motor co-ordination, the McCarthy Test evaluates dexterity skills that are assumed to be mastered by children between 2.6 and 8.6 years of

age. However, it does not account for specific differences that occur within this age range. Finally, the Achenbach Child Behaviour Checklist enquires about problems that could be defined by western values and not necessarily related to the ones of the communities included in the sample.

A debate about the transferability of concepts and indicators to different contexts is an issue beyond the scope of this thesis. However, it is argued here that the analysis was conducted with the best available data and the best methodological approach. Caveats in data open up a reminder about the need to develop longitudinal studies and measurement instruments for examining the state of child well-being in Mexico. The next section presents some reflections about the method and models used.

Method and Models

Structural Equation Modelling (SEM) proved to be a powerful tool for testing various hypotheses about the ways in which household poverty affects child well-being. Firstly, SEM allowed us to measure unobserved concepts through observed indicators. Thus, it was possible to relate complex ideas such as "poverty" and "child well-being". Secondly, SEM made it possible to look at outcome indicators in a simultaneous way. Hence, it facilitated a comprehensive perspective of child well-being. Thirdly, SEM included multiple correlations between assumed causes and effects. Therefore, it made it possible to construct a narrative that tested theoretical suppositions about the effects of poverty on children. And finally, SEM permitted the development of various types of modelling, which served to address the specific research questions.

The examination conducted throughout the thesis was a cumulative process, where results served as the foundation for subsequent chapters. Nevertheless, each type of model addressed particular research questions. Therefore, there are important differences in the analytic strategy between models. Multiple Indicator Multiple Cause (MIMIC) Models on Chapters 5 and 6 evaluated the assumed effects of household material circumstances in specific moments in the past on indicators of well-being. Growth Models on Chapter 7 calculated average rate of income change and linked overall trajectories over a 4 to 6 year-span with indicators of well-being. In both cases, the use of various waves of the panel from around the child´s birth to age 4-6 years facilitated a causal narrative.

Two main lessons are derived from the various models tested. The first one is related to the use of income as an assessor of poverty. Even though it is recognised that poverty is a multi-

dimensional phenomenon, income proved to be a predictor of child well-being. Conceptually, only it serves as a proxy for the resources available for child rearing. In practice, it was the indicator with the largest variation and the one that allowed the production of models with the best fit. The second one is related to the time-dimension of indicators. Measurements of household material circumstances at a single time-point proved to be significantly associated with child well-being. However, it seems that the longitudinal experience is a more accurate depiction of how poverty affects children. This provides an argument in favour of longitudinal poverty measurements over assessments at a single point in time.

After reviewing the main findings and reflecting about data and methods utilised in the thesis, it is possible to make an overall assessment of the contributions and limitations of this study. These are presented next.

Limitations and Contributions

This study has some limitations that are inherent to quantitative research with secondary data. Mostly, these limitations are derived from the data. Even though the ENCASEH/ENCEL provides rich information about the material circumstances of households, it contains important gaps. Particularly relevant is the fact that there is no information for 2001 and 2002, and that information on parenting for the cohorts of children included in this study is not available[82]. Therefore, the models developed in the thesis are to some extent data-driven. On the one hand, the models that looked at timing of poverty could not evaluate the effects of household income in the two years that were missing. On the other hand, issues that were theoretically assumed to be important in shaping child development, such as parenting, have not been included.

Secondly, an issue that represents a fresh approach to the topic is also a drawback: the sample is contained within poor and extremely poor rural communities. The fact that results are generally consistent with research conducted in other countries makes it possible to infer that a similar situation would be observed at the national level in Mexico. However, given that the sample is not nationally representative makes it impossible to be certain of whether the same relationships are found in households living in more affluent communities.

[82] The database contains information about issues related to parenting. For example, parental attendance to school meetings, expectations about children´s educative and employment prospects, and gender roles. However, these questions were asked only for parents with children aged 6 and older.

Finally, the uniqueness of this research project could be problematic. The fact that no other study has utilised the same database to explore the same research questions makes it difficult to triangulate the results.

This study, however, also possesses various contributions. Firstly, it provided an examination of the effects of poverty on child development in a context that has not been explored as extensively as other regions in the world. The analysis in this thesis helped to test whether findings in the United States and the United Kingdom are similar in a different context: Mexico. In fact, results in the sample of children living in poor rural communities in Mexico are consistent with the ones in other countries: deeper levels of poverty are associated with worse indicators of child well-being. Similarly, certain socio-demographic characteristics were also found to be associated with child outcome. Particularly, maternal education, ethnicity, and household composition were found to be associated in a statistically significant way with child physical health, cognitive ability, and motor co-ordination. This supports the WHO´s conclusion that child development up to the age of 5 is relatively equal and influenced by similar elements in all regions of the world (De Onis and Yip, 1996; De Onis and Blössner, 2003).

Secondly, the approach and methodology used in this thesis are novel within research in Mexico. As the Literature Review chapter revealed, most research in Latin America has looked at the relationship between poverty and child well-being in a cross-sectional way. These studies have provided crucial information about the measurement of child well-being and about the relationship between household material circumstances and child well-being. However, longitudinal examinations convey a more accurate depiction of reality and how changes in household material circumstances influence the developmental process of children. Also, most of the pieces of research that have used the ENCASEH/ENCEL have evaluated the effects of PROGRESA-Oportunidades on households and on children. These pieces of work are certainly helpful in understanding the role of programmes like PROGRESA-Oportunidades. However, scholarly work in Mexico has not used the data to look at how household material circumstances affect the well-being of children. To the best of our knowledge, this thesis is the first examination that looks at the effects of poverty on children at pre-school age in a longitudinal way in the country.

A third contribution of this study is that it provides a more detailed and thoroughgoing investigation of those "in poverty." Once again, most research in Latin America has looked at

differences in well-being between children living in poverty and those living in better-off conditions. The rural-urban disparities in Mexico with regard to public infrastructure and socio-economic development are extensively known and have been widely documented (Damián and Boltvinik, 2003; CONEVAL, 2011; Lustig and Székely, 1997; UNICEF, 2003; World Bank, 2005). However, variations within rural communities have not been fully addressed. This study offers a different perspective by looking at the extent to which depth of household poverty within poor and extremely poor rural communities matters for child development.

Another contribution of this thesis is that it utilises an innovative methodology. Structural Equation Modelling (SEM) allowed an examination of the effects of various elements on four dimensions of child well-being in a simultaneous way. SEM permitted a sound statistical analysis by testing the hypothesised effects of numerous explanatory variables at the same time. Furthermore, the examination of the effects of poverty on children was conducted through various types of models. Each kind of model complemented each other to address specific issues of whether depth, timing, and overall experience of household poverty are associated with well-being at pre-school age.

This thesis has helped in the advancement of knowledge on the effects of poverty on children. Many issues about the association between household poverty and child well-being have been addressed and many remain unexplained. Nevertheless, this thesis helps to delineate the road for future examinations, both in terms of the issues addressed and the methodology used. Possible lines of research are described in the next section.

Future Lines of Research

Research on the effects of poverty on children has certainly evolved during the last decades. As methodological tools have gained sophistication and theoretical frameworks have been enhanced, some studies have started to account for multiple relationships that take place between material and non-material elements that shape child development. This study has contributed to the field by exploring the effects of household material circumstances on indicators of child well-being at pre-school age. However, this piece of research could be complemented with other types of modelling, such as Latent Class Analysis. This type of modelling would allow an evaluation of

whether different classifications of poverty experiences are associated with child well-being. Also, the examination conducted herein could be enriched by including a qualitative approach. It would be interesting to understand children's perspectives about their well-being and their histories of household material circumstances. Furthermore, it could be enriched by including the role of parenting, nutrition, and other non-material elements that influence the developmental process of children. Finally, this research could be expanded to follow the well-being of the same sample later in life if further waves of the panel survey become available.

Findings from this thesis not only provide possible ways to expand the same study but also two parallel lines of research come to mind. One, it would be interesting to evaluate the coping strategies of households when income changes take place. Perhaps, it is not so much whether specific time-points or the overall trend of household income are associated with indicators of child well-being but whether parents can pre-empt income changes. Also, it is perhaps the kind of coping mechanism that shapes child outcomes. And two, it would be novel to evaluate the relationship between household (material and subjective) conditions and child well-being the other way round. Put simply, to look at the benefits that healthy, cognitive stimulated, and emotionally stable children bring to households.

Many issues with regard to how poverty affects children certainly remain unexplained. However, perhaps not all aspects involved in child development should be or could be *Scientified*. Using Edgar´s words, "every parent knows that having a child carries a certain cost. That people continue to have children suggests that they bring as well certain benefits" (1989, p. 173).

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Software utilised:

AnthroPlus v1.0.2
MPlus version 5.21
SPSS version 16.0

Differences that Count:
Effects of Household Poverty on Children in Rural Mexico

Technical Appendices

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TECHNICAL APPENDICES

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ANNEX 1

Descriptive Statistics

This annex provides the descriptive statistics for the variables used in this thesis.

Socio-demographic Overview

When well-being was assessed (in 2003), around 45% of the sample were aged 4 years, 50% were aged 5 tears, and less than 4% were aged 6 years. Practically half of the sample are boys and half of the sample are girls. With regard to ethnicity, almost 43% of the children are considered to be indigenous. In 2003, almost 77% of the households were receiving PROGRESA-Oportunidades. Finally, levels of maternal education were very low: around 18% of the sample´s mothers did not have any formal education. Around 70% have completed some basic education, out of which only 31% have completed all 6 six of primary education[83].

Table A1.1. General Characteristics of the Sample in 2003

Age in months N = 1870	4 years: 45.7%	5 years: 50.5%	6 years: 3.8%
Gender N = 1870	Female: 49.7%	Male: 50.3%	
Indigenous background N=1870	Yes: 42.8%	No: 57.0%	No Answer: 0.2%
PROGRESA-Oportunidades recipiency N = 1870	Yes: 76.6%	No: 23.4%	
Maternal education (years of formal education) N = 1719	0 (no education): 17.5 % 1 year: 3.5% 2 years: 9.0 % 3 years: 12.0% 4 years: 7.9%	5 years: 5.4% 6 years: 31.2% 7 years: 1.2% 8 years: 1.4%	9 years: 9.3% 10 years: 0.1% 11 years: 0.5% 12 years: 1.2%

Physical Health

Around 29% of the sample was stunted (below 2 SD of the height-for-age reference). Around 8% of the sample was outside the healthy range for weight-for-age, and more than 4% did not have a healthy BMI. With regard to haemoglobin concentration, around 17% of the sample manifested anaemia. This is summarised in Table A1.2.

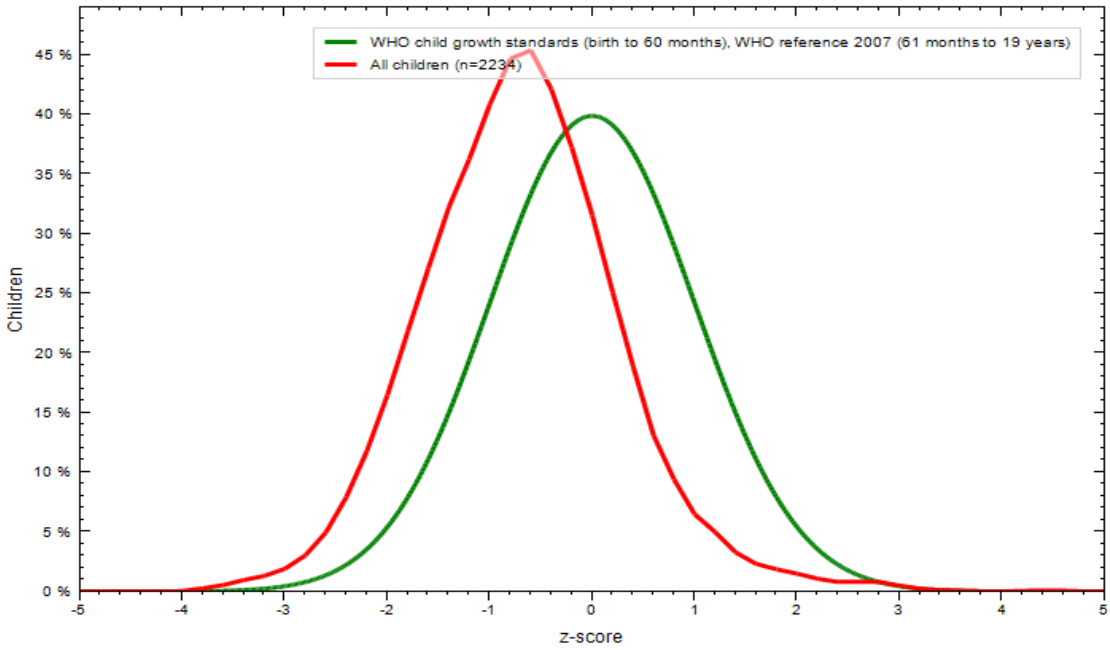
Table A1.2. Physical Health

Indicator	**Healthy Range (%)**	**Out of Healthy Range (%)**
Height-for-age	71.1	28.9
Haemoglobin concentration	83.5	16.5
Weight-for-age	91.6	8.4
BMI-for-age	95.7	4.3

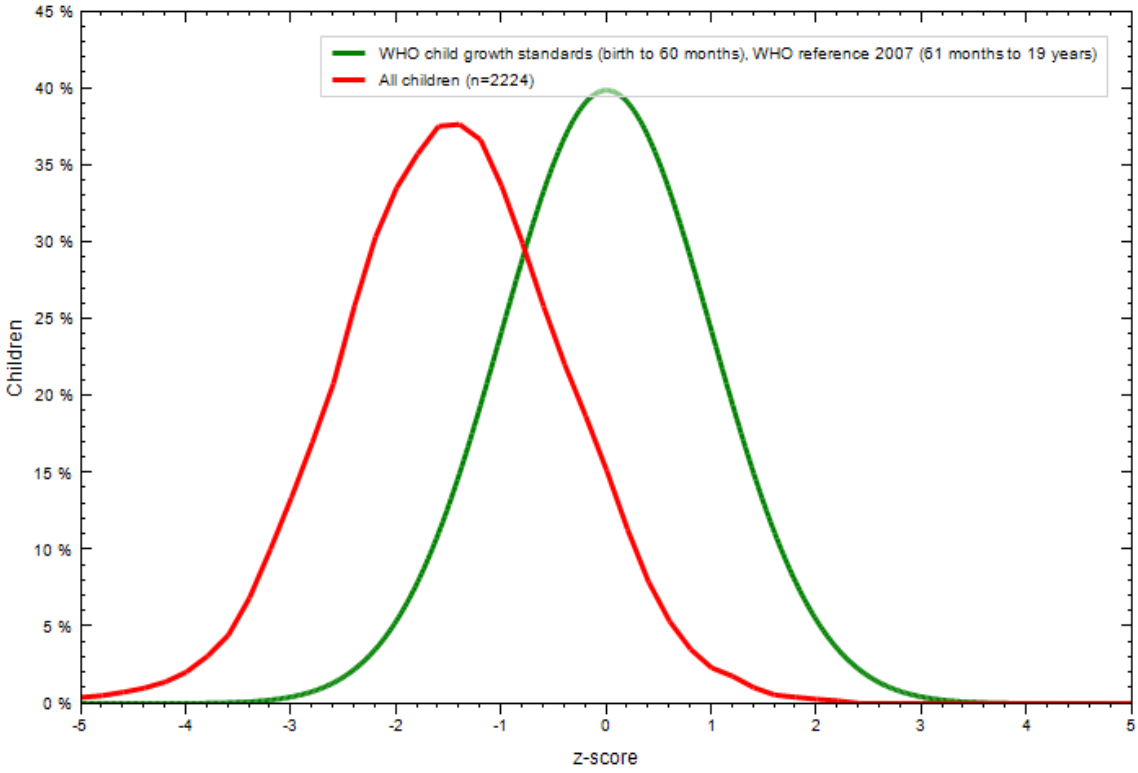
[83] It is relevant to mention that basic education (6 years of primary and 3 years of secondary) in Mexico is free and compulsory. National average for people aged 15 years and older was 8.6 years of completed education (2010 figures). More information at http://www.inegi.org.mx/sistemas/mexicocifras/default.aspx; reviewed in February 2011.

The distribution of the sample against the international norms shows that the mean for height-for-age and for weight-for-age fall below the norm, with -1.45 SD and -.68 SD respectively. However, mean BMI is 0.4 SD above the international mean. This is visualised in the following graphs[84]:

Graph A1.1. Weight-for-Age

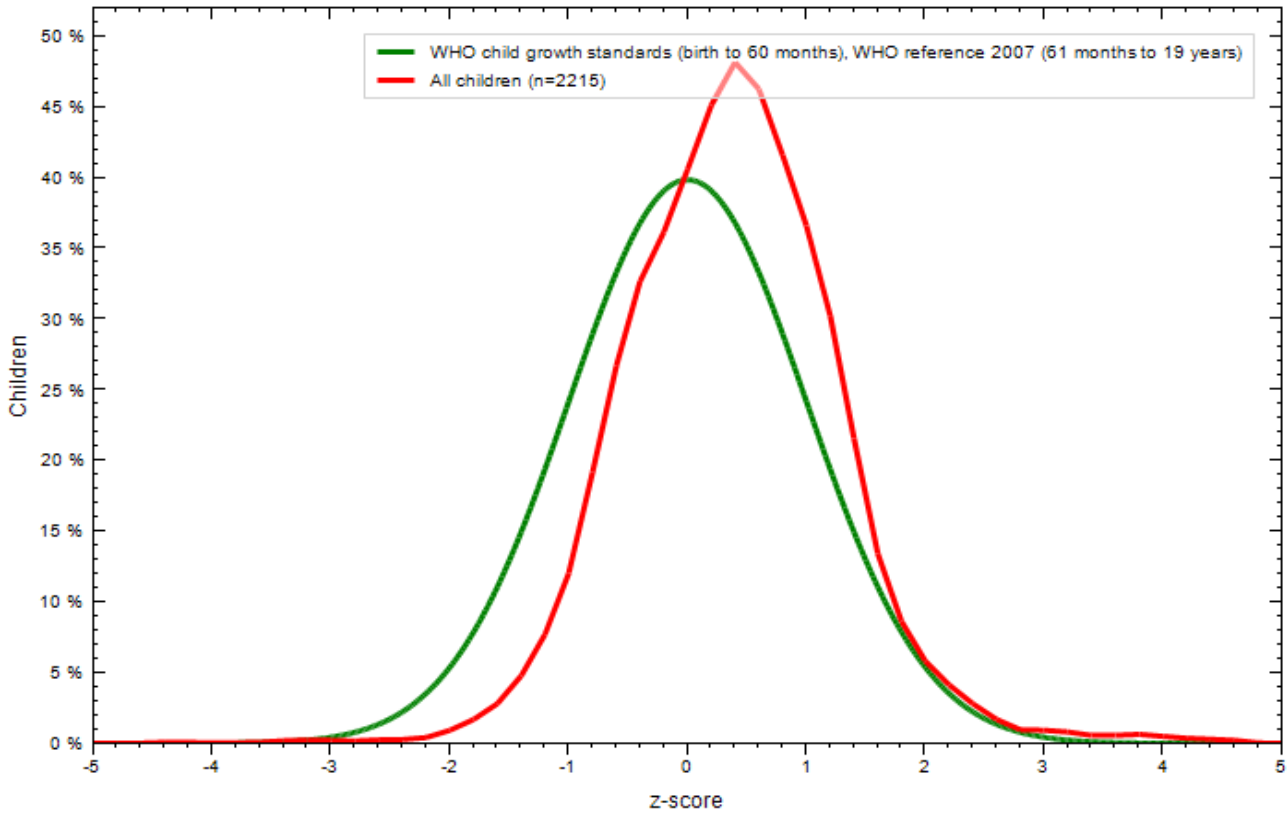


Graph A1.2. Height-for-Age



[84] Graphs for weight-for-age, height-for-age, and BMI-for-age were elaborated using AnthroPlus v.1.0.2.

