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absence during the early years**

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**JEL Codes: Early childhood development, Fatherhood, Developing countries**  
**Keywords: O15, J13**



# When fathers are gone: the consequences of paternal absence during the early years\*

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## Abstract

I examine the causal effect of paternal absence during the first years of life on early childhood development. I take advantage of Young Lives study, a unique panel dataset including skill outcomes of pairs of siblings with different levels of paternal involvement. With a difference in difference approach, I first compare the younger sibling exposed to the father's absence in the early years versus the older one exposed at age 5. Then, I control for the gap in skills between siblings living in households with no absence. Results show that paternal absence in the early years leads to a relative worsening in nutritional outcomes when 5 years old. The gap persists when 8 and 12 years old, with no evidence of cumulative effects. On the contrary, younger siblings relatively outperform their older counterparts in cognition in Peru and Vietnam, statistically significant for the former country. These findings are consistent with critical windows for ability development during the first 1,000 days of life. I find support for this conclusion as I observe no strong evidence on differences in development when absence occurs at age 5 for the younger and 8 for the older sibling.

**Keywords:** Early childhood development, Fatherhood, Developing countries

**JEL Codes:** O15, J13

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# 1 Introduction

The role of parents in human capital formation has garnered substantial attention in the field of economics. This can be explained by the following facts. The early years set the foundations for an ongoing process of skill accumulation; being the first 1,000 days of life—from conception to age 2—critical windows for anthropometric outcomes (Victora et al. 2010). Because skills matter for adult success, early childhood development has strong predictive power of outcomes such as education and wages (Black et al. 2017, Currie & Almond 2011). The process in which skills are formed is not only influenced by genetics but also by experiences faced by the child (Shonkoff et al. 2012). Moreover, experiences during the early years are mostly influenced by the home environment; but more specifically by interactions between the child and parents (Cunha & Heckman 2007). Altogether, this stresses how important parents are for future adult success.

Parenting plays a crucial role both in terms of nutrition and nurturing. They make fundamental choices such as food allocation and health investments, as well as offering emotional support and mental stimulation. Moreover, parent-child interactions can exacerbate or mitigate risk factors. What is the specific role of the mother and the father in this process is still an open question.

In the economic literature, most theoretical models of human capital formation limit the analysis to one adult and one child, with no distinction between mothers and fathers (Cunha & Heckman 2007). Others frame childcare distribution between parents in a setting of intra-household resources allocation (Becker 1991), where the relative allocation is mainly the result of a comparative advantage in caregiving. From an empirical perspective, most of the evidence comes from early childhood interventions that have mainly focused on the mother as the main provider of inputs for children’s development. This is adequate as long as maternal childcare is what only matters or if caregiving provided by either of the parents is perfectly substitutable.

Fathers may have a differential effect on the development of children for two reasons. First of all, fathers may complement maternal childcare by providing particular inputs which boost those provided by the mother. Secondly, fathers could also affect specific inputs that mothers do not. Either way, beyond the inaccuracy of the mentioned models, ignoring the role of the father in skill formation could potentially limit the impact of policies aiming at reducing the development gap observed across socioeconomic groups.

This paper answers the question whether the input of the father is important during the critical period of the first 1,000 days of life. I study the extreme case in which the father is absent, trying to understand if absence has an impact on skill formation; directly and indirectly. Moreover, I test whether the impact is the same across abilities. In this way, I seek to establish a causal relationship between paternal absence during the critical period on early childhood development outcomes in four developing countries—Ethiopia, India, Peru and Vietnam. I consider early childhood as the period that goes up to age 5, as evidence suggests that some ability gaps become salient only after some periods.<sup>1</sup>

I contribute to the human capital literature in the following dimensions. I isolate paternal inputs from other caregivers’ inputs, adding some insight on the relevance of the father on the skills production function. Secondly, I focus on the early years, highlighting the pertinence of paternal investments during the critical periods. I ex-

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<sup>1</sup>For instance, Schady (2011) find how the distribution in vocabulary scores among poor children in rural Ecuador changes during the period between 3 and 5 years old. Similarly, Rubio-Codina et al. (2015) finds a widening in the average gap in cognitive and language skills after 24 months of age in Bogota, Colombia.

plore nutritional, cognitive and socio-emotional outcomes, which enables me to look at how paternal absence affects each type of ability. In addition, I measure those outcomes in the short and the long run. More importantly, the methodology I use provides internal validity on the causal role of the father in early childhood development. Lastly, the evidence in four developing countries provides external validity of the results.

Finding a causal relationship between paternal absence and skills development is not an easy task. One of the main challenges is the endogeneity that goes along with children's outcomes and family decisions. One way to overcome this problem is by using siblings as counterfactuals, in which one of them experiences the departure of the father while the other does not. Intra-household comparisons would remove the effect of observable and unobservable characteristics that are common to both siblings. However, siblings could develop differently irrespectively of the changes in family structure. To overcome this issue, siblings in households with no absent fathers could also be compared. Then, if gaps in development between siblings in both types of households are indeed different from each other, it is credible that paternal absence has an impact on children's development.

I take advantage of the unique dataset provided by the Young Lives study which includes information on disadvantaged children in Ethiopia, India, Peru and Vietnam. The study follows up these children (from now on, the older sibling or index child) from early childhood for a 15 year span, collecting detailed data on development outcomes, information on parents and household and community characteristics. Five waves are available: 2002 (the baseline), 2006, 2009, 2013 and 2016. The main novelty of Young Lives for this paper is the inclusion of a survey on younger siblings in the last three waves. Exploiting this rich data, my sample comprises the index child, born in 2001-02, and his/her younger brother/sister born in 2003-05. I make use of the availability of nutritional outcomes, cognitive test and socio-emotional measures<sup>2</sup> of both children. Furthermore, I use the frequency the child sees his/her father in each round as a proxy of paternal presence. I will consider a father as absent if he does not see his child (the index child) on a daily basis or if he does, he does not live at home.

This data provides me with two sources of variation. First, I end up with two types of household, one that experiences the absence of the father in one of the rounds under study and another that does not. Second, given that absence occurs at one point in time, I exploit the chronological moment of the absence of the father and the corresponding age of each sibling when that happens. More specifically, when the older sibling is around 5 while the younger is in her/his early years. To mimic a child's counterfactual as much as possible, I compare the outcomes of pairs of siblings when they are of similar age measured at two different points in time, i.e. two consecutive waves. In other words, when assessing the gap when both are around 5 years old, I compare the older sibling in the second round (2006) and the younger in the third one (2009). Adding household fixed effects, my approach resembles a difference-in-difference methodology. The first difference is the gap within household in the development of siblings, measured when they are at a similar stage in life. The second one is the difference in the gaps between the two types of household (those that experience absence and those that do not). I analyze the short term impact on the outcomes when both aged 5 and the long term effects when both are 8 and 12 years old.

Exploiting earlier versus later exposure to paternal absence, I find that the father's absence seems to matter more for children's outcomes when aged 5 if it occurs during the first years of life relatively to at a later stage. But surprisingly, the effect of paternal input differs across abilities. On the one hand, paternal absence seems to

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<sup>2</sup>Outcomes are: weight-for-age, height-for-age, Peabody Picture Vocabulary Test and self-efficacy and self-esteem indices.

be detrimental for nutritional outcomes, and this relative under-performance in anthropometric measures prevails over time while no cumulative effects are found. On the contrary, it seems not to be the case for cognition, where I encounter no differential performance between siblings when pooling all countries.<sup>3</sup> In fact coefficients are positive for Peru and Vietnam, being statistically significant for the former country. In terms of socio-emotional outcomes, estimates do not give a clear interpretation as they vary across countries and ages at which siblings are measured.

Estimates could potentially reflect the relative importance of the father's presence earlier versus later in life, irrespective of if it happens around the 1,000 day window. Moreover, measures are in relative terms. Therefore, they could be showing the impact on the older sibling and not on the one suffering absence just after birth. In order to rule out these alternatives, I perform a second exercise in which I explore the case where absence occurs at age 5 and 8 for the younger and older sibling respectively. Indeed, I encounter that having an absent father when 5 is not any different than having it afterward in terms of nutrition and cognitive outcomes in the short nor the long-run.

An interesting question is what are the risk factors affected during paternal departure that explain my results. Exploring possible mechanisms, evidence suggests that the relatively more detrimental effect on nutrition can be explained by a negative income shock. Households suffering paternal absence are more likely to report a worsening in their economic situation with respect to those that did not experience paternal departure. On the other hand, results on cognition could be potentially explained by changes in family structure. It seems that households experiencing a father's departure are less likely to have other adult members leaving the household. Those adults are the ones potentially compensating lack of input by the father on cognitive skills formation.

It is worth mentioning that the data used in this paper does not provide information on the reason of departure, which creates two limitations. First of all, it prevents me of making any distinctions on whether absence is due to migration, divorce, abandonment or death. Each of these alternatives may have different effects on the well-being of the child as the length and the reason why he left may have different implications. I will approach this issue by studying temporary versus more permanent absence. To do this, I will analyze households in which fathers come back the next round and those that do not. Secondly, I do not know whether fathers had left as a result of a shock, which could potentially lead to a misinterpretation of the results. If this shock has a differential effect when it occurs in the early years, then my results could be capturing the impact of this particular episode rather than paternal absence. While unable to rule this issue out, I will control for the occurrence of shocks reported by the household.

These results provide support to the existence of critical periods for paternal input in the human capital production function, especially in terms of nutritional outcomes. In the countries I study, fathers seem to matter as financial supporters. Therefore, the negative income shock related to paternal absence can have a relatively higher (long lasting) detrimental effect on nutritional development when it occurs during the early years. The dissimilar effect on skill outcomes is consistent with the idea that abilities are affected by different risk factors in a heterogeneous manner. Hence, if paternal absence has a differential impact on risk factors, then I expect to find contrasting responses on abilities. Some factors, such as lower stimulation by the father or a worsening of the home environment, can be potentially mitigated by the mother or other family members. Others, such as the negative income shock, are less easily mitigated by relatives. The former factors—stimulation and home environment—are probably more relevant for cognition and socio-emotional outcomes, explaining the

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<sup>3</sup>India is excluded from this analysis as there is no information on cognitive outcomes for the younger sibling.

null gap (and positive for Peru and Vietnam) in cognitive development. The later could be more important for anthropometric measures, backing the results found.

The remainder of the paper is organized as follows. Section 2 goes through the most relevant literature on paternal absence and on the research done using siblings from Young Lives dataset. Section 3 provides details on the data used, how siblings were sampled and what are the outcomes to be measured. Section 4 goes into detail on the identification strategy and econometric specification while section 5 reports descriptive statistics for both types of households and compares older and younger siblings between them and across household types. Section 6 shows the main results while section 7 provides interpretations of the findings. Section 8 discusses possible mechanisms behind the results while section 9 provides a number of robustness checks. Finally, section 10 concludes.

## 2 Literature Review

The effects of adverse conditions during the early years materialize very soon in life, as gaps in skills arise very early between individuals and across socioeconomic groups (Cunha & Heckman 2007).<sup>4</sup> Moreover, gaps in development across the wealth distribution widen as children get older.<sup>5</sup> Inequalities at such an early stage is a concern as early childhood development has long-lasting consequences in adult success such as educational and labor market outcomes.<sup>6</sup> Hence, understanding what is behind the human capital production function has become a topic of interest in development economics. From a policy perspective, the question narrows to when and how to intervene, in order to ensure equal opportunities for children to reach their development potential.