Graph A1.3. Body Mass Index (BMI)



Cognitive Achievement

Most children tended to score in the lowest stanines for both the PPVT and the WJ.

Table A1.3. Woodcock-Johnson Tests and Peabody Picture Vocabulary Test

Woodcock-Johnson Memory for Names		**Woodcock-Johnson Visual Closure**		**Woodcock-Johnson Memory for Phrases**		**Peabody Picture Vocabulary Test**	
Stanine	%	Stanine	%	Stanine	%	Stanine	%
1	47.9	1	34.8	1	22.6	1	42.9
2	13.5	2	13.7	2	10.5	2	19.5
3	11.7	3	15.5	3	16.0	3	15.5
4	11.1	4	12.0	4	15.6	4	9.3
5	8.7	5	12.5	5	14.9	5	6.1
6-9	7.1	6-9	11.6	6-9	20.4	6-9	6.7

Motor Co-ordination

Most of the children were able to execute these tasks although a good proportion reported to perform three of the tests as "partially able".

Table A1.4. McCarthy Test

Sub-Test	Not Able (%)	Able (%)	Test	Not Able (%)	Partially able (%)	Able
Test 1: walking backwards	4.5	95.5	Test 6: skipping	19.9	33.3	46.7
Test 3 : walk on tip-toes	7.3	92.7	Test 2: standing on one foot	1.8	29.6	68.6
Test 5: walk in a straight line	7.2	92.8	Test 4: standing on the other foot	2.0	29.7	68.2

Emotional Competence

There is wide variation in the emotional problems reported by parents.

Table A1.5. Achenbach Child Behaviour Check-list (ACBC)

Item %	1	2	3	4	5	6	7	8	9	11	12	13
yes	43.5	26.5	25.8	27.5	20.7	43.9	39.1	22.4	37.6	26.8	49.7	33.6
Some-times	19.4	12.9	11.8	20.4	14.5	15.3	13.3	10.1	29.9	13.3	11.7	0.93
No	37.1	60.6	62.4	52.0	64.7	40.8	47.5	67.5	32.5	59.9	38.6	57.2

Item %	14	15	16	17	18	19	20	21	22	23	24	25	26
Yes	44.2	26.1	29.5	15.1	20.6	13.9	34.6	17.8	32.1	36.5	7.2	18.1	21.8
Some-times	11.4	12.9	13.4	8.2	11.9	9.4	14.3	17.3	14.1	13.9	7.3	10.6	12.3
No	44.4	61.0	57.1	76.6	67.5	76.7	51.1	64.9	53.7	49.6	85.5	71.3	65.9

1: arguing; 2: bragging; 3: feeling lonely; 4: crying; 5: abusiveness; 6: demands too much attention;
7: destroys own belongings; 8: destroys others´ belongings; 9: disobeying; 11: guiltless;
12: jealousness; 13: afraid of acting wrong; 14: perfectionism; 15: feels unloved; 16: paranoid;
17: feels inferior; 18: fighting; 19: friends with problematic people; 20: prefers to be alone;
21: cheats and lies; 22: nervous; 23: anxious; 24: feels dizzy; 25: feels guilty; 26: overtired

Table A1.6. Household Durables around Birth

Item	**% of possession N = 1163**
blender	28.7
fridge	10.9
stove	27.0
radio	55.2
TV	40.5

Table A1.7. Quality of Housing around Birth

Item	**% according to type**
Flooring material N = 1103	Dust = 61.7 Cement or similar = 38.3
Roofing material N = 1103	Cardboard or similar = 19.2 Wood or similar = 16.8 Metal or similar = 37.6 Cement, brick, or similar = 26.4
Walls material N = 1101	Cardboard or similar = 0.6 Wood or similar = 7.4 Metal or similar = 37.7 Cement, brick, or similar = 54.2
Water in the plot N = 1057	No = 64.3 Yes = 35.7

Table A1.8. Agricultural Means around Birth

Item	**% of possession**
Cows	15.4
Goats	12.2
Pigs	36.8
horses	16.7
Chicken	59.1
Land	60.3

Graph A1.4. Weekly Household Income (OECD equivalised) Around Birth (Logarithm)

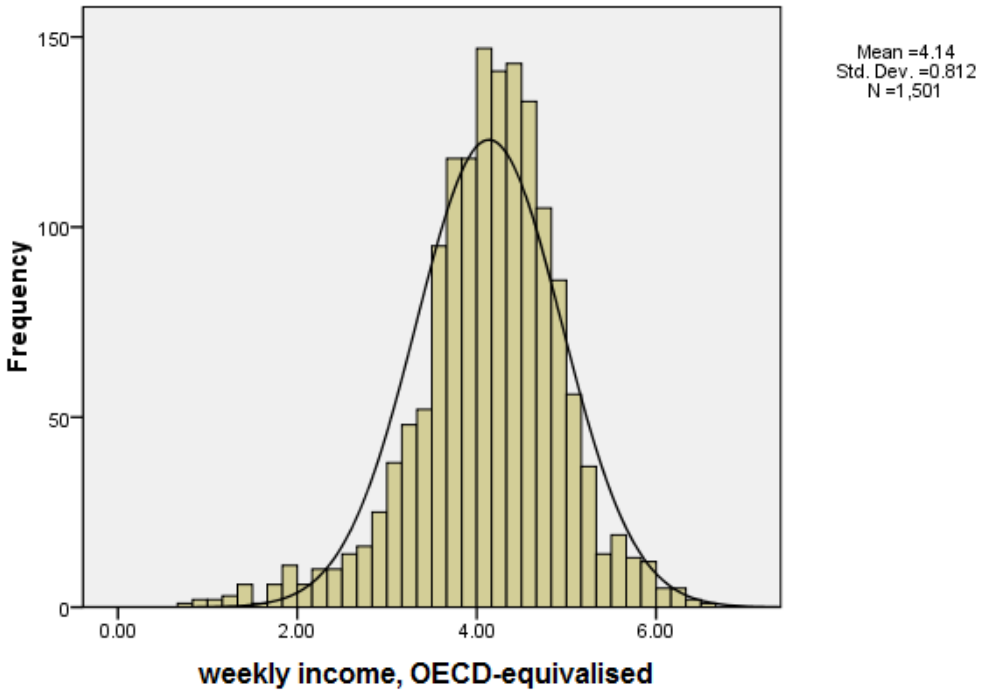


Table A1.9. Occupation

Type of occupation (non-agricultural)	**% of households with members in each type**
Payroll	15.1%
Self-employed	12.2%
Small family business	5.5%
Figures do not add up 100% because people may work in agricultural activities or a combination of various activities	

Table A1.10. Infant Care Practices

Item	**% of positive answers**
Breastfeeding	94.5%
Tuberculosis vaccine	83.3%
Diphteria-Tetanus-Pertussis vaccine	83.5%
Poliomyelitis vaccine	89.1%
Measles vaccine	35.0%

Household Poverty Data in Each Wave of the Panel

Weekly Income: Figures in Mexican pesos (inflation accounted for); OECD-equivalised and exclude top and bottom 1%.

Table A1.11. Household Income 1997-2003

OECD-equivalised household weekly income in 1997 prices, excluding top and bottom 1% of the sample		1997-October	1998-October	1999-March	1999-November	2000-March	2000-November	2003-September
Mexican Pesos	**Maximum**	525.00	406.82	246.95	373.95	383.51	498.62	547.53
	Mean	81.23	61.48	56.48	68.28	72.55	70.60	94.86
	Minimum	2.88	2.01	1.67	5.00	5.36	4.02	4.69
Logarithm	**Maximum**	6.26	6.01	5.51	5.92	5.95	6.21	6.31
	Mean	4.09	3.81	3.71	4.00	4.07	4.01	4.26
	Minimum	1.06	0.70	0.52	1.61	1.68	1.39	1.54
	Number of cases	1779	1663	1463	1670	1688	1635	1782
	Own calculations using Consumer Price Index for each time-point, available at Bank of Mexico´s website							

Table A1.12. Quality of Housing 1997-2003

Item	1997-October	1998-October	1999-March	2000-March	2000-November	2003-September
Floor	Dust = 62.9% Cement or similar = 37.1%	Dust = 61.8 Cement = 38.2	Dust = 61.4 Cement = 38.6	Dust = 60.7 Cement = 39.3	Dust = 61.1 Cement = 38.9	Dust = 48.9 Cement = 51.1
Roof	Cardboard or similar = 20.8% Wood or similar = 14.9% Metal or similar = 39.9% Cement or similar = 24.4%	Cardboard =19.7 Wood =15.5 Metal=39.7 Cement=26.5	Cardboard =18.8 Wood =16.0 Metal=38.7 Cement=26.5	Cardboard =17.2 Wood =16.5 Metal=38.8 Cement=27.4	Cardboard =17.3 Wood =16.4 Metal=38.1 Cement=28.2	Cardboard =14.0 Wood =9.2 Metal=45.4 Cement=31.4
Walls	Cardboard or similar = 0.5% Wood or similar = 7.5% Metal or similar = 37% Cement or similar = 54.9%	Cardboard =0.5 Wood =7.4 Metal=37.1 Cement=55.0	Cardboard =0.5 Wood =7.3 Metal=37.2 Cement=55.0	Cardboard =0.5 Wood =7.5 Metal=37.7 Cement=54.3	Cardboard =0.4 Wood =7.6 Metal=37.6 Cement= 54.3	Cardboard = 0.3 Wood =8.1 Metal=28.3 Cement=63.3
Water in the plot	No = 62.9% Yes = 37.1%	No = 62.6 Yes = 37.4	No = 62.6 Yes = 37.4	No = 62.5 Yes = 37.5	No = 63.5 Yes = 36.5	No = 44.3 Yes = 55.7

Table A1.13. Household Durables 1997-2003

	% of the sample that possesses:					
	1997-October	**1998-October**	**1999-March**	**2000-March**	**2000-November**	**2003-September**
Blender	29.5	24.5	28.3	34.1	32.1	56.0
Fridge	13.9	9.3	13.9	16.6	13.7	30.9
Stove	28.0	24.1	26.0	28.7	26.7	36.9
Heater	2.4	2.3	2.5	2.5	2.9	3.7
Radio	62.9	50.6	56.6	56.6	54.3	61.0
CD player	4.4	1.6	3.8	3.8	5.6	NA
TV	45.1	36.4	45.2	45.2	47.2	66.6
VCR	3.4	NA	NA	3.1	3.1	NA
Washer	2.9	2.5	NA	5.0	5.6	10.1
Fan	7.3	3.7	8.0	8.0	6.9	NA

Table A1.14. Agricultural Stock 1997-2003

% of the sample that possesses:						
	1997-October	**1998-October**	**1999-March**	**1999-November**	**2000-March**	**2003-September**
Goats	15.0	11.5	11.2	12.2	13.9	41.6* (includes pigs)
Cows	21.2	14.6	14.6	14.8	16.4	15.6
Chicken	70.2	57.3	57.9	59.7	59.8	59.9
Pigs	42.1	35.0	37.3	40.1	38.8	Included with goats
Horses	22.0	14.9	13.5	15.6	16.3	NA
Donkeys	22.3	16.8	15.5	17.5	18.5	NA

ANNEX 2

Correlations Between Variables

Variable names and definitions

Variable name	Definition
TV03	Television in 2003
LIC03	Blender in 2003
FRI03	Fridge in 2003
STO03	Stove in 2003
BINOD	Household income around birth
BLIC	Blender around birth
BFRI	Fridge around birth
BSTO	Stove around birth
BRADIO	Radio around birth
BTV	Television around birth
BPROO	People per room around birth
BTECH	Roofing around birth
BWALL	Walls around birth
BWAT	Water around birth
BCOW2	Cows around birth
BGOAT2	Goats around birth
BPIG2	Pigs around birth
BHO2	Horses around birth
BCHI2	Chicken around birth
BOCTOT	Occupation around birth
CARTY_1A	McCarthy Test 1
CARTY_3A	McCarthy Test 3
CARTY_5A	McCarthy Test 5
CD1	ACBC: arguing
CD2	ACBC: bragging
CD3	ACBC: feeling lonely
CD4	ACBC: crying
CD5	ACBC: abusiveness
CD6	ACBC: demands too much attention
CD7	ACBC: destroying own belongings
CD8	ACBC: destroying other´s belongings
CD9	ACBC: disobeying
CD11	ACBC: guiltless
CD12	ACBC: jealousness
CD13	ACBC: afraid of acting wrong
CD14	ACBC: perfectionism
CD15	ACBC: feels unloved
CD16	ACBC: paranoid
CD17	ACBC: feels inferior
CD18	ACBC: fighting
CD19	ACBC: friends with problematic people
CD20	ACBC: prefers to be alone
CD21	ACBC: cheats and lies
CD22	ACBC: nervous
CD23	ACBC: anxious
CD24	ACBC: feels dizzy
CD25	ACBC: feels guilty
CD26	ACBC: overtired
CAR6B	McCarthy Test 6
CAR2B	McCarthy Test 2
CAR4B	McCarthy Test 4
C2WJNAM	Woodcock-Johnson Test for Names
C2WJVIS	Woodcock-Johnson Test for Visual Integration
C2WJFRA	Woodcock-Johnson Test for Phrases
C2PEA	Peabody Test
HAZDI2	Height-for-age
WAZDI2	Weight-for-age
Y6M	Household income around birth to 6 months
Y12M	Household income at 12 months
Y18M	Household income at 18 months
Y24M	Household income at 24 months
Y30M	Household income at 30 months
LIN7	Concurrent income
LYINO97	household income in 1997 September
LYINO98O	household income in 1998 October
LYINO99M	household income in 1999 March
LYINO99N	household income in 1999 November
LYINO00M	household income in 2000 March
LYINO03	household income in 2003 September
INDIGID	Child´s ethnicity (indigenous / non-indigenous)
OPS2	PROGRESA-Oportunidades

Table A2.1. Correlations between variables

Model Estimated Covariances/Correlations/Residual Correlations[85]

	TV03	LIC03	FRI03	STO03	BINOD
TV03					
LIC03	0.480				
FRI03	0.483	0.534			
STO03	0.563	0.622	0.626		
BINOD	0.084	0.093	0.093	0.109	0.581
BLIC	0.343	0.379	0.382	0.445	0.127
BFRI	0.347	0.384	0.386	0.449	0.128
BSTO	0.437	0.483	0.486	0.566	0.162
BRADIO	0.233	0.258	0.260	0.302	0.086
BTV	0.322	0.356	0.358	0.417	0.119
BPROO	-0.277	-0.307	-0.308	-0.359	-0.073
BPISO	0.242	0.268	0.269	0.313	0.064
BTECH	0.178	0.197	0.198	0.231	0.047
BWALL	0.241	0.266	0.268	0.312	0.063
BWAT	0.095	0.105	0.105	0.123	0.025
BCOW2	0.170	0.188	0.189	0.220	0.061
BGOAT2	0.074	0.082	0.083	0.096	0.027
BPIG2	0.082	0.091	0.092	0.107	0.030
BHO2	0.102	0.113	0.114	0.133	0.037
BCHI2	0.074	0.082	0.082	0.096	0.027
BOCTOT	0.104	0.115	0.116	0.135	0.000
CARTY_1A	0.067	0.075	0.075	0.087	-0.028
CARTY_3A	0.068	0.075	0.075	0.088	-0.028
CARTY_5A	0.070	0.078	0.078	0.091	-0.029
CD1	0.017	0.018	0.018	0.021	0.008
CD2	0.017	0.019	0.019	0.022	0.008
CD3	0.014	0.016	0.016	0.018	0.007
CD4	0.017	0.019	0.019	0.022	0.008
CD5	0.018	0.020	0.020	0.023	0.008
CD6	0.016	0.018	0.018	0.021	0.007
CD7	0.015	0.017	0.017	0.019	0.007
CD8	0.017	0.019	0.019	0.022	0.008
CD9	0.015	0.016	0.016	0.019	0.007
CD11	0.010	0.011	0.012	0.013	0.005
CD12	0.016	0.018	0.018	0.021	0.007
CD13	0.015	0.017	0.017	0.020	0.007
CD14	0.010	0.011	0.011	0.013	0.005
CD15	0.018	0.020	0.021	0.024	0.008
CD16	0.018	0.020	0.020	0.023	0.008
CD17	0.018	0.020	0.020	0.024	0.008
CD18	0.019	0.021	0.021	0.025	0.009
CD19	0.014	0.016	0.016	0.019	0.007
CD20	0.010	0.011	0.011	0.012	0.004
CD21	0.016	0.018	0.018	0.021	0.007
CD22	0.016	0.018	0.018	0.021	0.008
CD23	0.013	0.014	0.014	0.017	0.006
CD24	0.016	0.018	0.018	0.021	0.008
CD25	0.017	0.019	0.019	0.022	0.008
CD26	0.016	0.018	0.018	0.021	0.007

[85] Calculations conducted in MPlus.