There has been a significant progress in the knowledge of how skills are accumulated. Child development is multidimensional; skills can be categorized as cognitive-language, sensory-motor or socio-emotional skills. Following the theoretical model by Cunha & Heckman (2007), skills formation is a multistage technology, as it is a process that occurs at different stages of the child's life. Each of these abilities is constructed on top of previously developed skills. Moreover, every element interacts with each other and previous investments reinforce future ones. There are two important aspects worth highlighting about the human capital accumulation process. First, there are critical periods in which some skills are more easily acquired than at other stages, making the timing of investment a first order concern. Second, while genes play an important role in the process of skills formation, external factors such as parenting are fundamental during the first years of life (Shonkoff et al. 2012, Cunha et al. 2006).

Impact evaluations on home visit programs have provided good evidence of how parenting impacts child development. One of the most well-known evaluations took place in Jamaica, in which apart from nutritional supplements, visitors taught mothers to play with their children. Grantham-McGregor et al. (1991) find that stimulation had a positive effect on children's development, and this effect lasted after 20 years (Gertler et al. 2014). Another evaluation in a psychosocial stimulation program in northeast Brazil also found positive results on cognitive and motor development (Eickmann et al. 2003). Likewise, in a randomized controlled trial in Colombia it was found that stimulation improved cognitive scores as well as receptive language (Attanasio et al. 2014). Attanasio et al. (2020) find that parental investment was

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<sup>4</sup>Evidence can be found in contexts as diverse as India, Indonesia, Peru and Senegal (Fernald et al. 2012), Chile, Colombia, Ecuador, Nicaragua and Peru (Schady et al. 2015) and Philippines (Ghuman et al. 2005).

<sup>5</sup>This pattern has been found among children aged 6-42 months in Colombia (Rubio-Codina et al. 2015), aged 3-6 years old in rural Ecuador (Paxson & Schady 2007) and Bangladesh (Hamadani et al. 2014), and aged 7 months-5 years old in Madagascar (Fernald et al. 2011) to name a few.

<sup>6</sup>Key references include Currie & Almond (2011), Grantham-McGregor et al. (2007), Hoddinott et al. (2013), Black et al. (2017).

the main driver of the improvement in skills. Moreover, they encounter that higher skilled mothers invest more in their children, once accounting for their children's skills level, highlighting the relevance of maternal characteristics. While these interventions have enlightened the role of parents in the development of children, the focus has been mainly on the mother as the main provider of stimulation. However, there are reasons to believe that inputs by the father could be complementary in the human capital production function, as shown by Macours et al. (2015). When testing the impact of a home-visiting parenting intervention in rural Nicaragua, they find that the effect on abilities is larger when both the mother and the father take part in the intervention. These findings suggest that the father may be more than the household's breadwinner. These results raise the question of complementarity of maternal and paternal inputs in skill formation, motivating the need to further investigate how fathers matter in early childhood development.

When it comes to critical periods, the medical literature has stressed the relative importance of the first 1,000 days of life for the development of the child (Barker 1990 and Victora et al. 2010). The economic literature has focused on the economic return to early interventions, arguing that investments during the early years is often more cost effective than later remediation interventions (Carneiro & Heckman 2003, Currie & Almond 2011), some emphasizing on the pregnancy period (Doyle et al. 2009). While still in their infancy, there have been some attempts to empirically identify the critical windows for early interventions in developing countries. Pathak & Macours (2017) analyse in India how policies that could potentially benefit human capital development can have long-lasting impacts in learning when children are exposed during the first 1,000 days versus at a later stage. Results show their educational outcomes are larger when children take advantage of those policies very early in life. Barham et al. (2013) compare the effect of a conditional cash transfer among Nicaraguan boys at age 10 exposed to the program before age 2 versus those exposed between age 2 and 5. They find short-term improvements in nutritional and health outcomes while in their long-term evaluation they encounter higher cognitive skills but equal anthropometric outcomes, consistent with a catch up in nutrition. This last finding provides evidence on the singularity of sensitive periods for each skill. Furthermore, it triggers the question on the mechanisms behind the results. More specifically, whether paternal and maternal inputs are equally relevant during this critical window.

This paper aims at contributing to a relatively unexplored literature in economics by studying the specific role of the father during the critical periods for human capital development. In order to isolate paternal inputs, my approach is to study the extreme case in which the father is absent from the household. Aiming at finding an adequate contrafactual, I compare the development across siblings in the same household exploiting the differential in timing of paternal absence. Moreover, I focus on four countries (Ethiopia, India, Peru and Vietnam) which not only provides evidence from the developing world but also provides external validity given the diversity on economic, social and cultural characteristics across countries. Below, I discuss related literature and how this paper contributes to each field.

The most evident literature studying the role of the father on the child's life is the one on migration and union dissolution. Within the migration literature, the focus is on disentangling the multiple effects that paternal departure may have on children's well-being. The ambiguity comes from the fact that departure may lead to an income effect –loss of income source versus remittances sent– but also to the so-called disruption effect. Paternal migration may impact children emotionally while lack of time investment could potentially jeopardize the cognitive and socio-emotional development of children. Moreover, it could alter resources allocation as a result of a change in decision making inside the household. Some studies explore the positive effect of remittances on educational investment (Cox Edwards & Ureta 2003, Calero et al. 2009, Acosta 2006). Others have tried to disentangle the income versus disruption ef-



fect of parental absence, finding that remittances can eventually compensate the lack of parenting conditional on socio-economic factors (Amuedo-Dorantes et al. 2010), if at least one parent stays at home (Lu & Treiman 2011) while others encounter heterogeneous effects between boys and girls (Hu 2012). Some studies differentiate between international versus domestic migration (Adams Jr & Cuecuecha 2010, Antman 2012), while others examine how the effect varies depending on the length of migration episodes (Giannelli & Mangiavacchi 2010). The literature focusing on divorce has also provided useful insights on the ambiguity of paternal absence. In rural Malawi, Chae (2016) finds that parental divorce is associated with lower grade attainment and larger schooling gap among children. Thiombiano et al. (2013) find in Burkina Faso that children of divorced parents experienced higher risks of dying before age 5 while their probability of entering primary school is lower. In both areas, little is known about the effects of father’s departure during the critical periods neither on skills measured in the early years. One relevant study is Macours & Vakis (2010), who find that seasonal migration of the father in Nicaragua has no significant effect on early cognitive development.

A literature closer to the role of the father at an early age is the one on paternity leave. A few papers have examined the impact of taking paternal leave on fathers’ participation in childcare; such as Nepomnyaschy & Waldfogel (2007) in the United States, Tanaka & Waldfogel (2007) in the UK, Ekberg et al. (2013) and Haas & Hwang (2008) in Sweden, Rege & Solli (2013) in Norway. Nevertheless, there is limited evidence on the implications of paternity leave on children’s outcomes. One of the exceptions is the study by Cools et al. (2015) in Norway, where they take advantage of the paternal quota in 1993 and find that children’s school performance at age 16 increases for children whose fathers are more educated than the mother. Again, effects are measured when children are no longer in their early years. Moreover, most of this literature has been focused on developed countries.

One of the strengths of this paper is the suitability of the data used to properly overcome previous papers’ limitations, i.e. early episodes of paternal absence and ability outcomes measured early in life. Fortunately, Young Lives project provides a unique dataset in that sense, as it is a longitudinal study that follows children from an early age in the four mentioned countries (Ethiopia, India, Peru and Vietnam). Young Lives reports detailed information on children and household characteristics. First, it includes information on the frequency in which children see their parents, which can be used as a proxy for paternal absence. Second, it provides measures on cognitive and socio-emotional outcomes from a young age.

Other researchers have taken advantage of the richness of Young Lives panel data to investigate similar interesting questions. Focusing on the role of the father, Darden et al. (2013) assess the impact of father presence on Peruvian children’s growth, making the distinction between absence during infancy, childhood and both. Using a mixed linear regression model, they find a negative effect on height when fathers are absent in both periods versus when he is present. On the other hand, children experiencing paternal absence during infancy (but not at age 5) performed better than those with a present father in both periods. Moreover, Nguyen & Vu (2016) assess the effect of temporary migration of parents on children’s outcomes when aged 5 and 8 in Vietnam. With a child fixed-effect approach, they find that parental absence has an effect on children’s time use. More specifically, children spend less time on home study, being the effect higher when the mother is the one absent (versus the father). In addition, maternal absence is linked to more time spent on housework. Nguyen (2016) performs a similar analysis in Ethiopia, India, Peru and Vietnam, and finds that parental migration helps households increase per capita consumption but does not improve nutritional and cognitive outcomes of children. Parental migration decreases health outcomes in India, Peru and Vietnam and reduces cognitive skills in India and Vietnam; and the effect accentuates the longer the parental departure is. In Ethiopia the effect is not statistically significant.

Using child-fixed effects, as the latter studies do, solves the differences in time-invariant characteristics among households. However, just following the same child over time does not allow to study the consequences of paternal absence when very young. A more suitable counterfactual of the child is needed to eventually be able to find a causal relationship between absence at an early age and child’s outcomes. The use of siblings has been a common practice to deal with this challenge (Behrman & Rosenzweig 2004, Black et al. 2005). Antman (2012) combines both the study of paternal migration in Mexico and the use of siblings to understand the impact of the father’s absence on schooling outcomes. By assuming educational outcomes are not affected when children are at least 20 years old, she compares older versus younger siblings who may still be in school. Using variation in siblings’ ages at the time of parental departure is an interesting approach to overcome selection problem. Indeed, households with an absent father might differ from those with no absence both in observable and unobservable characteristics. Therefore, a sibling seems to be a good counterfactual of what would have happened to the child under a different context.

Fortunately, Young Lives includes a survey on siblings, which has already been exploited in several studies. Sanchez et al. (2016) use the paired-sibling sample in Peru to evaluate the effect of conditional cash transfer (Juntos) implemented in 2005 on nutritional and cognitive outcomes. They take advantage of the difference in the timing in which siblings benefited from the program. Similarly, Outes-Leon et al. (2011) use a sibling-difference specification for Peruvian pre-school children in order to assess the link between nutritional outcomes and cognition, having as an instrument household shocks and food price changes. They compare older and younger siblings aged approximately 4-6, but measured at different points in time, 2006 and 2009 respectively.

In this paper, I rely on the availability of development outcomes of siblings at different stages in life and take advantage of the timing in which paternal absence occurs. In other words, I will exploit the fact that the younger sibling experiences the departure of the father during the first years of life while the older sibling experiences it when aged 5. Moreover, I control for the differential in development trends between siblings who had not experienced the departure at all. In this way, I am able to find a causal effect of the absence of the father on a child development when it occurs during the critical window versus at a later stage. In the following sections I explain the data used and the empirical methodology in more detail.

### 3 Data

The data I use in this paper comes from Young Lives<sup>7</sup>, an international study of childhood poverty in Ethiopia, India (Andhra Pradesh and Telangana), Peru and Vietnam. It follows two cohorts of 12,000 children in total for over 15 years. The first cohort was born in 1994-95 while the second was born in 2001-02. This paper focuses on the younger cohort, for which five waves are available: 2002 (the baseline), 2006, 2009, 2013 and 2016. Attrition rates between the first and fifth round are relatively low, around 4.5% for the four countries. In terms of sampling approach, around 20 sentinel sites were selected non-randomly in each country and poor areas were over-sampled. The sample comprises of around 2,000 children in each country, who were randomly selected based on their age from each of these communities. From now on, these children will be referred to as the *index children* or *older sibling*.

Young Lives longitudinal study is a unique dataset, as it provides detailed information on households and community characteristics. More importantly, the survey includes key questions about parents which I use to proxy paternal absence. My

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<sup>7</sup>Huttly & Jones (2014), Boyden (2014), Boyden (2011) Boyden et al. (2016) and Sanchez et al. (2018).

definition of absent father is based on the information collected on the frequency by which the index child sees her/his father as well as if the father lives at home. Additionally, the survey is particularly suitable for my analysis due to the inclusion of development outcomes of pairs of siblings in each household. While originally only the index child was tracked, information on the closest-in-age sibling started to be included after the third wave. The sibling questionnaire comprises those who were at least 24 or 36 months old (depending on the country), were able to stand and were in the community at the time of the survey. I will use data on all siblings who were born between 2003 and 2005.