	TV03	LIC03	FRI03	STO03	BINOD
CAR6B	0.058	0.064	0.065	0.075	-0.024
CAR2B	0.062	0.068	0.068	0.080	-0.025
CAR4B	0.060	0.066	0.067	0.078	-0.025
C2WJNAM	0.131	0.145	0.146	0.170	0.011
C2WJVIS	0.181	0.200	0.202	0.235	0.015
C2WJFRA	0.128	0.142	0.143	0.166	0.011
C2PEA	0.168	0.186	0.187	0.217	0.014
HAZDI2	0.166	0.183	0.184	0.215	-0.001
WAZDI2	0.100	0.110	0.111	0.129	0.000

	BLIC	BFRI	BSTO	BRADIO	BTV
BFRI	0.525				
BSTO	0.661	0.669			
BRADIO	0.353	0.357	0.450		
BTV	0.487	0.493	0.620	0.331	
BPROO	-0.420	-0.424	-0.534	-0.286	-0.394
BPISO	0.366	0.370	0.466	0.249	0.344
BTECH	0.270	0.273	0.343	0.183	0.253
BWALL	0.364	0.368	0.464	0.248	0.342
BWAT	0.143	0.145	0.182	0.097	0.134
BCOW2	0.257	0.260	0.327	0.175	0.241
BGOAT2	0.113	0.114	0.143	0.077	0.106
BPIG2	0.125	0.126	0.159	0.085	0.117
BHO2	0.155	0.157	0.197	0.105	0.145
BCHI2	0.112	0.113	0.143	0.076	0.105
BOCTOT	0.158	0.160	0.201	0.107	0.148
CARTY_1A	0.040	0.040	0.051	0.027	0.037
CARTY_3A	0.040	0.040	0.051	0.027	0.037
CARTY_5A	0.042	0.042	0.053	0.028	0.039
CD1	0.016	0.016	0.020	0.011	0.015
CD2	0.017	0.017	0.021	0.011	0.015
CD3	0.014	0.014	0.017	0.009	0.013
CD4	0.016	0.016	0.020	0.011	0.015
CD5	0.017	0.017	0.022	0.012	0.016
CD6	0.015	0.015	0.019	0.010	0.014
CD7	0.014	0.014	0.018	0.010	0.013
CD8	0.016	0.016	0.021	0.011	0.015
CD9	0.014	0.014	0.018	0.009	0.013
CD11	0.010	0.010	0.013	0.007	0.009
CD12	0.015	0.015	0.019	0.010	0.014
CD13	0.014	0.015	0.018	0.010	0.014
CD14	0.010	0.010	0.012	0.006	0.009
CD15	0.018	0.018	0.022	0.012	0.016
CD16	0.017	0.017	0.022	0.012	0.016
CD17	0.017	0.018	0.022	0.012	0.016
CD18	0.018	0.018	0.023	0.012	0.017
CD19	0.014	0.014	0.018	0.009	0.013
CD20	0.009	0.009	0.012	0.006	0.009
CD21	0.015	0.015	0.019	0.010	0.014
CD22	0.016	0.016	0.020	0.011	0.015
CD23	0.012	0.012	0.016	0.008	0.011
CD24	0.016	0.016	0.020	0.011	0.015

	BLIC	BFRI	BSTO	BRADIO	BTV
CD25	0.016	0.016	0.020	0.011	0.015
CD26	0.015	0.015	0.019	0.010	0.014
CAR6B	0.034	0.035	0.044	0.023	0.032
CAR2B	0.036	0.037	0.046	0.025	0.034
CAR4B	0.035	0.036	0.045	0.024	0.033
C2WJNAM	0.114	0.115	0.145	0.078	0.107
C2WJVIS	0.158	0.159	0.201	0.107	0.148
C2WJFRA	0.112	0.113	0.142	0.076	0.105
C2PEA	0.146	0.148	0.186	0.099	0.137
HAZDI2	0.138	0.139	0.176	0.094	0.129
WAZDI2	0.083	0.084	0.105	0.056	0.078

	BPROO	BPISO	BTECH	BWALL	BWAT
BPROO	5.140				
BPISO	-0.667				
BTECH	-0.491	0.429			
BWALL	-0.664	0.579	0.427		
BWAT	-0.261	0.228	0.168	0.227	
BCOW2	-0.176	0.153	0.113	0.153	0.060
BGOAT2	-0.077	0.067	0.049	0.067	0.026
BPIG2	-0.085	0.075	0.055	0.074	0.029
BHO2	-0.106	0.093	0.068	0.092	0.036
BCHI2	-0.077	0.067	0.049	0.067	0.026
BOCTOT	-0.091	0.079	0.058	0.079	0.031
CARTY_1A	0.019	-0.017	-0.012	-0.016	-0.006
CARTY_3A	0.019	-0.017	-0.012	-0.017	-0.006
CARTY_5A	0.020	-0.017	-0.013	-0.017	-0.007
CD1	0.027	-0.024	-0.017	-0.023	-0.009
CD2	0.028	-0.025	-0.018	-0.025	-0.010
CD3	0.023	-0.020	-0.015	-0.020	-0.008
CD4	0.027	-0.024	-0.018	-0.024	-0.009
CD5	0.029	-0.026	-0.019	-0.025	-0.010
CD6	0.026	-0.023	-0.017	-0.023	-0.009
CD7	0.024	-0.021	-0.016	-0.021	-0.008
CD8	0.028	-0.024	-0.018	-0.024	-0.009
CD9	0.024	-0.021	-0.015	-0.021	-0.008
CD11	0.017	-0.015	-0.011	-0.015	-0.006
CD12	0.026	-0.023	-0.017	-0.023	-0.009
CD13	0.025	-0.022	-0.016	-0.022	-0.008
CD14	0.016	-0.014	-0.010	-0.014	-0.006
CD15	0.030	-0.026	-0.019	-0.026	-0.010
CD16	0.029	-0.025	-0.019	-0.025	-0.010
CD17	0.030	-0.026	-0.019	-0.026	-0.010
CD18	0.031	-0.027	-0.020	-0.027	-0.011
CD19	0.024	-0.021	-0.015	-0.020	-0.008
CD20	0.016	-0.014	-0.010	-0.014	-0.005
CD21	0.026	-0.023	-0.017	-0.022	-0.009
CD22	0.027	-0.023	-0.017	-0.023	-0.009
CD23	0.021	-0.018	-0.013	-0.018	-0.007
CD24	0.027	-0.023	-0.017	-0.023	-0.009
CD25	0.027	-0.024	-0.018	-0.024	-0.009
CD26	0.026	-0.023	-0.017	-0.022	-0.009

	BPROO	BPISO	BTECH	BWALL	BWAT
CAR6B	0.016	-0.014	-0.011	-0.014	-0.006
CAR2B	0.017	-0.015	-0.011	-0.015	-0.006
CAR4B	0.017	-0.015	-0.011	-0.015	-0.006
C2WJNAM	-0.054	0.047	0.035	0.047	0.018
C2WJVIS	-0.075	0.065	0.048	0.065	0.025
C2WJFRA	-0.053	0.046	0.034	0.046	0.018
C2PEA	-0.069	0.060	0.044	0.060	0.024
HAZDI2	-0.093	0.081	0.060	0.081	0.032
WAZDI2	-0.056	0.049	0.036	0.049	0.019

	BCOW2	BGOAT2	BPIG2	BHO2	BCHI2
BGOAT2	0.384				
BPIG2	0.425	0.186			
BHO2	0.528	0.232	0.257		
BCHI2	0.382	0.167	0.185	0.230	
BOCTOT	0.076	0.033	0.037	0.046	0.033
CARTY_1A	0.013	0.006	0.006	0.008	0.006
CARTY_3A	0.013	0.006	0.006	0.008	0.006
CARTY_5A	0.013	0.006	0.006	0.008	0.006
CD1	0.011	0.005	0.005	0.007	0.005
CD2	0.012	0.005	0.006	0.007	0.005
CD3	0.009	0.004	0.005	0.006	0.004
CD4	0.011	0.005	0.005	0.007	0.005
CD5	0.012	0.005	0.006	0.007	0.005
CD6	0.011	0.005	0.005	0.006	0.005
CD7	0.010	0.004	0.005	0.006	0.004
CD8	0.011	0.005	0.006	0.007	0.005
CD9	0.010	0.004	0.005	0.006	0.004
CD11	0.007	0.003	0.003	0.004	0.003
CD12	0.011	0.005	0.005	0.006	0.005
CD13	0.010	0.004	0.005	0.006	0.004
CD14	0.007	0.003	0.003	0.004	0.003
CD15	0.012	0.005	0.006	0.007	0.005
CD16	0.012	0.005	0.006	0.007	0.005
CD17	0.012	0.005	0.006	0.007	0.005
CD18	0.013	0.006	0.006	0.008	0.006
CD19	0.010	0.004	0.005	0.006	0.004
CD20	0.006	0.003	0.003	0.004	0.003
CD21	0.011	0.005	0.005	0.006	0.005
CD22	0.011	0.005	0.005	0.007	0.005
CD23	0.009	0.004	0.004	0.005	0.004
CD24	0.011	0.005	0.005	0.007	0.005
CD25	0.011	0.005	0.005	0.007	0.005
CD26	0.011	0.005	0.005	0.006	0.005
CAR6B	0.011	0.005	0.005	0.007	0.005
CAR2B	0.012	0.005	0.006	0.007	0.005
CAR4B	0.011	0.005	0.005	0.007	0.005
C2WJNAM	0.046	0.020	0.022	0.028	0.020
C2WJVIS	0.064	0.028	0.031	0.038	0.028
C2WJFRA	0.045	0.020	0.022	0.027	0.020
C2PEA	0.059	0.026	0.029	0.036	0.026
HAZDI2	0.080	0.035	0.039	0.048	0.035
WAZDI2	0.048	0.021	0.023	0.029	0.021

	BOCTOT	CARTY_1A	CARTY_3A	CARTY_5A	CD1
CARTY_1A	-0.034				
CARTY_3A	-0.035	0.516			
CARTY_5A	-0.036	0.537	0.538		
CD1	0.009	0.012	0.012	0.012	
CD2	0.010	0.012	0.012	0.013	0.326
CD3	0.008	0.010	0.010	0.010	0.237
CD4	0.010	0.012	0.012	0.012	0.316
CD5	0.010	0.013	0.013	0.013	0.300
CD6	0.009	0.011	0.011	0.012	0.301
CD7	0.009	0.011	0.011	0.011	0.250
CD8	0.010	0.012	0.012	0.012	0.283
CD9	0.008	0.010	0.010	0.011	0.241
CD11	0.006	0.007	0.007	0.008	0.173
CD12	0.009	0.011	0.011	0.012	0.301
CD13	0.009	0.011	0.011	0.011	0.253
CD14	0.006	0.007	0.007	0.007	0.167
CD15	0.011	0.013	0.013	0.013	0.307
CD16	0.010	0.012	0.012	0.013	0.296
CD17	0.010	0.013	0.013	0.013	0.305
CD18	0.011	0.013	0.013	0.014	0.319
CD19	0.008	0.010	0.010	0.011	0.241
CD20	0.005	0.007	0.007	0.007	0.160
CD21	0.009	0.011	0.011	0.012	0.264
CD22	0.009	0.011	0.012	0.012	0.273
CD23	0.007	0.009	0.009	0.009	0.213
CD24	0.009	0.012	0.012	0.012	0.274
CD25	0.010	0.012	0.012	0.012	0.280
CD26	0.009	0.011	0.011	0.012	0.265
CAR6B	-0.030	0.444	0.445	0.463	0.010
CAR2B	-0.031	0.470	0.471	0.490	0.011
CAR4B	-0.031	0.457	0.458	0.476	0.010
C2WJNAM	0.014	0.137	0.137	0.143	0.016
C2WJVIS	0.019	0.189	0.190	0.198	0.023
C2WJFRA	0.014	0.134	0.135	0.140	0.016
C2PEA	0.018	0.175	0.176	0.183	0.021
HAZDI2	-0.001	0.167	0.167	0.174	0.021
WAZDI2	0.000	0.100	0.101	0.105	0.013

	CD2	CD3	CD4	CD5	CD6
CD3	0.247				
CD4	0.330	0.240			
CD5	0.314	0.257	0.304		
CD6	0.315	0.229	0.306	0.290	
CD7	0.262	0.214	0.254	0.364	0.242
CD8	0.296	0.243	0.287	0.412	0.274
CD9	0.253	0.207	0.245	0.351	0.233
CD11	0.181	0.251	0.175	0.188	0.167
CD12	0.314	0.228	0.305	0.290	0.291
CD13	0.265	0.368	0.257	0.275	0.245
CD14	0.174	0.242	0.169	0.181	0.161
CD15	0.321	0.446	0.312	0.334	0.297

	CD2	CD3	CD4	CD5	CD6
CD16	0.310	0.430	0.300	0.322	0.286
CD17	0.320	0.444	0.310	0.332	0.295
CD18	0.334	0.274	0.324	0.464	0.309
CD19	0.252	0.207	0.244	0.351	0.233
CD20	0.168	0.233	0.163	0.174	0.155
CD21	0.276	0.227	0.268	0.287	0.255
CD22	0.286	0.234	0.277	0.297	0.264
CD23	0.223	0.183	0.216	0.231	0.206
CD24	0.287	0.235	0.278	0.298	0.265
CD25	0.293	0.407	0.285	0.305	0.271
CD26	0.277	0.227	0.269	0.288	0.256
CAR6B	0.010	0.009	0.010	0.011	0.010
CAR2B	0.011	0.009	0.011	0.012	0.010
CAR4B	0.011	0.009	0.010	0.011	0.010
C2WJNAM	0.017	0.014	0.017	0.018	0.016
C2WJVIS	0.024	0.019	0.023	0.025	0.022
C2WJFRA	0.017	0.014	0.016	0.017	0.015
C2PEA	0.022	0.018	0.021	0.023	0.020
HAZDI2	0.022	0.018	0.021	0.023	0.020
WAZDI2	0.013	0.011	0.013	0.014	0.012

	CD7	CD8	CD9	CD11	CD12
CD8	0.633				
CD9	0.293	0.331			
CD11	0.157	0.177	0.151		
CD12	0.241	0.273	0.233	0.167	
CD13	0.230	0.260	0.222	0.269	0.245
CD14	0.151	0.171	0.146	0.177	0.161
CD15	0.278	0.315	0.269	0.326	0.296
CD16	0.268	0.304	0.259	0.314	0.286
CD17	0.277	0.313	0.267	0.324	0.295
CD18	0.387	0.438	0.374	0.200	0.308
CD19	0.292	0.331	0.282	0.151	0.233
CD20	0.145	0.165	0.140	0.170	0.155
CD21	0.239	0.271	0.231	0.166	0.255
CD22	0.248	0.280	0.239	0.171	0.264
CD23	0.193	0.218	0.186	0.133	0.206
CD24	0.248	0.281	0.240	0.172	0.265
CD25	0.254	0.288	0.245	0.298	0.271
CD26	0.240	0.272	0.232	0.166	0.256
CAR6B	0.009	0.010	0.009	0.006	0.010
CAR2B	0.010	0.011	0.009	0.007	0.010
CAR4B	0.009	0.011	0.009	0.006	0.010
C2WJNAM	0.015	0.017	0.014	0.010	0.016
C2WJVIS	0.020	0.023	0.020	0.014	0.022
C2WJFRA	0.015	0.016	0.014	0.010	0.015
C2PEA	0.019	0.021	0.018	0.013	0.020
HAZDI2	0.019	0.022	0.018	0.013	0.020
WAZDI2	0.011	0.013	0.011	0.008	0.012

	CD13	CD14	CD15	CD16	CD17
CD14	0.259				
CD15	0.477	0.314			
CD16	0.460	0.303	0.558		
CD17	0.475	0.313	0.576	0.555	
CD18	0.293	0.193	0.355	0.342	0.353
CD19	0.221	0.146	0.268	0.258	0.267
CD20	0.249	0.164	0.302	0.291	0.301
CD21	0.243	0.160	0.294	0.283	0.293
CD22	0.251	0.165	0.304	0.293	0.303
CD23	0.195	0.129	0.237	0.228	0.236
CD24	0.252	0.166	0.305	0.294	0.303
CD25	0.436	0.287	0.528	0.509	0.526
CD26	0.243	0.160	0.295	0.284	0.293
CAR6B	0.009	0.006	0.011	0.011	0.011
CAR2B	0.010	0.006	0.012	0.011	0.012
CAR4B	0.009	0.006	0.011	0.011	0.011
C2WJNAM	0.015	0.010	0.018	0.018	0.018
C2WJVIS	0.021	0.014	0.025	0.024	0.025
C2WJFRA	0.015	0.010	0.018	0.017	0.018
C2PEA	0.019	0.013	0.023	0.022	0.023
HAZDI2	0.019	0.013	0.023	0.023	0.023
WAZDI2	0.012	0.008	0.014	0.014	0.014

	CD18	CD19	CD20	CD21	CD22
CD19	0.619				
CD20	0.186	0.140			
CD21	0.306	0.231	0.154		
CD22	0.316	0.239	0.159	0.362	
CD23	0.246	0.186	0.124	0.282	0.535
CD24	0.317	0.239	0.159	0.362	0.375
CD25	0.324	0.245	0.276	0.269	0.278
CD26	0.306	0.231	0.154	0.350	0.362
CAR6B	0.012	0.009	0.006	0.010	0.010
CAR2B	0.012	0.009	0.006	0.010	0.010
CAR4B	0.012	0.009	0.006	0.010	0.010
C2WJNAM	0.019	0.014	0.009	0.016	0.016
C2WJVIS	0.026	0.020	0.013	0.022	0.022
C2WJFRA	0.019	0.014	0.009	0.015	0.016
C2PEA	0.024	0.018	0.012	0.020	0.021
HAZDI2	0.024	0.018	0.012	0.020	0.021
WAZDI2	0.015	0.011	0.007	0.012	0.012

	CD23	CD24	CD25	CD26	CAR6B
CD24	0.292				
CD25	0.216	0.278			
CD26	0.282	0.363	0.269		
CAR6B	0.008	0.010	0.010	0.010	
CAR2B	0.008	0.011	0.011	0.010	0.405
CAR4B	0.008	0.010	0.010	0.010	0.394
C2WJNAM	0.013	0.016	0.017	0.016	0.118
C2WJVIS	0.017	0.022	0.023	0.022	0.163
C2WJFRA	0.012	0.016	0.016	0.015	0.116
C2PEA	0.016	0.021	0.021	0.020	0.151
HAZDI2	0.016	0.021	0.021	0.020	0.144
WAZDI2	0.010	0.013	0.013	0.012	0.086

	CAR2B	CAR4B	C2WJNAM	C2WJVIS	C2WJFRA
CAR4B	0.788				
C2WJNAM	0.125	0.121			
C2WJVIS	0.173	0.168	0.407		
C2WJFRA	0.122	0.119	0.289	0.400	
C2PEA	0.160	0.156	0.377	0.522	0.370
HAZDI2	0.152	0.148	0.175	0.242	0.171
WAZDI2	0.092	0.089	0.105	0.145	0.103

	C2PEA	HAZDI2	WAZDI2
HAZDI2	0.224		
WAZDI2	0.134	0.637	

	TV03	LIC03	FRI03	RADIO03	Y6M
TV03					
LIC03	0.582				
FRI03	0.554	0.568			
RADIO03	0.200	0.205	0.195		
Y6M	0.086	0.088	0.084	0.030	0.566
Y12M	0.024	0.025	0.023	0.008	0.158
Y18M	0.006	0.007	0.006	0.002	0.043
Y24M	0.002	0.002	0.001	0.001	0.010
Y30M	0.000	0.000	0.000	0.000	0.000
LIN7	0.157	0.161	0.154	0.055	0.002
CARTY_1A	0.095	0.098	0.093	0.033	-0.005
CARTY_3A	0.095	0.097	0.093	0.033	-0.005
CARTY_5A	0.097	0.099	0.094	0.034	-0.005
CD1	0.015	0.015	0.014	0.005	0.009
CD2	0.015	0.016	0.015	0.005	0.010
CD3	0.013	0.013	0.012	0.004	0.008
CD4	0.015	0.015	0.015	0.005	0.009
CD5	0.016	0.016	0.016	0.006	0.010
CD6	0.014	0.015	0.014	0.005	0.009

	TV03	LIC03	FRI03	RADIO03	Y6M
CD7	0.013	0.014	0.013	0.005	0.008
CD8	0.015	0.015	0.015	0.005	0.009
CD9	0.013	0.013	0.013	0.005	0.008
CD11	0.009	0.009	0.009	0.003	0.006
CD12	0.014	0.015	0.014	0.005	0.009
CD13	0.013	0.014	0.013	0.005	0.008
CD14	0.009	0.009	0.009	0.003	0.006
CD15	0.016	0.017	0.016	0.006	0.010
CD16	0.016	0.016	0.015	0.006	0.010
CD17	0.016	0.017	0.016	0.006	0.010
CD18	0.017	0.017	0.016	0.006	0.011
CD19	0.013	0.013	0.012	0.004	0.008
CD20	0.008	0.009	0.008	0.003	0.005
CD21	0.014	0.014	0.014	0.005	0.009
CD22	0.014	0.015	0.014	0.005	0.009
CD23	0.011	0.012	0.011	0.004	0.007
CD24	0.014	0.015	0.014	0.005	0.009
CD25	0.015	0.015	0.014	0.005	0.009
CD26	0.014	0.014	0.014	0.005	0.009
CAR6B	0.077	0.079	0.075	0.027	-0.004
CAR2B	0.084	0.086	0.082	0.030	-0.005
C2WJNAM	0.162	0.166	0.158	0.057	0.036
C2WJVIS	0.221	0.226	0.215	0.078	0.049
C2WJFRA	0.160	0.164	0.156	0.056	0.036
C2PEA	0.207	0.212	0.202	0.073	0.046
HAZDI2	0.189	0.194	0.185	0.067	0.041
WAZDI2	0.113	0.116	0.111	0.040	0.024
BLIC	0.368	0.378	0.360	0.130	0.140
BFRI	0.382	0.392	0.373	0.134	0.145
BRADIO	0.261	0.268	0.255	0.092	0.099
BTV	0.356	0.366	0.348	0.126	0.136
BPISO	0.176	0.181	0.172	0.062	0.034
BTECH	0.136	0.139	0.133	0.048	0.026
BWALL	0.178	0.183	0.174	0.063	0.035
BWAT	0.070	0.072	0.069	0.025	0.014

	Y12M	Y18M	Y24M	Y30M	LIN7
Y12M	0.581				
Y18M	0.157	0.450			
Y24M	0.036	0.105	0.534		
Y30M	0.000	0.000	0.000	0.419	
LIN7	0.007	0.019	0.099	0.000	0.660
CARTY_1A	-0.007	0.004	0.007	0.000	0.057
CARTY_3A	-0.007	0.004	0.007	0.000	0.057
CARTY_5A	-0.007	0.004	0.007	0.000	0.058
CD1	0.001	-0.014	-0.007	0.000	0.000
CD2	0.001	-0.014	-0.007	0.000	0.000
CD3	0.001	-0.012	-0.006	0.000	0.000
CD4	0.001	-0.014	-0.007	0.000	0.000
CD5	0.001	-0.015	-0.007	0.000	0.000
CD6	0.001	-0.013	-0.006	0.000	0.000

	Y12M	Y18M	Y24M	Y30M	LIN7
CD7	0.001	-0.012	-0.006	0.000	0.000
CD8	0.001	-0.014	-0.007	0.000	0.000
CD9	0.001	-0.012	-0.006	0.000	0.000
CD11	0.001	-0.009	-0.004	0.000	0.000
CD12	0.001	-0.013	-0.006	0.000	0.000
CD13	0.001	-0.012	-0.006	0.000	0.000
CD14	0.001	-0.008	-0.004	0.000	0.000
CD15	0.001	-0.015	-0.007	0.000	0.000
CD16	0.001	-0.015	-0.007	0.000	0.000
CD17	0.001	-0.015	-0.007	0.000	0.000
CD18	0.001	-0.016	-0.008	0.000	0.000
CD19	0.001	-0.012	-0.006	0.000	0.000
CD20	0.001	-0.008	-0.004	0.000	0.000
CD21	0.001	-0.013	-0.006	0.000	0.000
CD22	0.001	-0.013	-0.007	0.000	0.000
CD23	0.001	-0.010	-0.005	0.000	0.000
CD24	0.001	-0.013	-0.007	0.000	0.000
CD25	0.001	-0.014	-0.007	0.000	0.000
CD26	0.001	-0.013	-0.006	0.000	0.000
CAR6B	-0.005	0.003	0.006	0.000	0.046
CAR2B	-0.006	0.004	0.006	0.000	0.051
C2WJNAM	0.024	0.039	0.039	0.000	0.051
C2WJVIS	0.032	0.054	0.054	0.000	0.069
C2WJFRA	0.023	0.039	0.039	0.000	0.050
C2PEA	0.030	0.050	0.050	0.000	0.065
HAZDI2	0.044	0.045	0.071	0.000	0.062
WAZDI2	0.026	0.027	0.043	0.000	0.037
BLIC	0.039	0.011	0.002	0.000	0.000
BFRI	0.041	0.011	0.003	0.000	0.000
BRADIO	0.028	0.007	0.002	0.000	0.000
BTV	0.038	0.010	0.002	0.000	0.000
BPISO	0.010	0.003	0.001	0.000	0.000
BTECH	0.007	0.002	0.000	0.000	0.000
BWALL	0.010	0.003	0.001	0.000	0.000
BWAT	0.004	0.001	0.000	0.000	0.000

	LYINO97	LYINO98O	LYINO99M	LYINO99N	LYINO00M	LYINO03	INDIGID	OPS2
LYINO97	0.716							
LYINO98O	0.163	0.763						
LYINO99M	0.161	0.157	0.740					
LYINO99N	0.123	0.120	0.119	0.424				
LYINO00M	0.115	0.112	0.111	0.103	0.473			
LYINO03	0.091	0.089	0.087	0.095	0.096	0.678		
INDIGID	-0.076	-0.074	-0.073	-0.080	-0.081	-0.086	0.245	
OPS2	-0.071	-0.058	-0.052	-0.046	-0.045	-0.040	0.030	0.179

ANNEX 3

Correlations Between Controls

This Annex includes descriptive statistics, T-tests, and Chi-Square tests for exploring correlations between the socio-demographic controls.

Table A3.1. PROGRESA-Oportunidades recipiency and maternal education

			Maternal education (years of formal schooling)		
		N	Mean	Std. Deviation	Std. Error Mean
PROGRESA	Recipient	1341	3.9142	2.81111	.07677
	Not recipient	378	5.4921	2.95073	.15177

Maternal education (years of formal schooling)		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
	Equal variances assumed	1.986	.159	-9.532	1717	.000	-1.57782	.16552	-1.90247	-1.25317
	Equal variances not assumed			-9.277	583.823	.000	-1.57782	.17008	-1.91186	-1.24378

Table A3.2. PROGRESA-Oportunidades recipiency and proportion of children in the household

			Proportion of children in the household		
		N	Mean	Std. Deviation	Std. Error Mean
PROGRESA	Recipient	1411	43.744	15.7594	.4195
	Not recipient	425	37.889	15.4054	.7473

Proportion of children in the household		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
	Equal variances assumed	.893	.345	6.749	1834	.000	5.8549	.8675	4.1534	7.5563
	Equal variances not assumed			6.832	712.147	.000	5.8549	.8570	4.1723	7.5374

Table A3.3. Indigenous background and maternal education

		Maternal education (years of formal schooling)		
	N	Mean	Std. Deviation	Std. Error Mean
Indigenous background	743	3.8493	2.91735	.10703
Non-indigenous background	972	4.5761	2.88170	.09243

Maternal education (years of formal schooling)		Levene's Test for Equality of Variances	t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	1.785	.182	-5.148	1713	.000	-.72687	.14118	-1.00378	-.44996
Equal variances not assumed			-5.140	1586.979	.000	-.72687	.14142	-1.00425	-.44949

Table A3.4. Indigenous background and proportion of children in the household

		Proportion of children in the household		
	N	Mean	Std. Deviation	Std. Error Mean
Indigenous background	790	42.156	15.6677	.5574
Non-indigenous background	1042	42.542	16.0377	.4968

Proportion of children in the household		Levene's Test for Equality of Variances	t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	2.475	.116	-.515	1830	.607	-.3859	.7491	-1.8551	1.0833
Equal variances not assumed			-.517	1718.504	.605	-.3859	.7467	-1.8504	1.0787

Table A3.5. PROGRESA-Oportunidades and indigenous background

			PROGRESA (ops)		
			No	Yes	Total
Indigenous background (indig)	No	Count	306	759	1065
		% within indig	28.7%	71.3%	100.0%
		% within ops	70.0%	53.1%	57.1%
		% of Total	16.4%	40.7%	57.1%
	Yes	Count	131	670	801
		% within indig	16.4%	83.6%	100.0%
		% within ops	30.0%	46.9%	42.9%
		% of Total	7.0%	35.9%	42.9%
Total		Count	437	1429	1866
		% within indig	23.4%	76.6%	100.0%
		% within ops	100.0%	100.0%	100.0%
		% of Total	23.4%	76.6%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	39.054[a]	1	.000		
Continuity Correction[b]	38.367	1	.000		
Likelihood Ratio	40.155	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	39.033	1	.000		
N of Valid Cases[b]	1866				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 187.59.

b. Computed only for a 2x2 table

ANNEX 4

Un-standardised Solutions and Standard Errors

This annex offers un-standardised results for all chapters. These are presented in the form of MPlus output:
BY = Measured by
ON = Regressed on
WITH = Correlated with

CHAPTER 4
Bridging the Gap: Conceptual and Empirical Dimensions of Child Well-Being in Mexico

Variable names and definitions, Chapter 4

Variable name	Definition
HAZDI2	Height-for-age
WAZDI2	Weight-for-age
C2WJNAM	Woodcock-Johnson Test for Names
C2WJVIS	Woodcock-Johnson Test for Visual Integration
C2WJFRA	Woodcock-Johnson Test for Phrases
C2PEA	Peabody Test
CARTY_3A	McCarthy Test 3
CARTY_1A	McCarthy Test 1
CAR6B	McCarthy Test 6
CAR4B	McCarthy Test 4
CARTY_5A	McCarthy Test 5
CD1	Achenbach Child Behaviour Checklist: arguing
CD12	Achenbach Child Behaviour Checklist: jealousness
CD2	Achenbach Child Behaviour Checklist: bragging
CD4	Achenbach Child Behaviour Checklist: crying
CD6	Achenbach Child Behaviour Checklist: demands too much attention
CD5	Achenbach Child Behaviour Checklist: abusiveness
CD7	Achenbach Child Behaviour Checklist: destroying own belongings
CD8	Achenbach Child Behaviour Checklist: destroying other´s belongings
CD9	Achenbach Child Behaviour Checklist: disobeying
CD18	Achenbach Child Behaviour Checklist: fighting
CD19	Achenbach Child Behaviour Checklist: friends with problematic people
CD3	Achenbach Child Behaviour Checklist: feeling lonely
CD11	Achenbach Child Behaviour Checklist: guiltless
CD13	Achenbach Child Behaviour Checklist: afraid of acting wrong
CD14	Achenbach Child Behaviour Checklist: perfectionism
CD15	Achenbach Child Behaviour Checklist: feels unloved
CD16	Achenbach Child Behaviour Checklist: paranoid
CD17	Achenbach Child Behaviour Checklist: feels inferior
CD20	Achenbach Child Behaviour Checklist: prefers to be alone
CD25	Achenbach Child Behaviour Checklist: feels guilty
CD21	Achenbach Child Behaviour Checklist: cheats and lies
CD22	Achenbach Child Behaviour Checklist: nervous
CD23	Achenbach Child Behaviour Checklist: anxious
CD24	Achenbach Child Behaviour Checklist: feels dizzy
AGE	Child´s age in months
SEX	Child´s gender
INDIGID	Child´s ethnicity (indigenous / non-indigenous)

Un-standardised Solution and Standard Errors for Measurement Model of Child Well-Being, Base Model.

	Estimate	S.E[86].	Est./S.E[87].	Two-Tailed P-Value
PHYSIO BY				
HAZDI2	1.000	0.000	999.000	999.000
WAZDI2	0.562	0.094	5.971	0.000
MENTAL BY				
C2WJNAM	1.000	0.000	999.000	999.000
C2WJVIS	1.268	0.052	24.440	0.000
C2WJFRA	0.989	0.046	21.683	0.000
C2PEA	1.165	0.048	24.170	0.000
MOTOR BY				
CARTY_3A	1.000	0.000	999.000	999.000
CARTY_1A	0.984	0.074	13.307	0.000
CAR6B	0.865	0.054	15.926	0.000
CAR4B	0.863	0.057	15.141	0.000
CARTY_5A	1.009	0.067	15.143	0.000
MISBEH BY				
CD1	1.000	0.000	999.000	999.000
CD12	0.895	0.059	15.176	0.000
CD2	1.017	0.059	17.127	0.000
CD4	0.980	0.059	16.691	0.000
CD6	0.960	0.060	16.087	0.000
AGGR BY				
CD5	1.000	0.000	999.000	999.000
CD7	0.825	0.049	17.001	0.000
CD8	0.939	0.049	19.169	0.000
CD9	0.809	0.046	17.401	0.000
CD18	1.052	0.051	20.759	0.000
CD19	0.795	0.055	14.320	0.000
SELFES BY				
CD3	1.000	0.000	999.000	999.000
CD11	0.751	0.059	12.830	0.000
CD13	1.096	0.065	16.816	0.000
CD14	0.709	0.058	12.218	0.000
CD15	1.327	0.066	19.985	0.000
CD16	1.261	0.066	19.117	0.000
CD17	1.313	0.069	19.037	0.000
CD20	0.687	0.058	11.859	0.000
CD25	1.234	0.068	18.088	0.000
SOMAT BY				
CD21	1.000	0.000	999.000	999.000
CD22	1.017	0.063	16.027	0.000
CD23	0.818	0.061	13.313	0.000

[86] Standard Error
[87] Estimate / Standard Error

CD26	1.027	0.069	14.989	0.000
CD24	1.068	0.079	13.459	0.000
EMOT BY				
MISBEH	1.000	0.000	999.000	999.000
AGGR	1.097	0.068	16.162	0.000
SELFES	0.826	0.058	14.172	0.000
SOMAT	0.962	0.065	14.797	0.000
MENTAL WITH				
PHYSIO	0.287	0.023	12.699	0.000
MOTOR WITH				
PHYSIO	0.208	0.032	6.573	0.000
MENTAL	0.192	0.020	9.796	0.000
EMOT WITH				
PHYSIO	0.034	0.019	1.819	0.069
MENTAL	0.019	0.011	1.843	0.065
MOTOR	0.006	0.015	0.406	0.685
CD7 WITH				
CD8	0.304	0.028	10.761	0.000
CD18 WITH				
CD19	0.250	0.031	8.092	0.000
CD22 WITH				
CD23	0.274	0.028	9.781	0.000
Variances				
PHYSIO	0.980	0.181	5.419	0.000
MENTAL	0.386	0.026	14.701	0.000
MOTOR	0.589	0.058	10.150	0.000
EMOT	0.279	0.026	10.747	0.000
Residual Variances				
MISBEH	0.053	0.014	3.785	0.000
AGGR	0.110	0.018	6.073	0.000
SELFES	0.141	0.016	8.858	0.000
SOMAT	0.086	0.017	5.042	0.000

Un-standardised Solution and Standard Errors for Measurement Model of Child Well-Being, Model with Controls.