The identification strategy then relies on the availability of development outcomes for both the older and the younger sibling when 5, 8 and 12 years old plus information on father’s involvement; allowing me to compare pairs of children from the same household that experienced absence at different moments in time. The following section explains how these variables are used to capture the causal relationship between paternal input in the early years and childhood development. But first, I provide more details on how paternal absence is defined, how the sample of siblings is selected as well as the construction of development outcomes for both children.

#### *Paternal absence*

From the question “How often does the child’s father see the child?”, an absent father is defined as a parent who does not see his child on a daily basis or if he does, the father does not live at home.<sup>8</sup> In terms of residency of the father, round one includes the following question: “Where does child’s biological father live?”. For the following rounds, IDs were matched in order to check their presence in the family roster and whether the individual still lived at home. It is important to note that in some rounds it is specified the fact that the father is the biological one. In round two and three, an extra question is included, where it is explicitly asked whether the paternal figure is the biological father. As it seems too restrictive, I do not constraint by the fact that the father is the biological one in the main specifications as there are only a few cases in which the father was not.<sup>9</sup>

#### *Siblings sample*

Siblings were incorporated in the survey from round 3 (2009) onward, including information such as their birthdate, anthropometric measures, cognitive and socio-emotional tests. In order to find a suitable counterfactual of the index child, I construct the appropriate sample by matching pairs of siblings who were at a similar stage in life one round apart (i.e. the older sibling should be the same age in 2006 as the younger sibling in 2009).

Unfortunately there is a trade-off between how close siblings are in age and sample size. Aiming at not being too restrictive, I impose that the younger sibling should have been born between 2003 and 2005 (between round 1 and round 2). On the downside, this leads to a wider distribution in terms of age among younger siblings than among index children.

First, I include those siblings already born in 2006, based on their presence in the household roster in round 2. Furthermore, I exclude those already born in the first round (2002), based on their appearance in the family roster or on the age

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<sup>8</sup>The question varies among rounds. In round 1 the exact question is the following: “In the last 6 months how often has the child’s biological father seen him/her?”, in the second and third round: “How often does the father see the child?”. In the fourth and fifth round the following question is only asked when the biological father is not in the household roster: “How often does the father see the child?”.

<sup>9</sup>If I calculate absence restricting to being a biological father, I would have 3 more observations when absence occurs in 2006.

they would have been in that round.<sup>10</sup> I calculate age from birthdates when available/reliable, otherwise I use reported age. I delete those observations where gender does not match between round 2 and 3. I also restrict to those who are biological brothers/sisters in order to make sure they share the same paternal figure. I end up with 2,565 younger siblings. For further information on how age in months was calculated, see appendix A.1. Table A1 exhibits the distribution of rounded ages between the index children and the younger siblings.

#### *Development outcomes*

In this paper, the outcomes under analysis are on nutrition, such as weight-for-age and height-for age, cognition- Peabody Picture Vocabulary test, and socio-emotional skills, agency and pride index.

Nutritional outcomes are calculated from information on weight, height, gender and age in months. Anthropometric z-scores are computed using the 2006 WHO child growth standards for children between 0 and 5 years old and 2007 WHO child growth standards for children aged 5 to 19. For weight-for-age, growth standards are only available up to age 10. For the index children, age in months is available in the dataset while for the younger siblings it is calculated based on birthdates if not included in the dataset (see appendix A.1 for more details). Z-scores are considered missing if values are implausible (based on the WHO cutoffs).

The Peabody Picture Vocabulary Test (PPVT) is a widely used cognitive test that attempts to measure children’s vocabulary by showing them a set of four pictures simultaneously and requesting them to select the picture that best represents the word mentioned by the examiner. Whereas for the index child data is available for the four countries, it is not the case for the younger sibling as the test was only administrated in Ethiopia, Peru and Vietnam (provided he/she was at least four years old in 2009). Therefore, India is excluded for this outcome. In Ethiopia and Vietnam the version used was the PPVT-III, while in Peru the Spanish version of the PPVT-R was provided. These two versions differ in aspects such as the number of items and the definition of the basal and ceiling rules, meaning that the computation of the raw score is not done equally. Moreover, raw scores are comparable only among children of the same age, which makes this score less suitable as the range of ages between pair of siblings widely varies. For these reasons, I consider that a proper standardization of the test needs to be done. Using external z-scores may not be the best option as external norms might not be appropriated when using data from developing countries. Hence, I use internally standardized scores by performing a simple standardization where the mean and standard deviation are calculated per country pooling older and younger siblings at all ages. As the variance in age among siblings is higher than among index children, and because adjusting for age is a common practice, I will control for a polynomial of age in the regressions.

The survey includes a group of psychosocial measures, pride and self-esteem (based on Rosenberg 1965) and agency/self-efficacy (based on Rotter 1966 and Bandura 1993). These items are only included in round 4 and 5 for the sibling. All questions are answered on a Likert scale (from 1 to 5, 5 being strongly agree). For each index, three subindices were constructed taking into consideration the fact that some questions were only asked to those children at school and those that worked. For the agency indices, some questions were asked negatively, which could eventually arise the problem of acquiescence bias, which refers to the tendency of the respondent to agree more than disagree. In order to correct for this bias, I follow the approach by Laajaj & Macours (2017) and calculate the acquiescence score of each individual by averaging the mean of all positive items and the mean of the negative items (before

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<sup>10</sup>Both conditions were imposed as some siblings were not in the household roster in 2002 but in fact were already born based on their calculated age. Therefore, siblings were kept in the sample as long as they were born at least one month after the first round survey was done.

reversing) and then average both. After subtracting 3, I deduct the acquiescence score to each question. All items were standardized using the mean and standard deviation per country. Each question in each subindex was weighted using factor analysis technique. For more details on items included in each index, see appendix A.2.

Once again, measures on anthropometrics and cognitive skills for the younger sibling are available in the last three waves, while information on socio-emotional skills is available in the fourth and fifth waves.

## 4 Identification Strategy and econometric specification

### 4.1 Identification Strategy

The aim of this paper is to estimate the impact of an absent father during the critical periods on early childhood development. Using Young Lives data, I assess what are the implications on children’s outcomes when the departure occurs during the first months of life versus when aged 5.

When estimating the causal impact of the absence of the father on early childhood development, researchers face the endogeneity related to the departure of the father and children’s performance. An appealing approach is to use siblings as counterfactuals, given that they are a good approximation of what would have happened to the child under different external conditions. Under this rationale, I evaluate the differential effect of paternal absence in the early years by comparing pairs of siblings that experienced the departure of the father at different stages of their life cycle. In other words, I take advantage of the timing of this departure and the age of the older and the younger sibling at which this event took place. By this way, I try to mimic the older child’s development path in a scenario in which absence of the father had occurred in the early years instead of when aged 5. In order to approximate my analysis as much as possible to this ideal scenario, I compare siblings when they are around the same age.

The simple comparison of siblings in households that experienced the absence of the father would ignore two issues. First of all, parents might allocate investments differently across siblings as a result of preferences or due to the economic cycle of the household. Secondly, as siblings are measured at different points in time, certain common shocks (for instance, a macroeconomic crisis) could have affected development independently of the departure of the father. One way to address these issues is to control for the eventual difference in development between siblings by including pairs of children from households with no paternal absence.

Hence, I compare pairs of siblings that experienced the absence of the father at different moments in their lives (treated households) versus pairs of siblings that did not experienced the absence of the father (control households). This methodology resembles to a difference-in-difference approach.

The identification strategy relies on certain assumptions worth mentioning. A central assumption is that the potential gap in development between the older and younger sibling in households that experienced the absence of the father would have been the same as those with no absence if the father had not left. In other words, trends in nutritional, cognitive and socio-emotional outcomes between siblings would have been parallel between both type of households if the father would have been present. Section 9 provides support for this assumption. A second assumption is that any differential in development between pairs of siblings of different type of households is caused directly by the absence of the father. This assumption could

be violated if there is a shock that has an impact on children’s well-being and at the same time leads to the absence of the father. For this reason, I will control for the fact the family experienced a negative shock as a robustness check. This will be explained in further detail in section 9. Lastly, I assume that the departure of the father is not a response to a particular shock that affects the development of one of the siblings. For instance, families could decide to send the father away as a result of the sickness of one of the children. If that was the case, I would be concluding that paternal absence has a negative effect on health when in fact departure was a response to the child’s illness.

Taking those assumptions into consideration, I exploit Young Lives data available on the children and their younger siblings born in 2001-02 and 2003-05 respectively and the possibility that a pair of siblings had experienced different paternal involvement early in life. The panel data will comprise of pairs of siblings when approximately aged 4-6 (from now on 5 year-olds) and 7-9 (from now on 8 year-olds). Below, the details on how I use this data for the identification strategy.

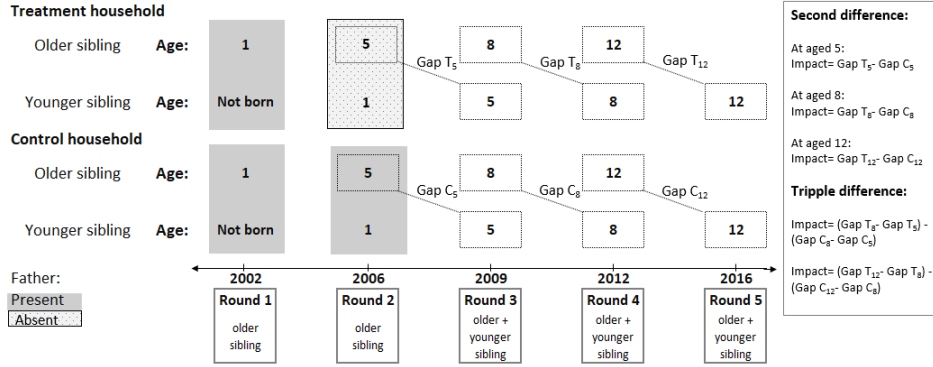
#### 4.1.1 Paternal absence during the early years versus at age 5

As seen in Figure 1 the first group (treatment group) had experienced the absence of the father in 2006 but not in 2002. In those households, only the younger sibling is the one who faced the absence of his/her father when very young, but not the older sibling who did when aged 5. In the control group, neither the younger nor the older sibling experienced the absence of the father in 2006 nor in 2002. It is worth recalling that there is only information if the father was present or absent each round but not on the date when the departure took place. The treatment group is composed of 153 households while the control group comprises 2,212 households (see table B3 for details on sample size per country).

There is no restriction on the presence/absence of the father in 2009 and onward. This is relevant as it could be the case that households with no absence in 2006 do experience the departure of the father afterward, in which case I would be comparing pairs of siblings experiencing the absence of the father at different moments in time. On the other hand, comparing households that have the father gone at some point may be more similar to the treated families, making it more accurate as a control group. As a robustness check, I will include alternative controls restricting presence of fathers after 2006 (Section 9).

In this exercise I take the first difference in nutritional and cognitive outcomes between pairs of siblings when around 5 years old (for the older sibling in 2006 and for the younger one in 2009) from treated households (absence in 2006) and the same difference between pairs of siblings in households in the control group. I perform a similar analysis when both siblings are 8 and 12 years old in order to have some insight on long terms effects. For socio-emotional outcomes, the analysis is done when siblings are around 8 and 12 years old.