	Estimate	S.E.	Est./S.E.	Two-Tailed P-Value
PHYSIO BY				
HAZDI2	1.000	0.000	999.000	999.000
WAZDI2	0.575	0.096	6.002	0.000
MENTAL BY				
C2WJNAM	1.000	0.000	999.000	999.000
C2WJVIS	1.243	0.051	24.470	0.000
C2WJFRA	0.972	0.046	20.942	0.000
C2PEA	1.167	0.049	23.967	0.000
MOTOR BY				
CARTY_3A	1.000	0.000	999.000	999.000
CARTY_1A	0.983	0.074	13.355	0.000
CAR6B	0.867	0.056	15.351	0.000
CAR4B	0.855	0.059	14.488	0.000
CARTY_5A	1.002	0.068	14.667	0.000
MISBEH BY				
CD1	1.000	0.000	999.000	999.000
CD12	0.922	0.059	15.613	0.000
CD2	1.016	0.059	17.278	0.000
CD4	0.995	0.059	16.987	0.000
CD6	0.953	0.059	16.073	0.000
AGGR BY				
CD5	1.000	0.000	999.000	999.000
CD7	0.837	0.050	16.836	0.000
CD8	0.936	0.050	18.859	0.000
CD9	0.812	0.047	17.172	0.000
CD18	1.059	0.051	20.697	0.000
CD19	0.797	0.056	14.221	0.000
SELFES BY				
CD3	1.000	0.000	999.000	999.000
CD11	0.751	0.058	13.065	0.000
CD13	1.073	0.064	16.863	0.000
CD14	0.699	0.057	12.170	0.000
CD15	1.318	0.065	20.373	0.000
CD16	1.248	0.064	19.473	0.000
CD17	1.297	0.067	19.256	0.000
CD20	0.671	0.057	11.813	0.000
CD25	1.217	0.066	18.326	0.000
SOMAT BY				
CD21	1.000	0.000	999.000	999.000
CD22	1.001	0.061	16.303	0.000
CD23	0.816	0.061	13.456	0.000
CD26	1.004	0.066	15.175	0.000
CD24	1.046	0.077	13.647	0.000

EMOT BY				
MISBEH	1.000	0.000	999.000	999.000
AGGR	1.087	0.067	16.186	0.000
SELFES	0.839	0.058	14.372	0.000
SOMAT	0.976	0.065	14.988	0.000
PHYSIO ON				
AGE	0.008	0.004	1.926	0.054
SEX	0.122	0.063	1.920	0.055
INDIGID	-0.414	0.064	-6.466	0.000
MENTAL ON				
AGE	0.006	0.002	2.579	0.010
SEX	0.068	0.034	1.993	0.046
INDIGID	-0.380	0.036	-10.430	0.000
MOTOR ON				
AGE	0.043	0.004	10.898	0.000
SEX	-0.009	0.048	-0.190	0.850
INDIGID	-0.241	0.050	-4.835	0.000
EMOT ON				
AGE	-0.001	0.002	-0.383	0.702
SEX	-0.033	0.028	-1.161	0.246
INDIGID	-0.033	0.029	-1.171	0.241
MENTAL WITH				
PHYSIO	0.258	0.023	11.298	0.000
MOTOR WITH				
PHYSIO	0.175	0.032	5.518	0.000
MENTAL	0.167	0.019	8.988	0.000
EMOT WITH				
PHYSIO	0.032	0.019	1.702	0.089
MENTAL	0.018	0.011	1.685	0.092
MOTOR	0.008	0.015	0.519	0.604
CD7 WITH				
CD8	0.301	0.028	10.674	0.000
CD18 WITH				
CD19	0.254	0.031	8.200	0.000
CD22 WITH				
CD23	0.263	0.028	9.312	0.000
Residual Variances				
PHYSIO	0.931	0.161	5.784	0.000
MENTAL	0.381	0.026	14.651	0.000
MOTOR	0.544	0.055	9.922	0.000
MISBEH	0.052	0.014	3.760	0.000
AGGR	0.104	0.018	5.799	0.000
SELFES	0.142	0.016	8.935	0.000
SOMAT	0.086	0.017	4.941	0.000
EMOT	0.282	0.026	10.810	0.000

CHAPTER 5
Effects of Early Household Material Conditions and Infant Care on Child Well-Being at Age 4 – 6 years

Variable names and definitions, Chapter 5

Variable name	Definition
HAZDI2	Height-for-age
WAZDI2	Weight-for-age
C2WJNAM	Woodcock-Johnson Test for Names
C2WJVIS	Woodcock-Johnson Test for Visual Integration
C2WJFRA	Woodcock-Johnson Test for Phrases
C2PEA	Peabody Test
CARTY_3A	McCarthy Test 3
CARTY_1A	McCarthy Test 1
CAR6B	McCarthy Test 6
CAR4B	McCarthy Test 4
CARTY_5A	McCarthy Test 5
CD1	Achenbach Child Behaviour Checklist: arguing
CD12	Achenbach Child Behaviour Checklist: jealousness
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CD9	Achenbach Child Behaviour Checklist: disobeying
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CD3	Achenbach Child Behaviour Checklist: feeling lonely
CD11	Achenbach Child Behaviour Checklist: guiltless
CD13	Achenbach Child Behaviour Checklist: afraid of acting wrong
CD14	Achenbach Child Behaviour Checklist: perfectionism
CD15	Achenbach Child Behaviour Checklist: feels unloved
CD16	Achenbach Child Behaviour Checklist: paranoid
CD17	Achenbach Child Behaviour Checklist: feels inferior
CD20	Achenbach Child Behaviour Checklist: prefers to be alone
CD25	Achenbach Child Behaviour Checklist: feels guilty
CD21	Achenbach Child Behaviour Checklist: cheats and lies
CD22	Achenbach Child Behaviour Checklist: nervous
CD23	Achenbach Child Behaviour Checklist: anxious
CD24	Achenbach Child Behaviour Checklist: feels dizzy
AGE	Child´s age in months
SEX	Child´s gender
INDIGID	Child´s ethnicity (indigenous / non-indigenous)
NIN1103	Proportion of children in the household
MATED2	Maternal education level
AGEMUM03	Maternal age
OPS2	PROGRESA-Oportunidades
BLIC	Blender around birth
BFRI	Fridge around birth
BSTO	Stove around birth
BRADIO	Radio around birth
BTV	Television around birth
BPISO	Flooring around birth
BTECH	Roofing around birth
BWALL	Walls around birth
BWAT	Water around birth
BCOW2	Cows around birth
BGOAT2	Goats around birth
BPIG2	Pigs around birth
BHO2	Horses around birth
BCHI2	Chicken around birth
BINOD	Household income around birth
BOCTOT	Occupation around birth
TV03	Television in 2003
LIC03	Blender in 2003
FRI03	Fridge in 2003
STOVE03	Stove in 2003

Un-standardised Solution and Standard Errors for Figure 5.5. Results: MIMIC Model Showing Correlations Between Constructs and Direct Effects of Early Household Material Circumstances, Early Care, and Concurrent Durables on Child Well-Being at age 4-6 Years

	Estimate	S.E[88].	Est./S.E[89].	Two-Tailed P-Value
BASSETS BY				
BLIC	1.000	0.000	999.000	999.000
BFRI	0.964	0.177	5.445	0.000
BSTO	2.104	0.554	3.798	0.000
BRADIO	0.540	0.080	6.783	0.000
BTV	0.883	0.125	7.084	0.000
BHOUSE BY				
BPISO	1.000	0.000	999.000	999.000
BTECH	0.581	0.088	6.598	0.000
BWALL	1.141	0.208	5.497	0.000
BWAT	0.269	0.055	4.897	0.000
BAGRO BY				
BCOW2	1.000	0.000	999.000	999.000
BGOAT2	0.157	0.089	1.755	0.079
BPIG2	0.182	0.103	1.771	0.076
BHO2	0.247	0.142	1.741	0.082
BCHI2	0.155	0.087	1.781	0.075
BNONAG BY				
BINOD	1.000	0.000	999.000	999.000
BOCTOT	0.843	0.232	3.628	0.000
CASSETS BY				
TV03	1.000	0.000	999.000	999.000
LIC03	1.216	0.135	9.023	0.000
FRI03	1.211	0.136	8.887	0.000
STO03	1.764	0.238	7.417	0.000
PHYSIO BY				
HAZDI2	1.000	0.000	999.000	999.000
WAZDI2	0.617	0.102	6.038	0.000
MENTAL BY				
C2WJNAM	1.000	0.000	999.000	999.000
C2WJVIS	1.754	0.152	11.550	0.000
C2WJFRA	0.984	0.084	11.686	0.000
C2PEA	1.506	0.127	11.818	0.000
MOTOR BY				
CARTY_1A	1.000	0.000	999.000	999.000
CARTY_3A	0.998	0.155	6.420	0.000
CARTY_5A	1.096	0.170	6.462	0.000
CAR6B	0.762	0.112	6.786	0.000
CAR2B	0.844	0.122	6.931	0.000
CAR4B	0.803	0.117	6.890	0.000

[88] Standard Error
[89] Estimate / Standard Error

MISBEH BY				
CD1	1.000	0.000	999.000	999.000
CD12	0.951	0.092	10.295	0.000
CD2	1.070	0.098	10.865	0.000
CD4	1.024	0.095	10.802	0.000
CD6	0.954	0.092	10.376	0.000
AGGR BY				
CD5	1.000	0.000	999.000	999.000
CD7	0.749	0.075	10.043	0.000
CD8	0.906	0.086	10.570	0.000
CD9	0.712	0.068	10.452	0.000
CD18	1.119	0.107	10.464	0.000
CD19	0.710	0.078	9.086	0.000
SELFES BY				
CD3	1.000	0.000	999.000	999.000
CD11	0.655	0.071	9.282	0.000
CD13	1.115	0.110	10.128	0.000
CD14	0.626	0.071	8.824	0.000
CD15	1.619	0.150	10.780	0.000
CD16	1.490	0.137	10.904	0.000
CD17	1.601	0.161	9.944	0.000
CD20	0.598	0.068	8.851	0.000
CD25	1.334	0.131	10.210	0.000
SOMAT BY				
CD21	1.000	0.000	999.000	999.000
CD22	1.056	0.107	9.841	0.000
CD23	0.739	0.084	8.839	0.000
CD26	1.005	0.111	9.047	0.000
CD24	1.061	0.132	8.022	0.000
EMOT BY				
MISBEH	1.000	0.000	999.000	999.000
AGGR	1.205	0.116	10.392	0.000
SELFES	0.880	0.091	9.636	0.000
SOMAT	0.985	0.102	9.636	0.000
CASSETS ON				
BASSETS	0.592	0.082	7.201	0.000
PHYSIO ON				
CASSETS	0.299	0.140	2.140	0.032
BASSETS	-0.432	0.945	-0.457	0.648
BHOUSE	-0.024	0.318	-0.074	0.941
BAGRO	0.059	0.131	0.451	0.652
BNONAG	0.226	0.930	0.243	0.808
CARE	0.137	0.079	1.724	0.085
MENTAL ON				
CASSETS	0.321	0.079	4.058	0.000
BASSETS	-0.042	0.091	-0.461	0.645
BHOUSE	-0.042	0.041	-1.019	0.308
BAGRO	0.002	0.012	0.130	0.897
BNONAG	0.250	0.126	1.984	0.047
CARE	0.031	0.036	0.852	0.394

MOTOR ON				
CASSETS	0.280	0.141	1.991	0.047
BASSETS	-0.073	0.165	-0.440	0.660
BHOUSE	-0.083	0.076	-1.093	0.274
BAGRO	0.003	0.021	0.158	0.875
BNONAG	-0.228	0.214	-1.065	0.287
CARE	0.075	0.057	1.324	0.186
EMOT ON				
CASSETS	0.057	0.068	0.839	0.401
BASSETS	0.007	0.082	0.083	0.934
BHOUSE	-0.061	0.040	-1.529	0.126
BAGRO	0.005	0.012	0.432	0.666
BNONAG	0.129	0.111	1.164	0.244
CARE	-0.035	0.034	-1.017	0.309
BASSETS ON				
INDIGID	-1.259	0.158	-7.967	0.000
OPS2	-1.010	0.149	-6.789	0.000
BHOUSE ON				
INDIGID	-1.051	0.155	-6.759	0.000
OPS2	-1.218	0.191	-6.382	0.000
BAGRO ON				
INDIGID	-0.421	0.312	-1.352	0.177
OPS2	-1.089	0.609	-1.788	0.074
BNONAG ON				
INDIGID	-0.284	0.042	-6.730	0.000
OPS2	-0.240	0.051	-4.708	0.000
PHYSIO ON				
AGE	0.016	0.030	0.523	0.601
SEX	0.470	0.725	0.649	0.517
INDIGID	-0.932	1.418	-0.657	0.511
NIN1103	-0.009	0.002	-3.697	0.000
MATED2	0.089	0.013	6.960	0.000
AGEMUM03	0.020	0.005	4.167	0.000
MENTAL ON				
AGE	0.004	0.003	1.422	0.155
SEX	0.080	0.039	2.051	0.040
INDIGID	-0.126	0.063	-2.011	0.044
NIN1103	-0.008	0.001	-5.802	0.000
MATED2	0.089	0.009	10.166	0.000
AGEMUM03	0.010	0.003	3.876	0.000
MOTOR ON				
AGE	0.062	0.009	7.023	0.000
SEX	0.020	0.070	0.288	0.773
INDIGID	-0.371	0.119	-3.117	0.002
NIN1103	-0.005	0.002	-2.219	0.026
MATED2	0.030	0.014	2.208	0.027
AGEMUM03	0.005	0.005	0.921	0.357

EMOT ON				
AGE	-0.001	0.003	-0.493	0.622
SEX	-0.016	0.036	-0.447	0.655
INDIGID	-0.015	0.057	-0.268	0.789
NIN1103	0.001	0.001	1.100	0.271
MATED2	0.009	0.007	1.316	0.188
AGEMUM03	0.005	0.002	2.151	0.031
BASSETS WITH				
BHOUSE	0.740	0.146	5.057	0.000
BAGRO	1.025	0.553	1.852	0.064
BNONAG	0.269	0.057	4.733	0.000
BHOUSE WITH				
BAGRO	0.665	0.394	1.686	0.092
BNONAG	0.182	0.061	2.991	0.003
BAGRO WITH				
BNONAG	0.476	0.268	1.777	0.076
MENTAL WITH				
PHYSIO	0.603	0.865	0.698	0.485
MOTOR WITH				
PHYSIO	0.840	1.206	0.697	0.486
MENTAL	0.197	0.040	4.918	0.000
EMOT WITH				
PHYSIO	0.066	0.141	0.472	0.637
MENTAL	0.009	0.015	0.606	0.545
MOTOR	0.012	0.026	0.467	0.640
CD7 WITH				
CD8	0.444	0.038	11.737	0.000
CD18 WITH				
CD19	0.409	0.043	9.519	0.000
CD22 WITH				
CD23	0.351	0.037	9.424	0.000
CAR2B WITH				
CAR4B	0.636	0.030	21.099	0.000
Residual Variances				
BINOD	0.469	0.044	10.572	0.000
BASSETS	1.111	0.254	4.377	0.000
BHOUSE	1.425	0.365	3.908	0.000
BAGRO	0.786	0.094	8.380	0.000
BNONAG	0.112	0.042	2.651	0.008
CASSETS	0.377	0.075	5.043	0.000
PHYSIO	0.948	0.172	5.513	0.000
MENTAL	0.348	0.046	7.533	0.000
MOTOR	1.019	0.257	3.957	0.000
MISBEH	0.052	0.020	2.552	0.011
AGGR	0.195	0.041	4.802	0.000
SELFES	0.214	0.034	6.271	0.000
SOMAT	0.149	0.034	4.364	0.000
EMOT	0.393	0.055	7.149	0.000

CHAPTER 6
When Poverty Happens: Timing of Income Fluctuations and Child Well-Being

Variable names and definitions, Chapter 6

Variable name	Definition
HAZDI2	Height-for-age
WAZDI2	Weight-for-age
C2WJNAM	Woodcock-Johnson Test for Names
C2WJVIS	Woodcock-Johnson Test for Visual Integration
C2WJFRA	Woodcock-Johnson Test for Phrases
C2PEA	Peabody Test
CARTY_3A	McCarthy Test 3
CARTY_1A	McCarthy Test 1
CAR6B	McCarthy Test 6
CAR4B	McCarthy Test 4
CARTY_5A	McCarthy Test 5
CD1	Achenbach Child Behaviour Checklist: arguing
CD12	Achenbach Child Behaviour Checklist: jealousness
CD2	Achenbach Child Behaviour Checklist: bragging
CD4	Achenbach Child Behaviour Checklist: crying
CD6	Achenbach Child Behaviour Checklist: demands too much attention
CD5	Achenbach Child Behaviour Checklist: abusiveness
CD7	Achenbach Child Behaviour Checklist: destroying own belongings
CD8	Achenbach Child Behaviour Checklist: destroying other´s belongings
CD9	Achenbach Child Behaviour Checklist: disobeying
CD18	Achenbach Child Behaviour Checklist: fighting
CD19	Achenbach Child Behaviour Checklist: friends with problematic people
CD3	Achenbach Child Behaviour Checklist: feeling lonely
CD11	Achenbach Child Behaviour Checklist: guiltless
CD13	Achenbach Child Behaviour Checklist: afraid of acting wrong
CD14	Achenbach Child Behaviour Checklist: perfectionism
CD15	Achenbach Child Behaviour Checklist: feels unloved
CD16	Achenbach Child Behaviour Checklist: paranoid
CD17	Achenbach Child Behaviour Checklist: feels inferior
CD20	Achenbach Child Behaviour Checklist: prefers to be alone
CD25	Achenbach Child Behaviour Checklist: feels guilty
CD21	Achenbach Child Behaviour Checklist: cheats and lies
CD22	Achenbach Child Behaviour Checklist: nervous
CD23	Achenbach Child Behaviour Checklist: anxious
CD24	Achenbach Child Behaviour Checklist: feels dizzy
AGE	Child´s age in months
SEX	Child´s gender
INDIGID	Child´s ethnicity (indigenous / non-indigenous)
NIN1103	Proportion of children in the household
MATED2	Maternal education level
AGEMUM03	Maternal age
TV03	Television in 2003
LIC03	Blender in 2003
FRI03	Fridge in 2003
RADIO03	Radio in 2003
Y6M	household income around birth up to 6 months
Y12M	household income at 12 months
Y18M	household income at 18 months
Y24M	household income at 24 months
LIN7	Concurrent household income
OPS2	PROGRESA-Oportunidades
BLIC	Blender around birth
BFRI	Fridge around birth
BRADIO	Radio around birth
BTV	Television around birth
BPISO	Flooring around birth
BTECH	Roofing around birth
BWALL	Walls around birth
BWAT	Water around birth