Figure 1: Absence in 2006: timing of absence and measurement of children's outcomes



**Notes:** This figure shows the identification strategy for the exercise. There are two types of households: (1) treated households, the father was present in the first round but was absent in 2006 (2) control households, the father was present in the first two rounds. In each household there is information on nutritional, cognitive and socio-emotional outcomes for a pair of siblings, a younger and an older sibling. Therefore, the sample includes those households with at least two siblings. Information on outcomes is only available for the younger sibling from 2009 onward. The main analysis consists of calculating the difference (or gap) between the younger and older sibling in the treatment group when 5, 8 and 12 years old (Gap  $T_4$ ,  $T_8$  and  $T_{12}$  respectively) minus the gap between siblings in the control group (Gap  $C_4$ ,  $C_8$  and  $C_{12}$  respectively). As a ancillary exercise, I also calculate the difference in the evolution of the gap between siblings in the treatment group versus the control group when they are 8 versus 5 ((Gap  $T_8 - \text{Gap } T_4$ )-(Gap  $T_{12} - \text{Gap } T_8$ )) and 12 versus 8 ((Gap  $T_8 - \text{Gap } T_4$ )-(Gap  $T_{12} - \text{Gap } T_8$ )).

Examining medium and long term effects is relevant as these two effects could differ for several reasons. For instance, the effect of the absence of the father that occurs when the younger sibling is very young, could potentially vanish, persist or increase over time (independently if the father comes back or not). In the case of the older sibling, if the departure of the father was very recent in 2006, measuring her/his outcomes when 5 years old may be premature to actually capture any kind of effect and would be likely noticeable at a later stage.

If there was evidence of medium and long term effects, it is interesting to understand the trends across time. Hence, as a secondary exercise, I estimate the difference between these gaps. With a triple difference approach, I study how paternal departure affects the evolution of these outcomes by performing a difference in the change when children are 5 and 8 years old, between pairs of siblings, among households experiencing the absence of the father and those that do not. Similarly, I study the change when children are 8 and 12 years old.

Before proceeding, a few data limitations for my paper. Given the sample size of treated households, one important concern is that this could compromise power and potentially increase the probability of type II error. For this reason, I restrict the sample the least possible by including siblings who were around- but not exactly- 5 years old in 2009. Moreover, countries are aggregated in order to gain the most feasible power. It is important to highlight that pooling countries together requires making the assumption that effects of the absence of the father are not heterogeneous and trends among siblings are similar across countries. I test for differences between countries.

A second limitation is that, while there is information on the absence of the father at specific points in time, it is not known whether fathers were absent in-between rounds. As long as there is no clear pattern among the control versus treated households in-between waves, this should not harm the credibility of my results. Moreover, there is no information on the duration of absence as there is no precise data of the departure date. This could be an issue if the length of absence is not long enough to have an effect on development outcomes. Estimating long term effects allows me to check whether paternal absence becomes more salient after a while among those in which fathers had just left in the studied rounds.

Lastly, the definition of absence is based on the frequency the child sees his/her father and if he lives in the household. However, there is no information on the reason the father has left (except if they are dead). Absence can be due to permanent or seasonal migration, or can be the result of abandonment, divorce or death. Restricting future presence gives some sense of the most plausible reason of departure. For instance, if the father is back in the next round then it is probable that he temporarily migrated. In section 8.3 I will study cases in which the father comes back the following round versus those that do not.

## 4.2 Econometric Specification

I propose the following baseline econometric specification, represented by equation (1):

$$y_{ih} = \alpha + \gamma \text{younger sibling}_{ih} + \delta(\text{HH w/absence in } 2006_h \times \text{younger sibling}_{ih}) + \text{HH}_h + \phi X_{ih} + \epsilon_{ih} \quad (1)$$

Where  $y_{ih}$  are nutritional (weight-for-age and height-for-age) and non-cognitive outcomes (standardized PPVT) when paired-siblings are around 5, 8 and 12 years old, while it represents socio-emotional outcomes when children are 8 and 12 years old. Variable  $\text{younger sibling}_{ih}$  is equal to 1 if the outcome belongs to the younger sibling and 0 if the outcome belongs to the older sibling.  $\text{HH w/absence in } 2006_h$  is equal to 1 if the household experiences absence in 2006 (but not in 2002) and 0 if there was no episode of absence in these two rounds. The coefficient of interest is  $\delta$ .  $\text{HH}_h$  is the household fixed effect.  $X_{ih}$  includes age, gender and birth order of each child. It also includes the interaction between each control variable and country dummies. When the dependent variable is the cognitive test measure, I include an age polynomial as control. Standard errors are clustered at the sentinel site level.

## 5 Descriptive statistics

Table B4 reports information on the characteristics of older siblings, mothers, fathers and their households' characteristics at baseline (i.e. 2002) by household type. Questions on whether the mother/father takes care of the child and if they are a financial support are referred to the older sibling (index child). On average, older siblings in both groups are similar in terms of age, birth order, reported birth weight, reported number of prenatal visits by mothers and whether the child attends regularly a *creche*. There are more girls in households where no absence occurred, significantly different at the 10% level. In terms of mothers' characteristics, they are slightly older in households experiencing paternal absence in 2006 while they do not seem to differ much in terms of education. In both types of households mothers regularly take care of the child (96%) and 63% are said to provide financial support to the older sibling. Fathers differ in terms of education as those who were absent in 2006 are on average more educated than those who were present. More interestingly, fathers seem on average to equally take care of the index children and to provide financial support at baseline. Household size does not statistically differ across type of households neither the percentage of families who report to live in the rural area. Moreover, a statistically similar percentage of household stated that someone in the household owns the house. However, it is worth noting that households in the treatment group seem to be on average richer when looking at the housing quality index and wealth index. Furthermore, treated households are more likely to have experienced a bad event at baseline than households in the control (62% versus 50%) and this difference is statistically significant at the 1% level.

Table B5 exhibits descriptive statistics of the outcomes of siblings (both older and younger ones) when 5 years old in households with and without an absent father in 2006. In general terms, older siblings in households that experience absence when



aged 5 outperform on average older siblings in households with no absence in terms of nutritional outcomes and these differences are statistically significant at the 1% level for height for age and at the 5% level for weight for age. However, their cognitive test scores are not statistically different from each other. The percentage of girls in households with an absent father is lower than the one in households not experiencing absence in the selected rounds. On the contrary, younger siblings are not statistically different from each other across type of households in terms of nutrition (standardized measures) and cognition, except for age, as children in households with an absent father early in life are slightly older than those in households with a present father. When looking at the gap within household types, column 13 shows that older siblings are doing better in terms of weight and height for age compared to their younger counterparts in households with the absence episode. However, younger children are outperforming the older ones in terms of cognition. Those differences are statistically significant. In households with no absence, older siblings outperform younger ones in terms of weight and height but when age differentials are taken into consideration (i.e. standardized values), the difference is no longer significant. As in treated households, the gap in cognition is positive and significant between the younger with respect to the older sibling. It is worth noting that the gap in nutritional (standardized) outcomes and in cognitive skills is more accentuated for the pair of siblings experiencing the absence of the father at different moments in their lives than for those that do not.

## 6 Results

Table 1 presents the main aggregated results. Older siblings (or index children) are the reference category. When variables are interacted with country dummies, Ethiopia is the reference category.

Column 1 and 2 show standardized anthropometric measures which allow us to compare children across ages and countries. When looking at these outcomes, it is noteworthy that, as the bottom of the table shows, older siblings are on average below the reference mean in terms of weight and height. This could be explained by the fact that Young Lives project over-samples the poor. Moreover, the standardized nutritional measures reveal that as children grow up (variable age) they perform worse.<sup>11</sup> This is probably due to a cumulative effect of bad nutrition which accentuates even more with time, explained mainly by the selection of disadvantaged households.

On average, the nutritional development of younger siblings in households with no absent fathers is statistically similar to that of their older siblings when aged 5. With respect to the estimate of interest, the interaction between being the younger sibling and belonging to a household with an absent father in 2006, it is negative for both weight and height for age. In other words, while pairs of siblings in households with no absent father perform similarly, it is not the case in households with an absent father as the gap becomes negative and significant (for weight-for-age)<sup>12</sup> between the older and younger sibling. These results suggest that the absence of the father during the first years of life affects negatively (or more negatively) the nutritional development of children compared with the case where absence occurs at age 5.

The following column reports the regression on cognitive skills, proxied by the Peabody Picture Vocabulary Test (standardized). It is important to note that the sample excludes India, leading to a lower sample size of households for both groups. Younger siblings outperform on average their older counterparts in terms of cognition in households with no paternal absence, and this difference is statistically significant.

<sup>11</sup>Except for Peru in terms of height.

<sup>12</sup>While it is significant at the 5% only for weight-for-age, the p-value for height-for-age is around 0.102, close to be significant at the 10% level.

More interestingly, this positive gap increases in households in which the father was absent. While not statistically significant, this is a striking result as it shows a differential effect with respect to nutritional outcomes. Moreover, lack of power could be hiding a positive impact (in relative terms) of the absence of the father on cognition.

Table 1: Nutritional and cognitive outcomes when 5 years old between younger and older siblings among households with and without absence in 2006

VARIABLES	(1) Weight-for-age	(2) Height-for-age	(3) PPVT Z-Score
Younger sibling	0.113 (0.255)	0.407 (0.341)	0.479** (0.202)
HH w/absence in 2006 * younger sibling	-0.187** (0.0870)	-0.199 (0.120)	0.126 (0.0942)
Age (Ethiopia)	-0.394*** (0.0507)	-0.309*** (0.0476)	-29.24 (26.54)
Age * India	0.157** (0.0708)	0.0981 (0.0743)	
Age * Peru	0.315*** (0.0647)	0.360*** (0.0748)	50.76 (59.08)
Age * Vietnam	0.156* (0.0866)	0.0991 (0.0745)	-148.1** (66.92)
Female (Ethiopia)	-0.135*** (0.0481)	-0.0482 (0.0681)	-0.0683** (0.0339)
Female * India	0.190** (0.0842)	0.132 (0.113)	
Female * Peru	-0.0807 (0.0814)	-0.0127 (0.103)	0.0553 (0.0532)
Female * Vietnam	0.167** (0.0737)	0.198** (0.0969)	0.131* (0.0694)
Birth order (Ethiopia)	-0.302 (0.254)	-0.372 (0.347)	-0.305 (0.200)
Birth order * India	0.197*** (0.0685)	-0.0899 (0.105)	
Birth order * Peru	0.201*** (0.0624)	0.152 (0.105)	0.910*** (0.0650)
Birth order * Vietnam	0.0422 (0.0785)	-0.169* (0.100)	0.0178 (0.127)
Observations	4,588	4,540	2,628
R-squared	0.084	0.039	0.541
Number of HH	2,294	2,270	1,314
Observations control	2,145	2,122	1,219
Mean control	-1.34	-1.64	-.89
Observations treatment	149	148	95
Mean treatment	-1.1	-1.37	-.97
Includes India	Yes	Yes	No
Age polynomial	No	No	Yes

**Notes:** Standard errors in parentheses, clustered at the sentinel site level. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Each regression includes a household fixed effect and presents the gap in the corresponding outcome between a child and his/her younger sibling in households that experienced the absence of the father in 2006 versus the gap in household that did not experienced his absence that year. In 2006, the relatively older child is around 5 years old and the younger sibling is in her/his early years. All outcomes are measured when both siblings are around 5 years old. Variable *younger sibling* is equal to 1 if the individual is the younger sibling and 0 if the individual is the relatively older child. Variable *hh with absence in 2006* is equal to 1 if the pair of siblings under comparison belong to a household which experienced the absence in 2006 but not in 2002, and 0 if the father was present in both rounds. Dependent variables in column 1 and 2 are weight-for-age z-score and height-for-age z-score. Both anthropometric z-scores are based on the 2006 WHO child growth standards for children below 5 and 2007 WHO child growth standards for children aged 5-19 years (except for weight-for-age for children older than 10). Dependent variable in column 3 corresponds to the standardized score of the Peabody Picture Vocabulary Test (PPVT) at the country level. For this outcome, India is excluded due to lack of data for younger siblings. All regressions are controlled for age, gender and birth order. Interactions between each control and each country are included, being Ethiopia the country of reference.

So far, the results presented correspond to the specification in which countries are pooled together. However, I could expect heterogeneities to arise across countries.

This is particular relevant as I am including different cultural contexts which may broadly vary in terms of family structures and family interactions. Table 2 presents the same analysis as before, but including country interactions for both the dummy variable corresponding to the younger sibling and the coefficient of interest (being a younger sibling in a household with an absent father in 2006). The table includes in brackets under each coefficient the p-values corresponding to the coefficient of the individual regression per country. It also provides the jointly significant test performed to assess whether country interactions are statistically different from each other.

Table 2: Nutritional and cognitive outcomes when 5 years old between younger and older siblings among households with and without and without absence in 2006 with country interactions

VARIABLES	(1) Weight-for-age	(2) Height-for-age	(3) PPVT Z-Score
Younger sibling (Ethiopia)	0.597*** (0.189) [0.006]	1.376* (0.731) [0.080]	0.0667 (0.107) [0.546]
Younger sibling * India	-0.215 (0.351) [0.220]	-0.883 (0.891) [0.354]	
Younger sibling * Peru	-0.497** (0.208) [0.260]	-0.357 (0.750) [0.000]	1.853*** (0.210) [0.000]
Younger sibling * Vietnam	-1.302*** (0.315) [0.013]	-1.742** (0.800) [0.287]	0.157 (0.203) [0.221]
HH w/absence in 2006 * younger sibling (Ethiopia)	-0.191 (0.128) [0.160]	-0.0480 (0.244) [0.849]	-0.0235 (0.0925) [0.805]
HH w/absence in 2006 * younger sibling * India	-0.248 (0.188) [0.006]	-0.142 (0.317) [0.369]	
HH w/absence in 2006 * younger sibling * Peru	0.103 (0.225) [0.646]	-0.378 (0.289) [0.014]	0.231* (0.137) [0.058]
HH w/absence in 2006 * younger sibling * Vietnam	0.177 (0.251) [0.950]	-0.213 (0.323) [0.245]	0.459* (0.271) [0.111]
Observations	4,588	4,540	2,628
R-squared	0.089	0.043	0.547
Number of HH	2,294	2,270	1,314
Observations control	2,145	2,122	1,219
Mean control	-1.34	-1.64	-.89
Observations treatment	149	148	95
Mean treatment	-1.1	-1.37	-.97
P-value younger sibling	.001	.003	.000
P-value HH w/absence in 2006 * younger sibling	.272	.577	.107
Includes India	Yes	Yes	No
Age polynomial	No	No	Yes

**Notes:** Standard errors in parentheses, clustered at the sentinel site level. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Each regression includes a household fixed effect and presents, by country, the gap in the corresponding outcome between a child and his/her younger sibling in households that experienced the absence of the father in 2006 versus the gap in household that did not experienced his absence that year. In 2006, the relatively older child is around 5 years old and the younger sibling is in her/his early years. All outcomes are measured when both siblings are around 5 years old. Variable *younger sibling* (being the reference Ethiopia) is equal to 1 if the individual is the younger sibling and 0 if the individual is the relatively older child. Variable *hh with absence in 2006* (being the reference Ethiopia) is equal to 1 if the pair of siblings under comparison belong to a household which experienced the absence in 2006 but not in 2002, and 0 if the father was present in both rounds. Dependent variables in column 1 and 2 are weight-for-age z-score and height-for-age z-score. Both anthropometric z-scores are based on the 2006 WHO child growth standards for children below 5 and 2007 WHO child growth standards for children aged 5-19 years (except for weight-for-age for children older than 10). Dependent variable in column 3 correspond to the standardized score of the Peabody Picture Vocabulary Test (PPVT) at the country level. For this outcome, India is excluded due to lack of data for younger siblings. All regressions are controlled for age, gender and birth order. Interactions between each control and each country are included.

Estimates on nutritional outcomes suggest that the gap between younger and older siblings in households with no absence differ across countries. For instance, while younger siblings over-perform older ones in Ethiopia (baseline country) in terms

of weight for age, in Vietnam they under-perform their counterparts and there is no clear trend in Peru and India. In terms of height for age, this coefficient is positive and statistically significant for Ethiopia and Peru and statistically equal to zero for India and Vietnam. When performing a joint significance test, results show coefficients are statistically different for weight and height for age. However, when looking at the coefficient of interest, the interaction terms are not jointly significant. Hence, I find suggestive evidence that the effect previously found when pooling the four countries is representative of each one of them. As seen in table 2, the gap in nutritional development between younger and older sibling gets wider in households with an absent father for each country. In terms of magnitudes, India seems to be pushing the negative coefficient the most in terms of weight for age, while for height for age Peru is the country showing the most negative coefficient.

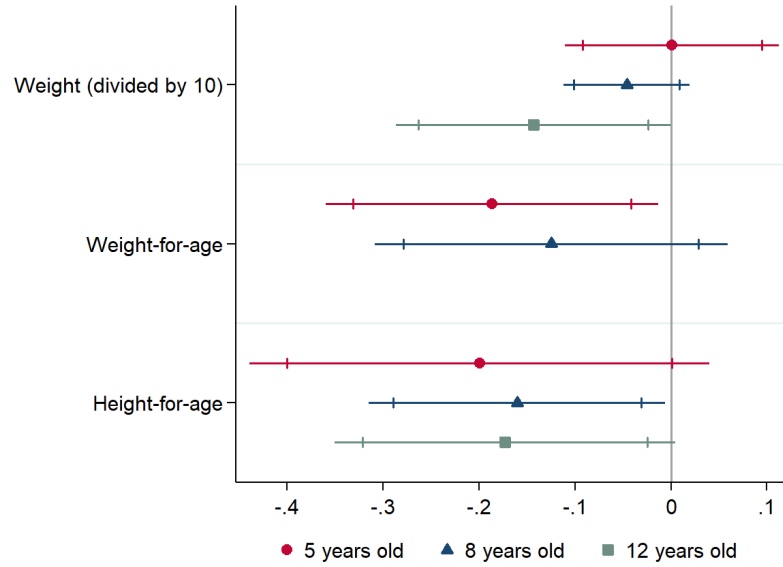
Turning now to cognition, younger siblings in the control households have on average a higher score than their older siblings in the three countries, while the coefficient is particularly larger in Peru and statistically significant at the 1% level. One of the most important results comes from the interaction term between the coefficient of interest with each of the three countries. As a reminder, the coefficient of interest is positive but not statistically significant when pooling the three countries. While in Ethiopia this coefficient goes close to zero, this is not the case for Peru and Vietnam. In fact, estimates show a positive gap among pairs of siblings when the father left compared to those with no absence. Furthermore, the coefficient is statistically significant at the 10% level for Peru while close to be significant for Vietnam (p-value= 0.111).

Up to this point, I have been comparing siblings that experienced the absence in the early years (younger siblings) and those that experienced it when 5 years old in treated households versus pairs of siblings in households from the control group. Since outcomes are contrasted when pairs of siblings are aged 5, the older sibling is being measured at the same wave at which the father is reported to be absent in treated households. However, it may be the case that departure has been so recent that older siblings had not yet faced the consequences of his absence. Therefore, looking at the evolution of the gap seems relevant not only to better understand the medium and long term effect of the absence but also in case the effect on the older child becomes apparent after a while. The following two figures display estimates of interest (interaction between being the younger sibling in a household with an absent father) when pairs of siblings are 8 and 12, including when aged 5 as a reference.

Figure 2 shows the estimates for nutrition. While the focus is on standardized nutritional outcomes, I also include weight, as weight-for-age becomes a less accurate measure for children over 10 years old. The figure shows 90% and 95% confidence intervals. When pooling the four countries, the estimate for weight-for-age still suggests a negative effect when siblings are measured at 8 years old (while no longer significant at the 10% level). More interestingly, estimates on height-for-age show a persistent relative under-performance between the younger and the older sibling in the medium and long run, being statistically significant at the 5% level when 8 and at the 10% level when 12 years old. Table C6 shows how the gap evolves per country at each stage.

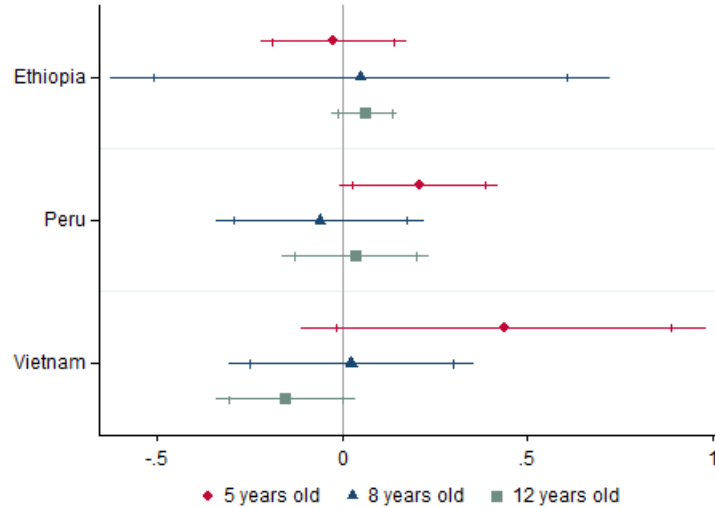
Table D7 shows how nutritional outcomes evolved over time, in order to compare the differential in the trends between sibling across household types. Details on the econometric specification for this exercise are explained in section D. First two columns show the evolution of the gap when pairs of siblings were 5 versus 8 years old. The last two columns show that evolution when siblings were 8 versus 12 years old. While I find a persistent negative effect of the absence of the father on height-for-age, results show no cumulative effects, as it seems not to increase neither decrease over time.

Figure 2: Estimates when siblings are 5, 8 and 12 years old for nutritional outcomes



**Notes:** This figure reports the estimates of interest (hh with an absent father in 2006 and outcomes for the younger sibling) obtained from the estimation of equation (1), when siblings are 5, 8 and 12 years old. For these specifications, the four countries (Ethiopia, India, Peru and Vietnam) were pooled. The figure includes 90% and 95% confidence intervals. Estimates represent the gap in the corresponding outcome between a child and his/her younger sibling in households that experienced the absence of the father in 2006 versus the gap in household that did not experienced his absence that year. Dependent variables are the following: weight (divided by 10 for exhibition purpose), weight-for-age z-score and height-for-age z-score. All anthropometric z-scores are based on the 2006 WHO child growth standards for children below 5 and 2007 WHO child growth standards for children aged 5-19 years (except for weight-for-age for children older than 10). All regressions include a household fixed effect and are controlled for age, gender and birth order. Interactions between each control and each country are included.

Figure 3: Estimates when siblings are 5, 8 and 12 years old for cognitive outcomes per country



**Notes:** This figure reports the estimates of interest (hh with an absent father in 2006 and outcomes for the younger sibling) obtained from the estimation of equation (1), when siblings are 5, 8 and 12 years old for each country. The figure includes 90% and 95% confidence intervals. Estimates represent the gap in the corresponding outcome between a child and his/her younger sibling in households that experienced the absence of the father in 2006 versus the gap in household that did not experienced his absence that year. Dependent variables correspond to Peabody Picture Vocabulary Test (PPVT) standardized at the country level. For cognitive outcomes, India is excluded due to lack of data for younger siblings. All regressions include a household fixed effect and are controlled for age, gender and birth order.

Figure 3 exhibits estimates for standardized cognitive measures by country. As previously shown, pooling the four countries does not seem to be pertinent given

the heterogeneity found across Ethiopia, Peru and Vietnam. Estimates for Ethiopia show that the null gap remains statistically unchanged in the long run between pairs of siblings. In Peru, the positive and statistically significant gap when measured at 5 years old vanishes over time. In Vietnam, the positive gap goes closer to zero and then becomes negative. While none of these coefficients are statistically significant for the latter country, this could suggest a reversal in the relative cognitive development as a result of paternal absence as time goes by.