Un-standardised Solution and Standard Errors for Figure 6.4-R. Results: Effects of Auto-regressed Income at Various Time-Points on Children

	Estimate	S.E[90].	Est./S.E[91].	Two-Tailed P-Value
PHYSIO BY				
HAZDI2	1.000	0.000	999.000	999.000
WAZDI2	0.599	0.099	6.066	0.000
MENTAL BY				
C2WJNAM	1.000	0.000	999.000	999.000
C2WJVIS	1.332	0.067	19.792	0.000
C2WJFRA	1.003	0.058	17.288	0.000
C2PEA	1.238	0.064	19.332	0.000
MOTOR BY				
CARTY_1A	1.000	0.000	999.000	999.000
CARTY_3A	1.003	0.077	13.002	0.000
CARTY_5A	1.024	0.076	13.433	0.000
CAR6B	0.818	0.065	12.583	0.000
CAR2B	0.901	0.067	13.410	0.000
MISBEH BY				
CD1	1.000	0.000	999.000	999.000
CD12	0.961	0.065	14.727	0.000
CD2	1.045	0.064	16.203	0.000
CD4	1.014	0.064	15.857	0.000
CD6	0.965	0.065	14.867	0.000
AGGR BY				
CD5	1.000	0.000	999.000	999.000
CD7	0.832	0.053	15.736	0.000
CD8	0.943	0.053	17.956	0.000
CD9	0.806	0.050	16.259	0.000
CD18	1.062	0.054	19.585	0.000
CD19	0.800	0.059	13.512	0.000
SELFES BY				
CD3	1.000	0.000	999.000	999.000
CD11	0.731	0.060	12.270	0.000
CD13	1.071	0.067	15.983	0.000
CD14	0.704	0.061	11.565	0.000
CD15	1.299	0.068	19.110	0.000
CD16	1.252	0.067	18.659	0.000
CD17	1.291	0.071	18.133	0.000
CD20	0.678	0.060	11.377	0.000
CD25	1.185	0.069	17.233	0.000
SOMAT BY				
CD21	1.000	0.000	999.000	999.000
CD22	1.033	0.067	15.417	0.000
CD23	0.805	0.066	12.273	0.000

[90] Standard Error
[91] Estimate / Standard Error

CD26	0.999	0.072	13.930	0.000
CD24	1.035	0.082	12.681	0.000
EMOT BY				
MISBEH	1.000	0.000	999.000	999.000
AGGR	1.084	0.071	15.226	0.000
SELFES	0.852	0.063	13.438	0.000
SOMAT	0.954	0.070	13.664	0.000
PHYSIO ON				
Y6M	0.064	0.048	1.336	0.181
Y12M	0.039	0.059	0.656	0.512
Y18M	0.055	0.061	0.903	0.367
Y24M	0.104	0.064	1.623	0.105
LIN7	0.078	0.044	1.753	0.080
AGE	0.004	0.005	0.848	0.396
SEX	0.108	0.068	1.579	0.114
INDIGID	-0.359	0.072	-4.955	0.000
NIN1103	-0.009	0.002	-3.704	0.000
MATED2	0.093	0.013	7.275	0.000
AGEMUM03	0.020	0.005	4.181	0.000
MENTAL ON				
Y6M	0.068	0.025	2.760	0.006
Y12M	0.004	0.027	0.149	0.882
Y18M	0.069	0.029	2.371	0.018
Y24M	0.046	0.030	1.524	0.127
LIN7	0.072	0.021	3.494	0.000
AGE	0.003	0.002	1.421	0.155
SEX	0.068	0.033	2.021	0.043
INDIGID	-0.276	0.037	-7.535	0.000
NIN1103	-0.007	0.001	-5.992	0.000
MATED2	0.077	0.007	11.234	0.000
AGEMUM03	0.008	0.002	3.924	0.000
MOTOR ON				
Y6M	-0.007	0.038	-0.191	0.848
Y12M	-0.014	0.045	-0.301	0.763
Y18M	0.011	0.046	0.250	0.803
Y24M	-0.004	0.043	-0.096	0.924
LIN7	0.086	0.033	2.602	0.009
AGE	0.043	0.004	9.789	0.000
SEX	0.002	0.051	0.032	0.974
INDIGID	-0.253	0.056	-4.494	0.000
NIN1103	-0.005	0.002	-2.860	0.004
MATED2	0.020	0.010	2.123	0.034
AGEMUM03	0.002	0.004	0.673	0.501
EMOT ON				
Y6M	0.015	0.021	0.713	0.476
Y12M	0.007	0.025	0.278	0.781
Y18M	-0.032	0.027	-1.197	0.231
Y24M	-0.007	0.026	-0.275	0.784
LIN7	0.001	0.018	0.062	0.950
AGE	-0.001	0.002	-0.493	0.622
SEX	-0.013	0.030	-0.446	0.655
INDIGID	-0.029	0.031	-0.944	0.345

NIN1103	0.001	0.001	1.102	0.270
MATED2	0.008	0.006	1.315	0.188
AGEMUM03	0.004	0.002	2.162	0.031
LIN7 ON				
Y24M	0.185	0.033	5.545	0.000
OPS2	-0.087	0.051	-1.695	0.090
Y24M ON				
Y18M	0.228	0.030	7.672	0.000
Y18M ON				
Y12M	0.256	0.022	11.743	0.000
Y12M ON				
Y6M	0.240	0.027	8.728	0.000
Y6M ON				
INDIGID	-0.351	0.044	-7.958	0.000
OPS2	-0.277	0.055	-5.047	0.000
MENTAL WITH				
PHYSIO	0.164	0.023	7.121	0.000
MOTOR WITH				
PHYSIO	0.161	0.033	4.798	0.000
MENTAL	0.140	0.019	7.315	0.000
EMOT WITH				
PHYSIO	0.022	0.021	1.054	0.292
MENTAL	0.017	0.010	1.701	0.089
MOTOR	0.010	0.016	0.661	0.509
CD7 WITH				
CD8	0.290	0.030	9.622	0.000
CD18 WITH				
CD19	0.248	0.032	7.647	0.000
CD22 WITH				
CD23	0.244	0.030	8.072	0.000
Residual Variances				
Y6M	0.572	0.018	32.581	0.000
Y12M	0.552	0.019	29.047	0.000
Y18M	0.412	0.013	32.119	0.000
Y24M	0.511	0.019	27.223	0.000
LIN7	0.641	0.022	29.108	0.000
PHYSIO	0.977	0.183	5.332	0.000
MENTAL	0.294	0.026	11.388	0.000
MOTOR	0.528	0.065	8.082	0.000
MISBEH	0.034	0.013	2.540	0.011
AGGR	0.110	0.019	5.823	0.000
SELFES	0.141	0.017	8.377	0.000
SOMAT	0.097	0.019	5.205	0.000
EMOT	0.278	0.028	10.006	0.000

Un-standardised Solution and Standard Errors for Figure 6.4b-R. Results: Child Well-Being on Auto-Regressed Income, Durables Around Birth, and Housing Around Birth

	Estimate	S.E.	Est./S.E.	Two-Tailed P-Value
BASSETS BY				
BTV	1.000	0.000	999.000	999.000
BLIC	1.030	0.077	13.377	0.000
BFRI	1.060	0.094	11.221	0.000
BRADIO	0.726	0.070	10.382	0.000
BHOUSE BY				
BPISO	1.000	0.000	999.000	999.000
BTECH	0.814	0.056	14.557	0.000
BWALL	1.088	0.073	14.863	0.000
BWAT	0.416	0.061	6.790	0.000
PHYSIO BY				
HAZDI2	1.000	0.000	999.000	999.000
WAZDI2	0.570	0.099	5.758	0.000
MENTAL BY				
C2WJNAM	1.000	0.000	999.000	999.000
C2WJVIS	1.333	0.067	19.960	0.000
C2WJFRA	0.995	0.058	17.267	0.000
C2PEA	1.238	0.064	19.466	0.000
MOTOR BY				
CARTY_1A	1.000	0.000	999.000	999.000
CARTY_3A	1.003	0.078	12.939	0.000
CARTY_5A	1.025	0.076	13.408	0.000
CAR6B	0.818	0.065	12.554	0.000
CAR2B	0.899	0.067	13.367	0.000
MISBEH BY				
CD1	1.000	0.000	999.000	999.000
CD12	0.963	0.065	14.770	0.000
CD2	1.044	0.064	16.206	0.000
CD4	1.013	0.064	15.866	0.000
CD6	0.964	0.065	14.887	0.000
AGGR BY				
CD5	1.000	0.000	999.000	999.000
CD7	0.833	0.053	15.744	0.000
CD8	0.944	0.053	17.977	0.000
CD9	0.806	0.050	16.266	0.000
CD18	1.060	0.054	19.582	0.000
CD19	0.800	0.059	13.519	0.000
SELFES BY				
CD3	1.000	0.000	999.000	999.000
CD11	0.734	0.060	12.287	0.000
CD13	1.072	0.067	15.965	0.000

CD14	0.703	0.061	11.545	0.000
CD15	1.300	0.068	19.090	0.000
CD16	1.254	0.067	18.636	0.000
CD17	1.293	0.071	18.118	0.000
CD20	0.678	0.060	11.353	0.000
CD25	1.185	0.069	17.210	0.000
SOMAT BY				
CD21	1.000	0.000	999.000	999.000
CD22	1.032	0.067	15.422	0.000
CD23	0.803	0.066	12.256	0.000
CD26	0.997	0.072	13.937	0.000
CD24	1.033	0.082	12.671	0.000
EMOT BY				
MISBEH	1.000	0.000	999.000	999.000
AGGR	1.082	0.071	15.241	0.000
SELFES	0.848	0.063	13.438	0.000
SOMAT	0.953	0.070	13.670	0.000
PHYSIO ON				
BASSETS	0.082	0.123	0.670	0.503
BHOUSE	0.070	0.097	0.717	0.473
MENTAL ON				
BASSETS	0.137	0.057	2.408	0.016
BHOUSE	-0.001	0.047	-0.028	0.978
MOTOR ON				
BASSETS	0.088	0.085	1.036	0.300
BHOUSE	-0.079	0.068	-1.164	0.244
EMOT ON				
BASSETS	0.016	0.045	0.345	0.730
BHOUSE	-0.050	0.041	-1.220	0.222
BASSETS ON				
INDIGID	-0.700	0.091	-7.654	0.000
OPS2	-0.704	0.111	-6.342	0.000
BHOUSE ON				
INDIGID	-0.667	0.067	-9.888	0.000
OPS2	-0.763	0.089	-8.588	0.000
PHYSIO ON				
Y6M	0.036	0.055	0.650	0.515
Y12M	0.039	0.060	0.646	0.518
Y18M	0.058	0.062	0.940	0.347
Y24M	0.105	0.065	1.622	0.105
LIN7	0.075	0.045	1.689	0.091
AGE	0.004	0.005	0.883	0.377
SEX	0.107	0.069	1.561	0.118
INDIGID	-0.267	0.089	-3.009	0.003
NIN1103	-0.009	0.002	-3.715	0.000
MATED2	0.094	0.013	7.341	0.000
AGEMUM03	0.020	0.005	4.208	0.000

MENTAL ON				
Y6M	0.028	0.028	1.007	0.314
Y12M	0.006	0.028	0.199	0.842
Y18M	0.068	0.029	2.355	0.019
Y24M	0.047	0.030	1.550	0.121
LIN7	0.070	0.021	3.389	0.001
AGE	0.003	0.002	1.418	0.156
SEX	0.068	0.033	2.029	0.042
INDIGID	-0.194	0.044	-4.387	0.000
NIN1103	-0.007	0.001	-5.993	0.000
MATED2	0.077	0.007	11.237	0.000
AGEMUM03	0.008	0.002	3.922	0.000
MOTOR ON				
Y6M	-0.021	0.044	-0.469	0.639
Y12M	-0.014	0.046	-0.304	0.761
Y18M	0.011	0.046	0.250	0.803
Y24M	-0.004	0.043	-0.102	0.919
LIN7	0.086	0.033	2.606	0.009
AGE	0.043	0.004	9.773	0.000
SEX	0.002	0.051	0.033	0.974
INDIGID	-0.249	0.068	-3.665	0.000
NIN1103	-0.005	0.002	-2.860	0.004
MATED2	0.020	0.010	2.123	0.034
AGEMUM03	0.002	0.004	0.674	0.501
EMOT ON				
Y6M	0.016	0.024	0.689	0.491
Y12M	0.006	0.025	0.257	0.797
Y18M	-0.032	0.027	-1.196	0.232
Y24M	-0.007	0.026	-0.282	0.778
LIN7	0.002	0.018	0.088	0.930
AGE	-0.001	0.002	-0.491	0.624
SEX	-0.013	0.030	-0.447	0.655
INDIGID	-0.051	0.038	-1.368	0.171
NIN1103	0.001	0.001	1.103	0.270
MATED2	0.008	0.006	1.313	0.189
AGEMUM03	0.004	0.002	2.163	0.031
Y6M ON				
INDIGID	-0.353	0.044	-8.022	0.000
OPS2	-0.254	0.054	-4.707	0.000
LIN7 ON				
Y24M	0.186	0.033	5.592	0.000
OPS2	-0.069	0.051	-1.346	0.178
Y24M ON				
Y18M	0.230	0.030	7.715	0.000
Y18M ON				
Y12M	0.261	0.022	11.884	0.000
Y12M ON				
Y6M	0.255	0.028	9.020	0.000

BASSETS WITH				
BHOUSE	0.265	0.035	7.531	0.000
Y6M	0.123	0.026	4.644	0.000
BHOUSE WITH				
Y6M	0.031	0.022	1.427	0.154
MENTAL WITH				
PHYSIO	0.157	0.024	6.563	0.000
MOTOR WITH				
PHYSIO	0.160	0.034	4.733	0.000
MENTAL	0.136	0.020	6.899	0.000
EMOT WITH				
PHYSIO	0.024	0.021	1.120	0.263
MENTAL	0.018	0.011	1.709	0.088
MOTOR	0.009	0.016	0.555	0.579
CD7 WITH				
CD8	0.290	0.030	9.603	0.000
CD18 WITH				
CD19	0.248	0.032	7.672	0.000
CD22 WITH				
CD23	0.244	0.030	8.071	0.000
Residual Variances				
Y6M	0.571	0.018	32.478	0.000
Y12M	0.547	0.019	28.601	0.000
Y18M	0.410	0.013	31.979	0.000
Y24M	0.510	0.019	27.192	0.000
LIN7	0.641	0.022	29.118	0.000
BASSETS	0.606	0.063	9.542	0.000
BHOUSE	0.551	0.056	9.768	0.000
PHYSIO	0.931	0.164	5.784	0.000
MENTAL	0.285	0.026	11.164	0.000
MOTOR	0.524	0.065	8.048	0.000
MISBEH	0.033	0.013	2.469	0.014
AGGR	0.110	0.019	5.811	0.000
SELFES	0.142	0.017	8.391	0.000
SOMAT	0.098	0.019	5.217	0.000
EMOT	0.278	0.028	10.004	0.000

Un-standardised Solution and Standard Errors for Figure 6.4c-R. Results: Child Well-Being on Auto-Regressed Income, Durables Around Birth, Housing Around Birth, and Concurrent Durables

	Estimate	S.E.	Est./S.E.	Two-Tailed P-Value
CASSETS BY				
TV03	1.000	0.000	999.000	999.000
LIC03	1.031	0.065	15.782	0.000
FRI03	0.881	0.057	15.459	0.000
RADIO03	0.360	0.049	7.311	0.000
BASSETS BY				
BTV	1.000	0.000	999.000	999.000
BLIC	1.027	0.078	13.244	0.000
BFRI	1.055	0.094	11.171	0.000
BRADIO	0.728	0.070	10.343	0.000
BHOUSE BY				
BPISO	1.000	0.000	999.000	999.000
BTECH	0.815	0.056	14.572	0.000
BWALL	1.097	0.074	14.891	0.000
BWAT	0.417	0.061	6.794	0.000
PHYSIO BY				
HAZDI2	1.000	0.000	999.000	999.000
WAZDI2	0.601	0.101	5.950	0.000
MENTAL BY				
C2WJNAM	1.000	0.000	999.000	999.000
C2WJVIS	1.366	0.069	19.782	0.000
C2WJFRA	0.992	0.059	16.898	0.000
C2PEA	1.278	0.067	19.193	0.000
MOTOR BY				
CARTY_1A	1.000	0.000	999.000	999.000
CARTY_3A	0.996	0.076	13.073	0.000
CARTY_5A	1.015	0.076	13.438	0.000
CAR6B	0.805	0.064	12.585	0.000
CAR2B	0.885	0.066	13.357	0.000
MISBEH BY				
CD1	1.000	0.000	999.000	999.000
CD12	0.963	0.065	14.748	0.000
CD2	1.044	0.064	16.189	0.000
CD4	1.014	0.064	15.850	0.000
CD6	0.965	0.065	14.878	0.000
AGGR BY				
CD5	1.000	0.000	999.000	999.000
CD7	0.833	0.053	15.734	0.000
CD8	0.945	0.053	17.964	0.000
CD9	0.806	0.050	16.255	0.000
CD18	1.061	0.054	19.572	0.000
CD19	0.801	0.059	13.527	0.000
SELFES BY				
CD3	1.000	0.000	999.000	999.000
CD11	0.732	0.060	12.279	0.000
CD13	1.071	0.067	15.982	0.000

CD14	0.703	0.061	11.550	0.000
CD15	1.299	0.068	19.118	0.000
CD16	1.252	0.067	18.664	0.000
CD17	1.292	0.071	18.144	0.000
CD20	0.677	0.060	11.365	0.000
CD25	1.184	0.069	17.226	0.000
SOMAT BY				
CD21	1.000	0.000	999.000	999.000
CD22	1.033	0.067	15.403	0.000
CD23	0.805	0.066	12.245	0.000
CD26	0.999	0.072	13.928	0.000
CD24	1.035	0.082	12.661	0.000
EMOT BY				
MISBEH	1.000	0.000	999.000	999.000
AGGR	1.083	0.071	15.231	0.000
SELFES	0.852	0.063	13.445	0.000
SOMAT	0.953	0.070	13.647	0.000
PHYSIO ON				
CASSETS	0.313	0.060	5.184	0.000
BASSETS	0.073	0.124	0.584	0.560
BHOUSE	0.050	0.097	0.513	0.608
MENTAL ON				
CASSETS	0.272	0.031	8.844	0.000
BASSETS	0.124	0.057	2.182	0.029
BHOUSE	-0.017	0.046	-0.357	0.721
MOTOR ON				
CASSETS	0.143	0.044	3.252	0.001
BASSETS	0.090	0.087	1.041	0.298
BHOUSE	-0.093	0.068	-1.353	0.176
EMOT ON				
CASSETS	0.025	0.026	0.956	0.339
BASSETS	0.013	0.046	0.287	0.774
BHOUSE	-0.050	0.040	-1.236	0.217
CASSETS ON				
OPS2	-0.427	0.070	-6.130	0.000
INDIGID	-0.651	0.057	-11.457	0.000
BASSETS ON				
INDIGID	-0.701	0.092	-7.652	0.000
OPS2	-0.615	0.109	-5.670	0.000
BHOUSE ON				
INDIGID	-0.664	0.067	-9.879	0.000
OPS2	-0.770	0.089	-8.649	0.000
PHYSIO ON				
Y6M	0.034	0.055	0.614	0.539
Y12M	0.041	0.060	0.679	0.497
Y18M	0.055	0.061	0.889	0.374

Y24M	0.119	0.065	1.841	0.066
LIN7	-0.002	0.047	-0.033	0.974
AGE	0.004	0.005	0.847	0.397
SEX	0.108	0.068	1.579	0.114
INDIGID	-0.081	0.099	-0.820	0.412
NIN1103	-0.009	0.002	-3.702	0.000
MATED2	0.093	0.013	7.253	0.000
AGEMUM03	0.020	0.005	4.183	0.000
MENTAL ON				
Y6M	0.027	0.027	0.974	0.330
Y12M	0.006	0.027	0.234	0.815
Y18M	0.067	0.029	2.354	0.019
Y24M	0.060	0.030	1.971	0.049
LIN7	-0.001	0.022	-0.025	0.980
AGE	0.003	0.002	1.415	0.157
SEX	0.067	0.033	2.046	0.041
INDIGID	-0.030	0.047	-0.648	0.517
NIN1103	-0.007	0.001	-5.978	0.000
MATED2	0.076	0.007	11.189	0.000
AGEMUM03	0.008	0.002	3.924	0.000
MOTOR ON				
Y6M	-0.023	0.044	-0.517	0.605
Y12M	-0.013	0.047	-0.288	0.773
Y18M	0.012	0.046	0.253	0.800
Y24M	0.002	0.044	0.040	0.968
LIN7	0.052	0.035	1.488	0.137
AGE	0.043	0.004	9.784	0.000
SEX	0.002	0.052	0.033	0.974
INDIGID	-0.166	0.074	-2.245	0.025
NIN1103	-0.005	0.002	-2.861	0.004
MATED2	0.021	0.010	2.121	0.034
AGEMUM03	0.002	0.004	0.678	0.498
EMOT ON				
Y6M	0.017	0.024	0.702	0.483
Y12M	0.006	0.025	0.259	0.795
Y18M	-0.032	0.027	-1.197	0.231
Y24M	-0.006	0.026	-0.224	0.823
LIN7	-0.005	0.020	-0.265	0.791
AGE	-0.001	0.002	-0.491	0.623
SEX	-0.013	0.030	-0.447	0.655
INDIGID	-0.037	0.042	-0.875	0.381
NIN1103	0.001	0.001	1.103	0.270
MATED2	0.008	0.006	1.315	0.189
AGEMUM03	0.004	0.002	2.162	0.031
Y6M ON				
INDIGID	-0.353	0.044	-8.021	0.000
OPS2	-0.244	0.054	-4.532	0.000
LIN7 ON				
Y24M	0.186	0.033	5.585	0.000
OPS2	-0.054	0.050	-1.094	0.274

Y24M ON				
Y18M	0.230	0.030	7.712	0.000
Y18M ON				
Y12M	0.261	0.022	11.878	0.000
Y12M ON				
Y6M	0.254	0.028	9.007	0.000
CASSETS WITH				
LIN7	0.161	0.021	7.741	0.000
BASSETS WITH				
BHOUSE	0.270	0.035	7.657	0.000
Y6M	0.125	0.027	4.718	0.000
BHOUSE WITH				
Y6M	0.032	0.022	1.465	0.143
MENTAL WITH				
PHYSIO	0.108	0.024	4.608	0.000
MOTOR WITH				
PHYSIO	0.136	0.034	4.059	0.000
MENTAL	0.113	0.019	5.870	0.000
EMOT WITH				
PHYSIO	0.019	0.021	0.926	0.354
MENTAL	0.014	0.010	1.331	0.183
MOTOR	0.007	0.016	0.424	0.671
CD7 WITH				
CD8	0.290	0.030	9.601	0.000
CD18 WITH				
CD19	0.248	0.032	7.660	0.000
CD22 WITH				
CD23	0.244	0.030	8.071	0.000
Residual Variances				
Y6M	0.571	0.018	32.488	0.000
Y12M	0.547	0.019	28.596	0.000
Y18M	0.410	0.013	31.983	0.000
Y24M	0.510	0.019	27.195	0.000
LIN7	0.642	0.022	29.137	0.000
CASSETS	0.602	0.051	11.836	0.000
BASSETS	0.614	0.064	9.537	0.000
BHOUSE	0.546	0.056	9.756	0.000
PHYSIO	0.980	0.181	5.419	0.000
MENTAL	0.237	0.023	10.146	0.000
MOTOR	0.523	0.065	8.080	0.000
MISBEH	0.034	0.013	2.517	0.012
AGGR	0.110	0.019	5.822	0.000
SELFES	0.141	0.017	8.384	0.000
SOMAT	0.098	0.019	5.221	0.000
EMOT	0.276	0.028	9.979	0.000

Un-standardised Solution and Standard Errors for Figure 6.4d-R. Results: Child Well-Being on Auto-Regressed Income, Durables Around Birth, Housing Around Birth, and Regressed Concurrent Durables

	Estimate	S.E.	Est./S.E.	Two-Tailed P-Value
CASSETS BY				
TV03	1.000	0.000	999.000	999.000
LIC03	1.030	0.063	16.477	0.000
FRI03	0.969	0.059	16.522	0.000
RADIO03	0.352	0.050	7.068	0.000
BASSETS BY				
BTV	1.000	0.000	999.000	999.000
BLIC	1.033	0.075	13.748	0.000
BFRI	1.061	0.096	11.085	0.000
BRADIO	0.741	0.069	10.696	0.000
BHOUSE BY				
BPISO	1.000	0.000	999.000	999.000
BTECH	0.773	0.055	14.093	0.000
BWALL	1.019	0.070	14.517	0.000
BWAT	0.399	0.060	6.626	0.000
PHYSIO BY				
HAZDI2	1.000	0.000	999.000	999.000
WAZDI2	0.598	0.102	5.860	0.000
MENTAL BY				
C2WJNAM	1.000	0.000	999.000	999.000
C2WJVIS	1.366	0.069	19.676	0.000
C2WJFRA	0.990	0.059	16.771	0.000
C2PEA	1.281	0.067	19.080	0.000
MOTOR BY				
CARTY_1A	1.000	0.000	999.000	999.000
CARTY_3A	0.997	0.076	13.068	0.000
CARTY_5A	1.015	0.076	13.423	0.000
CAR6B	0.805	0.064	12.581	0.000
CAR2B	0.885	0.066	13.346	0.000
MISBEH BY				
CD1	1.000	0.000	999.000	999.000
CD12	0.964	0.065	14.770	0.000
CD2	1.043	0.064	16.201	0.000
CD4	1.013	0.064	15.849	0.000
CD6	0.965	0.065	14.887	0.000
AGGR BY				
CD5	1.000	0.000	999.000	999.000
CD7	0.833	0.053	15.722	0.000
CD8	0.945	0.053	17.955	0.000
CD9	0.806	0.050	16.251	0.000
CD18	1.061	0.054	19.573	0.000
CD19	0.802	0.059	13.532	0.000

SELFES BY				
CD3	1.000	0.000	999.000	999.000
CD11	0.732	0.060	12.288	0.000
CD13	1.071	0.067	15.986	0.000
CD14	0.702	0.061	11.552	0.000
CD15	1.298	0.068	19.114	0.000
CD16	1.253	0.067	18.660	0.000
CD17	1.292	0.071	18.144	0.000
CD20	0.677	0.060	11.365	0.000
CD25	1.184	0.069	17.231	0.000
SOMAT BY				
CD21	1.000	0.000	999.000	999.000
CD22	1.031	0.067	15.412	0.000
CD23	0.803	0.066	12.249	0.000
CD26	0.998	0.072	13.936	0.000
CD24	1.034	0.082	12.668	0.000
EMOT BY				
MISBEH	1.000	0.000	999.000	999.000
AGGR	1.082	0.071	15.232	0.000
SELFES	0.852	0.063	13.452	0.000
SOMAT	0.953	0.070	13.663	0.000
CASSETS ON				
BASSETS	0.562	0.060	9.347	0.000
PHYSIO ON				
CASSETS	0.401	0.131	3.069	0.002
BASSETS	-0.147	0.191	-0.768	0.442
BHOUSE	0.061	0.096	0.631	0.528
MENTAL ON				
CASSETS	0.308	0.058	5.299	0.000
BASSETS	-0.045	0.081	-0.554	0.579
BHOUSE	-0.003	0.045	-0.056	0.955
MOTOR ON				
CASSETS	0.184	0.092	1.999	0.046
BASSETS	-0.002	0.131	-0.014	0.989
BHOUSE	-0.087	0.068	-1.293	0.196
EMOT ON				
CASSETS	0.044	0.051	0.859	0.390
BASSETS	-0.012	0.069	-0.172	0.864
BHOUSE	-0.047	0.040	-1.184	0.236
CASSETS ON				
OPS2	-0.130	0.087	-1.483	0.138
INDIGID	-0.241	0.074	-3.235	0.001
BASSETS ON				
INDIGID	-0.696	0.091	-7.678	0.000
OPS2	-0.631	0.109	-5.813	0.000

BHOUSE ON				
INDIGID	-0.697	0.070	-9.956	0.000
OPS2	-0.801	0.092	-8.694	0.000
PHYSIO ON				
Y6M	0.031	0.059	0.527	0.598
Y12M	0.038	0.062	0.620	0.535
Y18M	0.050	0.063	0.790	0.430
Y24M	0.101	0.067	1.499	0.134
Y30M	0.093	0.080	1.170	0.242
LIN7	-0.023	0.057	-0.407	0.684
AGE	0.004	0.005	0.849	0.396
SEX	0.108	0.068	1.578	0.115
INDIGID	-0.175	0.088	-1.999	0.046
NIN1103	-0.009	0.002	-3.703	0.000
MATED2	0.093	0.013	7.254	0.000
AGEMUM03	0.020	0.005	4.184	0.000
MENTAL ON				
Y6M	0.025	0.029	0.854	0.393
Y12M	0.003	0.028	0.117	0.907
Y18M	0.066	0.029	2.224	0.026
Y24M	0.055	0.032	1.704	0.088
Y30M	0.016	0.036	0.449	0.653
LIN7	-0.003	0.026	-0.110	0.912
AGE	0.003	0.002	1.411	0.158
SEX	0.067	0.033	2.047	0.041
INDIGID	-0.122	0.040	-3.039	0.002
NIN1103	-0.007	0.001	-5.975	0.000
MATED2	0.076	0.007	11.172	0.000
AGEMUM03	0.008	0.002	3.923	0.000
MOTOR ON				
Y6M	-0.027	0.048	-0.559	0.576
Y12M	-0.014	0.048	-0.290	0.772
Y18M	0.012	0.048	0.241	0.809
Y24M	0.017	0.048	0.362	0.717
Y30M	-0.038	0.063	-0.601	0.548
LIN7	0.049	0.042	1.157	0.247
AGE	0.043	0.004	9.783	0.000
SEX	0.002	0.052	0.033	0.974
INDIGID	-0.209	0.066	-3.182	0.001
NIN1103	-0.005	0.002	-2.861	0.004
MATED2	0.021	0.010	2.121	0.034
AGEMUM03	0.002	0.004	0.678	0.497
EMOT ON				
Y6M	0.017	0.025	0.673	0.501
Y12M	0.006	0.026	0.247	0.805
Y18M	-0.033	0.028	-1.173	0.241
Y24M	0.008	0.028	0.279	0.780
Y30M	-0.063	0.032	-1.970	0.049
LIN7	0.000	0.024	-0.017	0.987
AGE	-0.001	0.002	-0.492	0.623
SEX	-0.013	0.030	-0.446	0.656
INDIGID	-0.042	0.037	-1.132	0.258
NIN1103	0.001	0.001	1.104	0.270

MATED2	0.008	0.006	1.313	0.189
AGEMUM03	0.004	0.002	2.162	0.031
Y6M ON				
INDIGID	-0.358	0.044	-8.157	0.000
OPS2	-0.255	0.054	-4.745	0.000
LIN7 ON				
Y30M	0.271	0.040	6.806	0.000
OPS2	-0.057	0.050	-1.146	0.252
Y30M ON				
Y24M	0.218	0.030	7.147	0.000
Y24M ON				
Y18M	0.264	0.029	8.965	0.000
Y18M ON				
Y12M	0.273	0.022	12.226	0.000
Y12M ON				
Y6M	0.283	0.029	9.704	0.000
CASSETS WITH				
LIN7	0.157	0.020	7.761	0.000
BASSETS WITH				
BHOUSE	0.288	0.035	8.303	0.000
Y6M	0.141	0.025	5.609	0.000
BHOUSE WITH				
Y6M	0.035	0.023	1.519	0.129
MENTAL WITH				
PHYSIO	0.112	0.024	4.743	0.000
MOTOR WITH				
PHYSIO	0.136	0.034	3.967	0.000
MENTAL	0.115	0.019	6.082	0.000
EMOT WITH				
PHYSIO	0.020	0.021	0.934	0.350
MENTAL	0.013	0.010	1.297	0.194
MOTOR	0.005	0.016	0.316	0.752
CD7 WITH				
CD8	0.290	0.030	9.601	0.000
CD18 WITH				
CD19	0.248	0.032	7.664	0.000
CD22 WITH				
CD23	0.244	0.030	8.083	0.000
Residual Variances				
Y6M	0.565	0.018	32.039	0.000
Y12M	0.534	0.019	27.696	0.000

Y18M	0.406	0.013	31.477	0.000
Y24M	0.495	0.019	26.133	0.000
Y30M	0.389	0.016	24.258	0.000
LIN7	0.630	0.022	28.585	0.000
CASSETS	0.381	0.047	8.195	0.000
BASSETS	0.591	0.061	9.632	0.000
BHOUSE	0.597	0.061	9.791	0.000
PHYSIO	0.979	0.184	5.311	0.000
MENTAL	0.244	0.023	10.396	0.000
MOTOR	0.521	0.064	8.111	0.000
MISBEH	0.034	0.013	2.506	0.012
AGGR	0.111	0.019	5.846	0.000
SELFES	0.141	0.017	8.378	0.000
SOMAT	0.098	0.019	5.223	0.000
EMOT	0.275	0.027	10.008	0.000

CHAPTER 7
Growing Together: Overall Household Income Trajectories and Child Well-being

Variable names and definitions, Chapter 7

Variable name	Definition
HAZDI2	Height-for-age
WAZDI2	Weight-for-age
C2WJNAM	Woodcock-Johnson Test for Names
C2WJVIS	Woodcock-Johnson Test for Visual Integration
C2WJFRA	Woodcock-Johnson Test for Phrases
C2PEA	Peabody Test
CARTY_3A	McCarthy Test 3
CARTY_1A	McCarthy Test 1
CAR6B	McCarthy Test 6
CAR4B	McCarthy Test 4
CARTY_5A	McCarthy Test 5
CD1	Achenbach Child Behaviour Checklist: arguing
CD12	Achenbach Child Behaviour Checklist: jealousness
CD2	Achenbach Child Behaviour Checklist: bragging
CD4	Achenbach Child Behaviour Checklist: crying
CD6	Achenbach Child Behaviour Checklist: demands too much attention
CD5	Achenbach Child Behaviour Checklist: abusiveness
CD7	Achenbach Child Behaviour Checklist: destroying own belongings
CD8	Achenbach Child Behaviour Checklist: destroying other´s belongings
CD9	Achenbach Child Behaviour Checklist: disobeying
CD18	Achenbach Child Behaviour Checklist: fighting
CD19	Achenbach Child Behaviour Checklist: friends with problematic people
CD3	Achenbach Child Behaviour Checklist: feeling lonely
CD11	Achenbach Child Behaviour Checklist: guiltless
CD13	Achenbach Child Behaviour Checklist: afraid of acting wrong
CD14	Achenbach Child Behaviour Checklist: perfectionism
CD15	Achenbach Child Behaviour Checklist: feels unloved
CD16	Achenbach Child Behaviour Checklist: paranoid
CD17	Achenbach Child Behaviour Checklist: feels inferior
CD20	Achenbach Child Behaviour Checklist: prefers to be alone
CD25	Achenbach Child Behaviour Checklist: feels guilty
CD21	Achenbach Child Behaviour Checklist: cheats and lies
CD22	Achenbach Child Behaviour Checklist: nervous
CD23	Achenbach Child Behaviour Checklist: anxious
CD24	Achenbach Child Behaviour Checklist: feels dizzy
AGE	Child´s age in months
SEX	Child´s gender
INDIGID	Child´s ethnicity (indigenous / non-indigenous)
NIN1103	Proportion of children in the household
MATED2	Maternal education level
AGEMUM03	Maternal age
OPS2	PROGRESA-Oportunidades
LYINO97	household income in 1997 September
LYINO98O	household income in 1998 October
LYINO99M	household income in 1999 March
LYINO99N	household income in 1999 November
LYINO00M	household income in 2000 March
LYINO03	household income in 2003 September