So far, findings suggest that paternal absence in early years has a differential effect depending on the outcome measured. The following table looks at socio-emotional outcomes, as the role of the father could impact differently on children's self esteem and self efficacy.

Table 3: Socio-emotional outcomes when 5 years old between younger and older siblings among households with and without and without absence in 2006

VARIABLES	Self-efficacy (Agency index)			Self-esteem (Pride index)		
	(1)	(2)	(3)	(1)	(2)	(3)
<b>8 years old</b>						
HH w/absence in 2006 * younger sibling (Ethiopia)	0.334** (0.167) [0.064]	0.340*** (0.106) [0.005]	0.363*** (0.0783) [0.000]	-0.0969 (0.563) [0.867]	-0.348 (0.257) [0.199]	0.0374 (0.166) [0.827]
HH w/absence in 2006 * younger sibling * India	-1.392** (0.626) [0.101]	-0.772** (0.316) [0.171]	-0.826** (0.332) [0.176]	-0.557 (0.602) [0.007]	-0.0715 (0.353) [0.105]	-0.357 (0.306) [0.238]
HH w/absence in 2006 * younger sibling * Peru	-0.363 (0.341) [0.924]	-0.198 (0.301) [0.628]	-0.251 (0.331) [0.736]	0.492 (0.667) [0.289]	0.542 (0.332) [0.379]	0.217 (0.257) [0.220]
HH w/absence in 2006 * younger sibling * Vietnam	-0.878 (0.565) [0.336]	-0.660 (0.424) [0.456]	-0.592 (0.390) [0.564]	0.0887 (0.690) [0.984]	0.526 (0.328) [0.404]	0.125 (0.281) [0.494]
Observations	2,025	3,635	4,081	1,316	2,969	4,323
R-squared	0.030	0.020	0.020	0.109	0.081	0.083
Number of HH	1,020	1,838	2,062	663	1,502	2,183
Observations control	954	1709	1924	624	1,398	2,036
Observations treatment	66	129	138	39	104	147
P-value younger sibling	.045	.039	.014	.198	.146	.000
P-value HH w/absence in 2006 * younger sibling	.074	.056	.044	.075	.109	.345
<b>12 years old</b>						
HH w/absence in 2006 * younger sibling (Ethiopia)	-0.272 (0.226) [0.251]	-0.225 (0.223) [0.334]	-0.193 (0.191) [0.333]	0.0868 (0.230) [0.715]	0.00764 (0.225) [0.974]	0.00333 (0.190) [0.986]
HH w/absence in 2006 * younger sibling * India	0.772** (0.307) [0.029]	0.567** (0.281) [0.064]	0.539** (0.238) [0.027]	0.00709 (0.420) [0.796]	0.0522 (0.357) [0.834]	-0.0532 (0.340) [0.864]
HH w/absence in 2006 * younger sibling * Peru	0.196 (0.327) [0.756]	0.142 (0.311) [0.711]	0.0728 (0.280) [0.574]	0.0502 (0.342) [0.601]	0.139 (0.302) [0.486]	0.200 (0.292) [0.377]
HH w/absence in 2006 * younger sibling * Vietnam	0.0393 (0.378) [0.462]	0.0631 (0.359) [0.579]	0.162 (0.296) [0.896]	0.119 (0.252) [0.064]	0.218 (0.257) [0.091]	0.260 (0.249) [0.127]
Observations	3,484	4,436	4,482	2,785	3,668	4,515
R-squared	0.026	0.027	0.022	0.018	0.015	0.015
Number of HH	1,752	2,234	2,257	1,403	1,851	2,275
Observations control	1,632	2,088	2,110	1,301	1,726	2,127
Observations treatment	120	146	147	102	125	148
P-value Sibling	.166	.193	.027	.000	.000	.001
P-value Household type * Sibling	.057	.156	.09	.957	.831	.653

**Notes:** Standard errors in parentheses, clustered at the sentinel site level. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Each regression includes a household fixed effect and presents, by country, the gap in the corresponding outcome between a child and his/her younger sibling in households that experienced the absence of the father in 2006 versus the gap in household that did not experienced his absence that year. While the upper panel exhibits outcomes when both siblings were 8 years old, the bottom one shows them when they are 12 years old. The reference country corresponds to Ethiopia. Dependent variables in column 1-3 are the following subindices: (1) agency index including all questions, (2) agency index excluding those related to work and (3) agency index excluding those related to work and school. Dependent variables in column 4-6 are the following subindices: (1) pride index including all questions, (2) pride index excluding those related to work and (3) pride index excluding those related to work and school. These indices were calculated as explained in section 3. All regressions are controlled for age, gender and birth order. Interactions between each control and each country are included.

Table 3 provides evidence in Ethiopia of a relatively over-performance in terms of self-efficacy by the younger sibling when 8 years old in households with an absent

father. However, this differential vanishes when measured the following round, when aged 12 years old. On the contrary, there seems not to be a differential gap in the development of this skill for the rest of the countries. The only exception is India with a significant coefficient when aged 12. When it comes to self-esteem (or pride index), Indian younger siblings seem to under-perform older ones at age 8 when suffering the departure of their father earlier on but it is only statistically significant when including all questions (column 4, smaller sample size). On the contrary, estimates are positive and significant for Vietnam for column 1 and 2 when aged 12. This gap only shows in the medium run as the gap disappears when they are 12. Given the noise these measures may have, from now on I will focus on results on nutrition and cognition.

## 7 Discussions

From the previous results I conclude that having an absent father very early in life has a differential effect than experiencing it at age 5. More striking, I observe that skills do not respond the same way to lack of paternal input.

In terms of nutrition, younger siblings relatively under-perform older siblings in households with an absent father. When both siblings are measured at 5 years old, younger ones are less nourished and are smaller than their older counterparts. These results seems to hold for the four countries under study. More interestingly, the relatively lag in height does not vanish over time but on the contrary it persists, when both siblings are measured at 8 and 12 years old. These results hold when pooling the four countries as well as when looking at them separately.<sup>13</sup> Therefore, long-term effects on nutrition suggest that paternal absence in early years leave a stronger mark on the younger sibling relatively to the older one. According to the World Health Organization, a low height-for-age can be interpreted differently depending on the age of the child, especially in developing countries. Among children aged below 2-3 years old, low height-for-age probably reflects a continuing process of “failing to grow” or “stunting”; for older children, it reflects a state of “having failed to grow” or “being stunted” (WHO, 2018).<sup>14</sup> Based on this idea, the lower standardized score of the younger sibling with respect to the older one may be explained by a slower growth process when very little. Moreover, I should expect trends to be parallel if the effect is not cumulative. Indeed, trends in the evolution of anthropometric outcomes are parallel when looking at table D7. My findings provide suggestive evidence of the relevance of critical periods for paternal inputs in nutritional development.

On the contrary, results suggest that cognitive outcomes do not respond to paternal absence the same way. Ethiopian siblings seem to react equally or not to react at all to the absence of the father when the younger experienced it early in life and the older when aged 5. This conclusion holds when measured at 5, 8 and 12 years old. Surprisingly, younger siblings in Peru score relatively higher than their older counterparts in the vocabulary test when measured at 5 years old in households with an absent father versus in those where no absence occurred. This differential effect vanishes over time. In the case of Vietnam, the estimate is also positive and close to statistically significant at the 10% level when measured at age 5 (p-value=0.111). These outcomes, especially the ones in Peru and Vietnam, could be potentially explained either by an improvement in cognition by the younger sibling or by a worsening of cognitive skills by the older sibling. As a reminder, the older sibling is being measured just when the father is gone (i.e. he/she is 5 years old in 2006). When looking at countries pooled and individually, measuring the pair of siblings at age 8 and 12 shows that the gap is not statistically different than the one corresponding to households with no absent father. In terms of the magnitudes of the estimates for Peru and Vietnam, they get closer to zero with respect to the ones

<sup>13</sup>Except for Ethiopia at age 12, where the coefficient is marginally positive but statistically not different than zero.

<sup>14</sup>Global Database on Child Growth and Malnutrition. Retrieved from: [www.who.int](http://www.who.int).

when siblings are measured at 5 years old. One interesting case is Vietnam, where the point estimate –while still not statistically significant– actually becomes negative when both siblings are measured at 12. In other words, there could be a reversal in the relatively over-performance of the younger sibling when measured in the short run. However, no strong conclusion can be made from these coefficients as variation is too wide to have precise estimators.

Estimates are in relative terms. My findings could either reflect the responses by the younger sibling to paternal absence or its impact on the older sibling (or a mix of both). For instance, the negative gap in nutrition can be interpreted as a relative improvement of weight and height of the older sibling as a result of paternal absence. Similar reasoning for cognitive outcomes. If that is the case, no clear conclusions can be made about the relevance of paternal presence during the first months of life.

Fortunately, Young Lives allows me to perform an ancillary analysis to back up my main results. Hence, instead of comparing siblings when paternal absence happens during the early years versus when 5 years old, I can compare pairs of siblings who experience absence at a later stage. On top of that, I can make sure that both siblings had their father present around the age they were born.<sup>15</sup> In brief, the identification strategy resembles the one from the previous exercise except that absence occurs in 2009, when the younger sibling is around 5 years old and the older sibling is 8 years old. Therefore, when they are measured at age 5, only the younger sibling is contemporaneously experiencing the absence at that moment. Details on the identification strategy and econometric specification can be found in section E as well as descriptive statistics (table E8 and E9) and results on estimates (E10, E6, E11 and 12).

Results show that, when pooling the four countries, their comparing nutritional and cognitive outcomes do not seem to diverge any differently than the ones of siblings in households experiencing no absence. These results hold when aged 5 (E10) and when siblings grow up (E6). I arrive to a similar conclusion when looking at countries individually (E11), as estimates do not show any (statistically significant) differential response. The only exception is Vietnam, which shows a negative coefficient at age 5 in terms of weight (statistically significant at the 10% level), but not in terms of height. This could be interpreted as a temporary shock in nutrition as it becomes insignificant the next round and I see no consequences in term of height at age 8. On top of that, the coefficient for height-for-age becomes positive when aged 12. While no clear conclusion can be made from these coefficients, it stresses the consistency of previous results. Specifically, how previous estimates might be capturing something about the first 1,000 days of life, rather than the mere differential effect of sooner versus later absence in nutrition.

This ancillary exercise provides further support on the relevance of the timing of paternal absence, especially in terms of nutritional outcomes. The general results provide strong evidence that paternal absence can be relatively more detrimental to physical development when it occurs during the first years of life and that this negative effect persists over time. One intuitive mechanisms is that paternal absence has a negative income effect on the household and this leads to a reduction in the quantity or quality of food intakes of children. Moreover, this income shock is more harmful when it occurs during the critical periods in the development of children. This hypothesis could be pushed further based on the the fact that common trends between 2002 and 2006 in anthropometrics hold for older sibling in both types of households (see figure 4, section 9 for details). Therefore, it could be argued that the income effect only affects the younger sibling and therefore his/her nutritional outcomes. While this is a strong statement, it could also be backed up by the evidence found when performing the second exercise (absence occurring in 2009), where no impact on nutritional outcomes is encountered (except for Vietnam). Therefore,

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<sup>15</sup>Again, I have data on paternal presence at each round but no in-between.



I would be capturing the absolute effect of paternal absence in that case only if it is assumed no ex-ante effect of the future departure of the father on the older sibling. Independently of this latter argument, a negative income shock seems to be the most plausible mechanisms to the relative worsening on nutrition.

The impact of the departure of the father on cognition is not clear when looking at the aggregated results as it appears that its effect is country specific. Cultural norms, as well as heterogeneities in family structures could be behind these outcomes.

In the following section I will explore the two mechanisms mentioned above; the negative income effect which may explain relative deterioration in anthropometrics, and changes in family structure which may give some hints on the unexpected direction of the results on cognition. Moreover, I will explore temporary versus more permanent absence. Due to the limitations on the sample size, most of the analysis on mechanisms will be done pooling the four countries together, with the downside of potentially missing deeper insights.

## 8 Mechanisms

So far, I study the reduced form of the causal relationship between paternal absence and child development when absence occurs early in life. However, the way fathers affect their offsprings' outcomes is through different inputs they provide in the production function of skills. In this section I attempt to understand what are the factors affected by the absence of the father which seems more plausible to impact on nutrition and cognition.

### 8.1 Income effect

The relative worsening of nutritional outcomes when absence occurs during the first years of life could be explained by a negative income effect of the departure of the father which could differently affect both the older and the younger sibling. My hypothesis is that the negative income shock –as a result of the father's departure– could have a relatively bigger repercussion on anthropometrics if it happens when the child is in her first years of life rather than at a later stage. This could be explained by the critical periods in nutritional development during the first 1,000 days of life. The following results provide support for this mechanism.

During the second round (2006), households were asked about their current economic situation and the one four years ago (at baseline, in 2002). Table 4 shows that households that suffer absence in the second round are more likely to report that their economic situation is relatively worse than the one in the previous round. This coefficient is statistically significant at the 1 percent level. On the other hand, these households are less likely to report they are better or that their situation has not changed –while not statistically significantly different than zero. As shown, each regression is controlled by country in order to capture any potential macroeconomic shock.

In the ancillary exercise from the previous section I show that the gap in development between siblings experiencing absence at age 5 versus 8 was not any different than the gap in development between sibling not experiencing absence at all. One possibility is that, unlike the case in which absence occurs in the early years for the younger sibling, these households do not experience an income shock as a result of paternal departure. This scenario would weaken the strength of my conclusions. In order to provide some insight on this alternative, I perform a similar exercise by looking at expenditures in households experiencing paternal absence in 2009 versus those that did not.

Table 4: Change in economic situation pre and post departure of the father in households with absence in 2006

VARIABLES	(1) Same	(2) Worse	(3) Better
HH w/absence in 2006	-0.0609 (0.0377)	0.0981*** (0.0322)	-0.0371 (0.0427)
India	0.0877** (0.0413)	-0.00851 (0.0305)	-0.0792** (0.0371)
Peru	0.281*** (0.0543)	-0.141*** (0.0318)	-0.140*** (0.0452)
Vietnam	0.0573 (0.0647)	-0.153*** (0.0313)	0.0959 (0.0646)
Constant (Ethiopia)	0.323*** (0.0353)	0.226*** (0.0247)	0.450*** (0.0337)
Observations	2,365	2,365	2,365
R-squared	0.046	0.038	0.026
Observations Control	2,212	2,212	2,212
Mean Control	.421	.166	.412
Observations Treatment	153	153	153
Mean Treatment	.359	.261	.379

**Notes:** Standard errors in parentheses, clustered at the sentinel site level. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Variables are constructed from the following question in round 2 (2006): “During the period (current/four year ago), how would you describe the household you were living in?” (1) very rich (2) rich (3) comfortable-manage to get by (4) struggle-never have quite enough (5) poor (6) destitute. Variable *same* is equal to 1 if the situation has no changed and 0 otherwise. Variable *worse* is equal to 1 if current situation reported is higher (as the higher the poorer) than the one four years ago and 0 otherwise. Variable *better* is equal to 1 if current situation reported is lower than the one four years ago and 0 otherwise.

Table F13 shows the evolution of food, non-food and total expenditures between the previous round (2006) and the one in which the father was absent in treated households (2009).<sup>16</sup> The estimate in the first line represents how expenditures change between households that experienced the absence of the father in 2009 versus those that did not at baseline, before the absence happened. As expected, expenditures do not seem to differ on average when the father was present in both types of households. Once the father has left, expenditures evolved less on household experiencing absence with respect to the control households, as shown by the third estimate (the interaction term). It is important to note that this difference is statistically significant for food expenditures at the 10% level. As an exploratory exercise, I compare the response of whether the household is economically the same, worse or better in 2006 versus in 2002. Because these rounds are before any absence took place<sup>17</sup>, I would expect no income shock to happen. Table F14 shows this is not the case, as households experiencing absence in 2009 already had a higher likelihood of being relatively worse before any absence took place. This result somewhat weakens the argument that there were common trends before paternal absence for the mentioned sample. Further details on this issue will be exposed in section 9.

Even if no causality can be claimed, results provide support to the idea that the absence of the father is correlated to a negative income shock. While in both cases-absence in 2006 and in 2009- this income shock was present, the worsening in the economic situation has only a differential impact on nutrition for children in their first years of life versus their older siblings.

## 8.2 Family structure

Family structures may differ across cultures, especially in terms of family size and the presence of extended family members in the household. Results in cognition appear to be counter intuitive, as they do not show the same reaction as nutritional outcomes do to paternal absence. My hypothesis is that family dynamics compensate the departure of the father, acting as a buffer to the disruptive effect of not having

<sup>16</sup>This analysis could not be done to the sample with absence in 2006 as no information on expenditures is available in the first round.

<sup>17</sup>Under the assumption there is no absence in-between rounds.

a present paternal figure.

First of all, it is important to corroborate how different family structures are at baseline across household types. When analyzing the percentage of families that can be defined as nuclear families<sup>18</sup> in the sample, I find dissimilarities across countries. In Ethiopia, around 70% of the sample can be defined as a nuclear family, in Peru this percentage goes to 62%, in Vietnam 53% while in India it stands at 37%. Nevertheless, what matters is to what extent family structures vary between households with and without absent fathers. Table F15 shows the differential in the probability of belonging to a nuclear family between treated households that experienced absence in 2006 (column 1) versus those that did not. The first column shows that, in India, Peru and Vietnam, treated households are as likely to belong to a nuclear family as in control households as estimates are not statistically significant. These is not the case for Ethiopia, where the likelihood of belonging to a nuclear family is around 13 percentage points higher than in the control group.

Table 5: Change in the number of adults over time

VARIABLES	(1) Number of adults
<b>Absence in 2006</b>	
HH w/absence in 2006	-0.0163 (0.141)
year 2006	-0.450*** (0.0489)
HH w/absence in 2006 * yr 2006	0.215 (0.139)
Mean HH w/ no absence at year 2002	1.05
Mean HH w/absence at year 2002	.97
<b>Absence in 2009</b>	
<i>Before departure</i>	
HH w/absence in 2009	-0.0455 (0.126)
year 2006	-0.441*** (0.0499)
HH w/absence in 2009 * yr 2006	-0.103 (0.0943)
Mean HH w/no absence at year 2002	1.05
Observations Treatment	182
Mean HH w/absence at year 2002	1.09
<i>After departure</i>	
HH w/absence in 2009	-0.0930 (0.0819)
year 2009	-0.166*** (0.0214)
HH w/absence in 2009 * yr 2009	0.320*** (0.0878)
Mean HH w/no absence at year 2006	.78
Mean HH w/absence at year 2006	.73

**Notes:** Standard errors in parentheses, clustered at the sentinel site level. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Adult is defined as other members excluding parents, older than 14 years old by 2002. No household fixed effects were included. Each regression is controlled for country dummies.

As an explanatory exercise, I perform the same exercise for households experiencing absence in 2009 (second column). For this case, treated households have the

<sup>18</sup>I define nuclear family as a household where no other adult (older than 14 years old), except the parents, is reported in the household roster at baseline. Because I include as adult those siblings over 14 years old, my definition differs from the standard one. Nevertheless, I will call this type of households as “nuclear” for simplicity.

same probability of belonging to a nuclear family than those in the control group.

Even when family structures differ at baseline in some countries, what matters is how it changed over time, presumably as a result of the departure of the father. Table 5 presents how the number of adults –excluding parents– changes over time for treated and untreated households. The upper panel shows the difference in the evolution over time of the number of other members between households that experienced the absence in 2006 versus those that did not; where the baseline year is 2002 (when the father was present in both types of households). The first coefficient of the first panel shows that—when pooling the four countries— households with and without an absent father had on average the same number of adults living in the household before paternal departure occurred for the treated homes.<sup>19</sup> Nevertheless, household dynamics appear to differ when the father is not present anymore. As the estimate of the interaction term suggests, in households where the father was absent, the number of other members did not fall as much as in households where the father did not leave (however it is not statistically significant). As an ancillary exercise, I perform the same analysis for households where absence occurs in 2009 (second and third panel). As estimates in the third panel show, the number of other members actually increased after the departure and it is statistically significant. The middle panel shows a placebo test for households that experienced absence in 2009 but before departure occurred (pre-treatment trends). Interestingly, no statistically significant difference in trends can be found before the absence occurs.

One last interesting exercise is to replicate the main results but including an interaction term with a dummy indicating if the household was a nuclear family type at baseline irrespectively of how dynamics changed with the departure of the father. I would expect that in households that were originally composed of only the mother and the father, effects could be potentially different than when other members were around from the beginning. Table F16 presents estimates when 5, 8 and 12 years old, for the sample which includes paternal absence in 2006. I will focus on cognitive outcomes. Irrespectively of how family dynamics change afterward, estimates show that in households in which other adults lived with the older sibling at baseline, the relative effect of paternal absence was positive at each age period in which cognition was measured. However, when interacting with the fact of belonging to a nuclear family at baseline, the coefficient decreases or even becomes negative in the long run. This is consistent with the idea that those households in which initially there were no other adults members had a harder time compensating for the absence of the father, independently if other members arrived when the father was gone.

From these results I find suggestive evidence that, with the departure of the father, households in the treatment group changed their family dynamics differently than households where the father was present. Once again, I cannot claim causality between the departure of the father and the differential in the variations with respect to family members living in the same home. However, this evidence may provide a plausible explanation on the dissimilar response in terms of nutrition and cognition siblings have when the father is absent. Other members in the households are able to mitigate lack of paternal input. What is more interesting is the findings when absence happens later on in the siblings’ life. First, the same correlation between absence and changes in family structure is found among households where absence occurs when siblings are aged 5 and 8. However, this seems not to translate to a gap in cognitive development. While purely speculative, this could suggest higher sensitivity during the early years when it comes to the ability of other caregivers to mitigate risk factors.

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<sup>19</sup>Consistent with previous results, the exception is Ethiopia where the number of adults is lower for households with an absent father.

### 8.3 Temporary versus more permanent absence

Permanent paternal absence can have a different impact on the development of children than temporary absence. If the father has left the household temporarily, he may still support his family economically, may still be in touch with his relatives and his return could somehow lead to a catch up in development of the children. Contrarily, permanent departure could be the result of abandonment by the father, causing a different development path of his offsprings.

While there is no information on the reason why the father was not present in the round under study, I know whether the father was present in the following rounds. I can potentially differentiate temporary versus more permanent absent by distinguishing cases in which the father came back 4 years after the episode of absence. In table F17 I replicate the main results by interacting the term of interest with a dummy equal to 1 if the father was still absent in 2009 and 0 otherwise.

Results show that the gap in nutritional performance is not statistically different when absence is temporary versus when it more permanent. When it comes to cognitive skills, it seems that longer periods of absence accentuates the relative over performance of the younger sibling versus the older one. While purely speculative, this finding could be interpreted as a clearer overcompensating response from households facing a more permanent departure of the paternal figure.

## 9 Robustness check

### 9.1 Common trends

One of the main assumptions of this paper is that, if the father had not temporarily left the household, then the differences in development outcomes between siblings would have been the same when comparing both types of households (those considered treated and those considered in the control group). In other words, the validity of the parallel trend assumption must hold. The second assumption is that there was no shock that impacted the outcomes of the younger and older sibling differently and also led to the departure of the father at the same time. If both assumptions are valid, any difference in the outcomes of the matched siblings between these two types of households should be due to the paternal absence.