Un-standardised Solution and Standard Errors for Figure 7.4-R. Results for 6-Year-Olds: Effects of Household Income Trajectory on Child Well-Being

	Estimate	S.E[92].	Est./S.E[93].	Two-Tailed P-Value
I |				
LYINO97	1.000	0.000	999.000	999.000
LYINO98O	1.000	0.000	999.000	999.000
LYINO99M	1.000	0.000	999.000	999.000
LYINO99N	1.000	0.000	999.000	999.000
LYINO00M	1.000	0.000	999.000	999.000
LYINO03	1.000	0.000	999.000	999.000
S1 |				
LYINO97	0.000	0.000	999.000	999.000
LYINO98O	1.000	0.000	999.000	999.000
LYINO99M	1.500	0.000	999.000	999.000
LYINO99N	1.500	0.000	999.000	999.000
LYINO00M	1.500	0.000	999.000	999.000
LYINO03	1.500	0.000	999.000	999.000
S2 |				
LYINO97	0.000	0.000	999.000	999.000
LYINO98O	0.000	0.000	999.000	999.000
LYINO99M	0.000	0.000	999.000	999.000
LYINO99N	1.000	0.000	999.000	999.000
LYINO00M	1.500	0.000	999.000	999.000
LYINO03	2.000	0.000	999.000	999.000
PHYSIO BY				
HAZDI2	1.000	0.000	999.000	999.000
WAZDI2	1.174	0.140	8.356	0.000
MENTAL BY				
C2WJNAM	1.000	0.000	999.000	999.000
C2WJVIS	1.107	0.139	7.958	0.000
C2WJFRA	0.683	0.128	5.343	0.000
C2PEA	1.359	0.156	8.693	0.000
MOTOR BY				
CARTY_5A	1.000	0.000	999.000	999.000
CAR6B	-0.208	0.107	-1.939	0.052
CAR4B	-0.040	0.095	-0.416	0.677
MISBEH BY				
CD1	1.000	0.000	999.000	999.000
CD12	0.888	0.164	5.421	0.000
CD2	0.768	0.153	5.023	0.000
CD4	0.766	0.132	5.800	0.000
CD6	1.094	0.158	6.925	0.000

[92] Standard Error
[93] Estimate / Standard Error

AGGR BY				
CD5	1.000	0.000	999.000	999.000
CD7	0.791	0.159	4.985	0.000
CD8	0.822	0.169	4.855	0.000
CD9	0.827	0.160	5.167	0.000
CD18	0.974	0.158	6.156	0.000
CD19	0.766	0.187	4.088	0.000
CD20	0.947	0.160	5.915	0.000
SELFES BY				
CD3	1.000	0.000	999.000	999.000
CD11	1.130	0.209	5.414	0.000
CD13	1.520	0.271	5.618	0.000
CD14	0.877	0.245	3.588	0.000
CD15	1.477	0.260	5.679	0.000
CD16	1.397	0.244	5.727	0.000
CD17	1.557	0.291	5.355	0.000
CD25	1.525	0.250	6.109	0.000
SOMAT BY				
CD21	1.000	0.000	999.000	999.000
CD22	1.174	0.253	4.637	0.000
CD23	1.230	0.258	4.759	0.000
CD26	0.898	0.269	3.339	0.001
CD24	1.493	0.338	4.423	0.000
EMOT BY				
MISBEH	1.000	0.000	999.000	999.000
AGGR	1.032	0.180	5.743	0.000
SELFES	0.836	0.170	4.918	0.000
SOMAT	0.782	0.174	4.486	0.000
PHYSIO ON				
I	0.622	0.243	2.555	0.011
S1	0.830	0.316	2.624	0.009
S2	0.335	0.284	1.178	0.239
MENTAL ON				
I	0.891	0.183	4.879	0.000
S1	1.122	0.254	4.412	0.000
S2	0.668	0.219	3.047	0.002
MOTOR ON				
I	0.659	0.417	1.583	0.113
S1	0.983	0.640	1.535	0.125
S2	0.849	0.515	1.650	0.099
EMOT ON				
I	-0.053	0.133	-0.399	0.690
S1	0.088	0.184	0.480	0.631
S2	0.032	0.170	0.190	0.850
I ON				
INDIGID	-0.253	0.152	-1.667	0.095
OPS2	-0.346	0.164	-2.111	0.035
S1 ON				
INDIGID	-0.246	0.138	-1.781	0.075
OPS2	-0.031	0.153	-0.200	0.842
S2 ON				
INDIGID	0.120	0.089	1.359	0.174

OPS2	0.057	0.108	0.534	0.593
S2 WITH				
I	-0.049	0.026	-1.910	0.056
S1	-0.165	0.026	-6.391	0.000
I WITH				
S1	-0.321	0.037	-8.612	0.000
PHYSIO ON				
SEX	0.315	0.229	1.378	0.168
INDIGID	-0.239	0.266	-0.899	0.368
NIN1103	-0.003	0.006	-0.489	0.625
AGEMUM03	0.030	0.014	2.143	0.032
MATED2	0.092	0.041	2.265	0.024
MENTAL ON				
SEX	0.026	0.115	0.224	0.823
INDIGID	-0.329	0.293	-1.123	0.261
NIN1103	-0.005	0.004	-1.349	0.177
AGEMUM03	0.007	0.006	1.119	0.263
MATED2	0.085	0.024	3.599	0.000
MOTOR ON				
SEX	0.039	0.619	0.063	0.950
INDIGID	0.749	0.617	1.213	0.225
NIN1103	0.009	0.020	0.439	0.661
AGEMUM03	-0.041	0.045	-0.925	0.355
MATED2	0.042	0.106	0.396	0.692
EMOT ON				
SEX	0.076	0.093	0.819	0.413
INDIGID	-0.174	0.125	-1.395	0.163
NIN1103	-0.001	0.003	-0.342	0.732
AGEMUM03	0.009	0.005	1.584	0.113
MATED2	0.017	0.018	-0.920	0.358
MENTAL WITH				
PHYSIO	0.348	0.068	5.091	0.000
MOTOR WITH				
PHYSIO	-0.822	0.098	-8.352	0.000
MENTAL	0.145	0.063	2.286	0.022
EMOT WITH				
PHYSIO	0.143	0.053	2.701	0.007
MENTAL	0.041	0.035	1.190	0.234
MOTOR	0.054	0.084	0.650	0.516
CD7 WITH				
CD8	0.423	0.092	4.583	0.000
CD18 WITH				
CD19	0.246	0.102	2.421	0.015
CD22 WITH				
CD23	0.335	0.098	3.423	0.001
Residual Variances				
I	0.535	0.046	11.540	0.000
S1	0.391	0.042	9.293	0.000
S2	0.261	0.026	9.902	0.000

Un-standardised Solution and Standard Errors for Figure 7.5-R. Results for 5-Year-Olds: Effects of Household Income Trajectory on Child Well-Being

	Estimate	S.E.	Est./S.E.	Two-Tailed P-Value
I |				
LYINO97	1.000	0.000	999.000	999.000
LYINO98O	1.000	0.000	999.000	999.000
LYINO99M	1.000	0.000	999.000	999.000
LYINO99N	1.000	0.000	999.000	999.000
LYINO00M	1.000	0.000	999.000	999.000
LYINO03	1.000	0.000	999.000	999.000
S1 |				
LYINO97	-1.000	0.000	999.000	999.000
LYINO98O	0.000	0.000	999.000	999.000
LYINO99M	0.500	0.000	999.000	999.000
LYINO99N	0.500	0.000	999.000	999.000
LYINO00M	0.500	0.000	999.000	999.000
LYINO03	0.500	0.000	999.000	999.000
S2 |				
LYINO97	0.000	0.000	999.000	999.000
LYINO98O	0.000	0.000	999.000	999.000
LYINO99M	0.000	0.000	999.000	999.000
LYINO99N	0.500	0.000	999.000	999.000
LYINO00M	1.000	0.000	999.000	999.000
LYINO03	2.000	0.000	999.000	999.000
PHYSIO BY				
HAZDI2	1.000	0.000	999.000	999.000
WAZDI2	0.687	0.181	3.801	0.000
MENTAL BY				
C2WJNAM	1.000	0.000	999.000	999.000
C2WJVIS	1.468	0.101	14.491	0.000
C2WJFRA	1.068	0.084	12.641	0.000
C2PEA	1.324	0.095	13.938	0.000
MOTOR BY				
CARTY_5A	1.000	0.000	999.000	999.000
CAR6B	1.317	0.246	5.345	0.000
CAR4B	1.298	0.256	5.063	0.000
MISBEH BY				
CD1	1.000	0.000	999.000	999.000
CD12	0.946	0.092	10.264	0.000
CD2	1.060	0.091	11.630	0.000
CD4	1.014	0.091	11.106	0.000
CD6	1.022	0.095	10.726	0.000
AGGR BY				
CD5	1.000	0.000	999.000	999.000
CD7	0.811	0.062	12.992	0.000
CD8	0.921	0.063	14.544	0.000

CD9	0.730	0.058	12.506	0.000
CD18	0.973	0.066	14.718	0.000
CD19	0.748	0.075	10.013	0.000
SELFES BY				
CD3	1.000	0.000	999.000	999.000
CD11	0.741	0.085	8.744	0.000
CD13	1.087	0.092	11.757	0.000
CD14	0.658	0.084	7.841	0.000
CD15	1.338	0.094	14.216	0.000
CD16	1.329	0.095	13.998	0.000
CD17	1.373	0.103	13.349	0.000
CD25	1.144	0.093	12.355	0.000
CD20	0.617	0.080	7.693	0.000
SOMAT BY				
CD21	1.000	0.000	999.000	999.000
CD22	1.016	0.087	11.670	0.000
CD23	0.808	0.085	9.520	0.000
CD26	0.940	0.092	10.182	0.000
CD24	1.012	0.106	9.521	0.000
EMOT BY				
MISBEH	1.000	0.000	999.000	999.000
AGGR	1.199	0.108	11.109	0.000
SELFES	0.870	0.091	9.530	0.000
SOMAT	0.992	0.097	10.235	0.000
PHYSIO ON				
I	0.338	0.113	2.997	0.003
S1	-0.037	0.092	-0.400	0.689
S2	0.261	0.129	2.018	0.044
MENTAL ON				
I	0.250	0.052	4.822	0.000
S1	0.053	0.042	1.256	0.209
S2	0.203	0.059	3.472	0.001
MOTOR ON				
I	-0.052	0.063	-0.826	0.409
S1	-0.045	0.048	-0.943	0.346
S2	-0.011	0.068	-0.155	0.877
EMOT ON				
I	-0.081	0.049	-1.661	0.097
S1	0.006	0.039	0.156	0.876
S2	-0.042	0.055	-0.776	0.438
I ON				
INDIGID	-0.231	0.038	-6.147	0.000
OPS2	-0.216	0.044	-4.846	0.000
S1 ON				
INDIGID	-0.019	0.046	-0.402	0.688
OPS2	0.103	0.055	1.877	0.060

S2 ON				
INDIGID	-0.036	0.038	-0.956	0.339
OPS2	-0.008	0.045	-0.177	0.859
PHYSIO ON				
SEX	0.064	0.096	0.670	0.503
INDIGID	-0.148	0.101	-1.458	0.145
NIN1103	-0.007	0.004	-1.962	0.050
AGEMUM03	0.018	0.007	2.461	0.014
MATED2	0.076	0.018	4.351	0.000
MENTAL ON				
SEX	0.095	0.044	2.163	0.031
INDIGID	-0.175	0.046	-3.759	0.000
NIN1103	-0.007	0.002	-4.943	0.000
AGEMUM03	0.008	0.003	2.668	0.008
MATED2	0.079	0.009	8.671	0.000
MOTOR ON				
SEX	0.049	0.054	0.908	0.364
INDIGID	-0.139	0.060	-2.325	0.020
NIN1103	-0.002	0.002	-0.807	0.420
AGEMUM03	0.000	0.004	-0.075	0.940
MATED2	0.023	0.011	2.063	0.039
EMOT ON				
SEX	0.013	0.040	0.316	0.752
INDIGID	-0.081	0.043	-1.865	0.062
NIN1103	0.002	0.001	1.202	0.229
AGEMUM03	0.002	0.003	0.687	0.492
MATED2	0.006	0.008	0.798	0.425
I WITH				
S2	-0.147	0.010	-15.034	0.000
S1	0.019	0.009	2.005	0.045
S1 WITH				
S2	-0.157	0.011	-14.312	0.000
MENTAL WITH				
PHYSIO	0.094	0.030	3.119	0.002
MOTOR WITH				
PHYSIO	0.100	0.039	2.554	0.011
MENTAL	0.076	0.021	3.642	0.000
EMOT WITH				
PHYSIO	0.004	0.028	0.151	0.880
MENTAL	0.009	0.012	0.742	0.458
MOTOR	0.006	0.015	0.369	0.712
CD7 WITH				
CD8	0.282	0.043	6.571	0.000
CD18 WITH				
CD19	0.277	0.046	6.038	0.000

CD22 WITH				
CD23	0.218	0.041	5.286	0.000
CD25 WITH				
CD26	0.241	0.038	6.329	0.000
CD13 WITH				
CD14	0.169	0.042	3.980	0.000
Residual Variances				
I	0.261	0.011	23.169	0.000
S1	0.386	0.017	23.355	0.000
S2	0.268	0.012	22.534	0.000

Un-standardised Solution and Standard Errors for Figure 7.6-R. Results for 4-Year-Olds: Effects of Household Income Trajectory on Child Well-Being

	Estimate	S.E.	Est./S.E.	Two-Tailed P-Value
I BY				
LYINO99M	1.000	0.000	999.000	999.000
LYINO99N	1.000	0.000	999.000	999.000
LYINO00M	1.000	0.000	999.000	999.000
LYINO03	1.000	0.000	999.000	999.000
S2 BY				
LYINO99M	0.000	0.000	999.000	999.000
LYINO99N	0.500	0.000	999.000	999.000
LYINO00M	1.000	0.000	999.000	999.000
LYINO03	2.000	0.000	999.000	999.000
PHYSIO BY				
HAZDI2	1.000	0.000	999.000	999.000
WAZDI2	0.407	0.123	3.300	0.001
MENTAL BY				
C2WJNAM	1.000	0.000	999.000	999.000
C2WJVIS	1.160	0.083	14.053	0.000
C2WJFRA	0.958	0.076	12.644	0.000
C2PEA	1.048	0.076	13.840	0.000
MOTOR BY				
CARTY_5A	1.000	0.000	999.000	999.000
CAR6B	0.791	0.090	8.822	0.000
CAR4B	0.750	0.087	8.666	0.000
MISBEH BY				
CD1	1.000	0.000	999.000	999.000
CD12	0.950	0.096	9.863	0.000
CD2	1.044	0.099	10.579	0.000
CD4	1.083	0.098	11.103	0.000
CD6	0.875	0.094	9.334	0.000

AGGR BY				
CD5	1.000	0.000	999.000	999.000
CD7	0.868	0.091	9.568	0.000
CD8	1.000	0.092	10.887	0.000
CD9	0.933	0.089	10.508	0.000
CD18	1.179	0.094	12.593	0.000
CD19	0.846	0.097	8.720	0.000
CD20	0.600	0.084	7.178	0.000
SELFES BY				
CD3	1.000	0.000	999.000	999.000
CD11	0.664	0.088	7.579	0.000
CD13	0.935	0.096	9.785	0.000
CD14	0.653	0.086	7.585	0.000
CD15	1.235	0.095	12.974	0.000
CD16	1.145	0.097	11.795	0.000
CD17	1.196	0.100	11.984	0.000
CD25	1.167	0.103	11.302	0.000
SOMAT BY				
CD21	1.000	0.000	999.000	999.000
CD22	1.020	0.102	10.010	0.000
CD23	0.772	0.101	7.647	0.000
CD26	1.079	0.107	10.094	0.000
CD24	1.075	0.124	8.633	0.000
EMOT BY				
MISBEH	1.000	0.000	999.000	999.000
AGGR	1.019	0.106	9.624	0.000
SELFES	0.843	0.094	8.981	0.000
SOMAT	0.977	0.109	8.980	0.000
PHYSIO ON				
I	1.267	0.232	5.982	0.000
S2	1.339	0.659	2.031	0.042
MENTAL ON				
I	0.957	0.165	6.426	0.000
S2	0.189	0.421	0.448	0.654
MOTOR ON				
I	0.757	0.206	3.464	0.001
S2	1.886	0.625	2.384	0.017
EMOT ON				
I	0.014	0.096	0.144	0.886
S2	0.229	0.279	0.822	0.411
I ON				
INDIGID	-0.315	0.050	-6.269	0.000
OPS2	-0.377	0.057	-6.658	0.000
S2 ON				
INDIGID	-0.022	0.045	-0.500	0.617
OPS2	0.168	0.047	3.573	0.000
MENTAL WITH				
PHYSIO	0.241	0.037	6.451	0.000
MOTOR WITH				
PHYSIO	0.175	0.057	3.069	0.002
MENTAL	0.211	0.036	5.924	0.000

EMOT	WITH			
PHYSIO	0.035	0.030	1.173	0.241
MENTAL	0.034	0.018	1.937	0.053
MOTOR	0.004	0.026	0.150	0.881
CD7	WITH			
CD8	0.290	0.042	6.869	0.000
CD18	WITH			
CD19	0.255	0.046	5.529	0.000
CD22	WITH			
CD23	0.280	0.045	6.283	0.000
Residual Variances				
I	0.038	0.011	3.432	0.001
S2	0.019	0.011	1.649	0.099