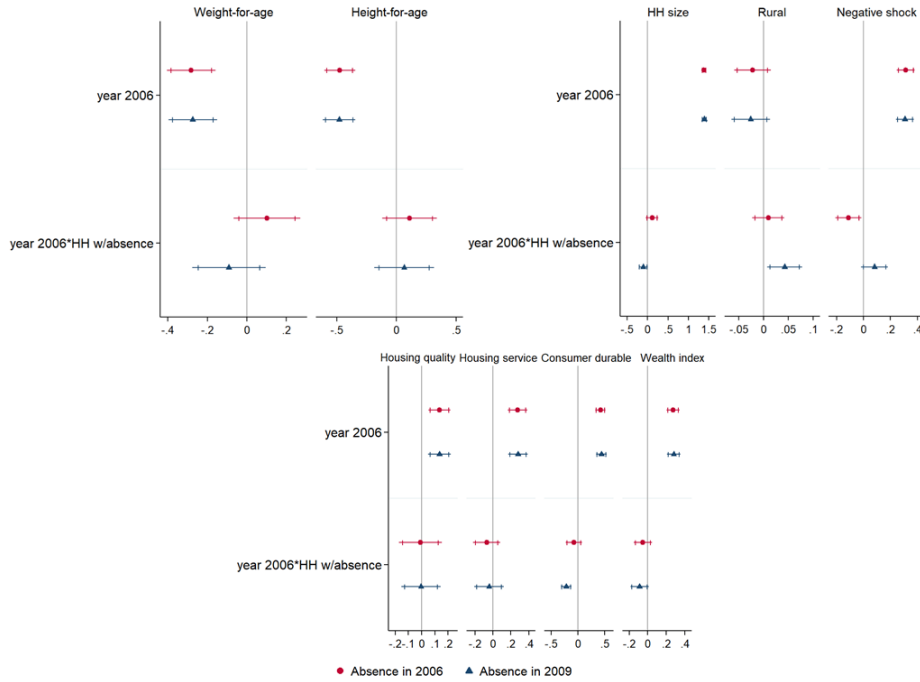
Ideally, I could provide support for the first assumption by looking at the trends in the outcomes before the departure of the father occurs for both, the older and the younger sibling. Unfortunately, there is no information available on the outcomes of the younger siblings previous to round 3 (2009). However, there is data on the older sibling as well as household characteristics for the first and second round. This allows me to explore common trends. It is important to note I will be comparing outcomes before the departure occurs and outcomes during paternal absence. In other words, trends cannot be considered as pre-treatment.

I perform a difference in difference approach on nutritional outcomes for the older sibling and household characteristics by comparing their evolution in households that experienced the absence of the father versus those that did not. Fortunately, Young Lives provides a wide range of information on features such as household size, whether the family lives in the rural or urban area. I include a dummy equal to 1 if the respondent states there has been a shock that has decreased economic welfare of the households. Moreover, I analyze socioeconomic variables such as a wealth index and its components. The wealth index is constructed from three equally weighted indices: housing quality, access to services and consumer durables; which I standardize at the country level. Figure 4 provides support to a parallel evolution in time across older sibling for households that experienced absence versus those that did not.

Bottom-line, I find support for the common trend assumption, providing robustness to the conclusions of the relative importance of paternal absence in the early years. The only threat is the differential in the probability of experiencing a negative shock at baseline which will be taken into consideration in section 9.2.

I perform the same exercise for households in which absence occurs in 2009, as it allows me to more accurately study common trends as outcomes are pre-treatment (first and second round). Even though children's outcomes evolved parallelly, there are reasons to question the common trend assumption. Households experiencing absence seem to do worse in consumer durable index as well as wealth index previously to the father departure. They also seem to be more likely to have experienced a bad event and more likely to have moved to a rural area. Moreover, household size has increased less than in the control group.

Figure 4: Common trends



**Notes:** Standard errors in parentheses, clustered at the sentinel site level. The three panels correspond to nutritional outcomes of the older sibling (top left), household characteristics (top right) and wealth measures of the household (bottom). The figure includes 90% and 95% confidence intervals. Variable *year 2006* is equal to 1 if the outcome is measured in 2006 and 0 if measured in 2002. Variable *year 2006 \* HH w/absence* is an interaction term in which HH w/absence is equal to 1 if the household experienced an absence in 2006 (red circle) or in 2009 (blue triangle) and 0 otherwise.

## 9.2 Controlling for negative shocks

From descriptive statistics (table B4) I observe that households experiencing absence are more likely to suffer from a negative shock at baseline as compared to those that do not experience absence. This could be a threat as long as it reflects selection to paternal departure. A second finding is that the exposure to bad events increased from baseline to the second round for control households, but this increase was lower for those experiencing absence. In fact, they were equally likely to report experiencing a shock in the contemporaneous year in which treated household reported the departure of the father. In that case, I could argue that estimates from my main specification are not particularly capturing negative shocks in general but the departure of the father.

I attempt to address the higher vulnerability at baseline of treated households by controlling the main results for the exposure to shocks in 2002. Table G18 shows

estimates including interactions with a dummy variable indicating if the household reports to have experienced a negative shock in 2002. Before continuing, it is important to remark that the dependent variable negative shocks is quite noisy. It includes a long list of different shocks, they are self-reported and some of them may not be particularly relevant for the development of children. However, I decided to add all of them in order not to make any arbitrary decision. In addition, sample limitations prevents me from making strong conclusions on the results shown below.<sup>20</sup> Nevertheless, it provides some insights on the strength of my assumptions.

Controlling for shocks happening before paternal departure for treated households allows me to compare more similar families in terms of vulnerability to negative events at baseline. Below the table, I show the estimates extracted from the main exercise as a reference. The estimate on weight remains negative when the household with absence reports to have experienced a bad event at baseline and when it does not. In the case of height, the magnitude of the coefficient of interest without the interaction with negative shock in 2002 becomes smaller with respect to the estimates from the main exercise. It could suggest that most of the impact is explained by most vulnerable households. In terms of cognition, the coefficient without the interaction becomes more positive than the benchmark. In other words, the positive coefficient on PPVT test can be mainly explained by less vulnerable households. From these findings I find support to my main results as estimates on weight and cognition seem to be robust to the fact that treated households were more vulnerable to shocks at baseline.

### 9.3 Results with alternative control groups

In all the previous results, the control group had no further restrictions but the fact that the father had to be present in the rounds under analysis but no constraints were imposed in terms of his presence in the following rounds. There are reasons to believe that this could not be the most suitable control group. First, I am including households in which no absence occurred afterward, whose characteristics could differ from the treated households in such a way that the common trend assumption is threaten. Hence, it would be more appropriate to compare treated households with families in which the father was absent at some point in the future. On the contrary, having households with episodes of absence afterward could also have its downside. When comparing the relative gap between siblings in treated versus control households when the latter actually experiences the absence in the following rounds, I may be capturing the effect of different timing of paternal departure and its effects on the relative gap of siblings.

As an exercise, I perform the main specification with alternative control groups. For each outcome, the first column presents the results previously interpreted as a reference, the second includes a control group in which the father was present in each round while in the third one the control group was constructed with all households in which absence occurred at some point in the future.

Table G19 presents results when siblings are measured at age 5, 8 and 12 years old, when absence occurs in 2006.<sup>21</sup> The interaction term maintains its negative sign both for weight and height for age irrespectively of the control group with which households with an absent father in 2006 are compared. It is interesting to note that the effect seems to be stronger when compared the gap of siblings at age 5 between treated and control group when the control includes those households that experienced absence in the following rounds. This type of households could be considered better suited as a control group as they could be potentially more

<sup>20</sup>In 2002, 62% of treated households reported having experienced a negative shock, while 50% did among the control households. In 2006, around 80% of the households experienced a negative shock in both type of households.

<sup>21</sup>A similar exercise is performed for sample in which absence occurs in 2009. Table G20 shows the results.

similar to the treated households, i.e. they are also vulnerable to paternal departure. Nevertheless, confidence intervals seem to overlap, providing support to the fact that effects are statistically the same irrespectively to the control group chosen. Similar conclusions apply for cognitive skills.

## 10 Conclusion

In this paper I attempt to estimate the causal effect of paternal absence during the first years of life on early childhood development. I take advantage of Young Lives Study, a unique dataset that provides longitudinal data on early childhood development in countries so diverse as Ethiopia, India, Peru and Vietnam. Using skill outcomes of pair of siblings of similar age at different points in time, I take advantage of variations in paternal absence just after born versus at age 5.

I find striking evidence of dissimilar implications of paternal absence across skills when departure occurs at the beginning of a child's life. I show that the absence of the father very early in life has a negative effect on nutritional development both in the short and long run with respect to an absence at a later stage in life. While the negative and significant effect persists on height, it does not increase nor decrease over time. Moreover, these conclusions hold across the four countries. Interestingly, the response on cognition goes in a different direction. Estimates indicate that the effect of early absence has a positive effect for Peru and Vietnam— being significant for the former one— while statistically null for Ethiopia.

I go one step further and try to explore possible mechanisms to explain my results. It is important to note that the relatively small sample size limits the extent to which I can make strong conclusions about the findings. Moreover, I face a clear constraint when it comes to performing heterogeneous effects, especially relevant as I am including four different countries with their own contexts. Nevertheless, I find suggestive evidence that households that suffer the departure of the father are more likely to report that their economic situation is relatively worse than at baseline with respect to those households that did not suffer from it. On the other hand, I encounter that in households where the father was absent, the number of adult members did not decrease as much as in households where the father did not leave.

While these are mere correlations, it provides some intuition on what could be behind the different responses in skill outcomes. I could argue that anthropometric outcomes seem to be mainly affected by nutritional inputs and health. These inputs are most likely vulnerable to the income shock associated to the departure of the father. This explains the negative sign on weight and height. On the other hand, cognition may not only be affected by these inputs but also by other factors such as home environment and time investment. If father's absence have a differential effect on each of these inputs, i.e. nutrition, health and stimulation, skill responses are expected to be heterogeneous. In addition, certain risk factors— such as lack of time investment by the father— could potentially be compensated by other family members. Indeed, these mechanisms could explain the relative improvement in vocabulary tests. To summarize, while the father appears to be the main financial support of the household, his role in fostering cognitive skills may be substituted by other adults in the household.

My research is relevant for several reasons. First of all, unlike most of the literature, it focuses on the consequences of paternal rather than maternal inputs on early childhood development outcomes. Second, the use of siblings and household fixed effects overcomes endogeneity issues in this type of studies. Third, it contributes to the literature on the relative importance of the first 1,000 days in human capital accumulation. I analyze nutritional, cognitive and socio-emotional skills, allowing me to study how each ability reacts to the absence of the father. In addition, I measure those skills both in the short and the long run. Moreover, the use of data



from developing countries contributes to a broader evidence on the role of the father at an early stage outside the developed world. Lastly, the study of countries so diverse as Ethiopia, India, Peru and Vietnam, provides external validity of my results.

From a policy perspective, this paper provides some useful insight on the importance of taking into consideration the role of the father on early childhood interventions. Ignoring his role in skill formation could potentially limit the impact of these type of policies. Furthermore, understanding the importance of the father in the early years is not only relevant for early childhood interventions but also for policies in the field of labor and gender inequality. Paternal involvement is linked to intra-household resource allocation and the division of responsibilities among the members. The optimality of these decisions is a subject of interest. Moreover, paternal involvement on the child's life has consequences on female labor participation and therefore on gender equality and the mother's well-being. A more balanced share of responsibilities between parents could eventually lead to a reduction in the gender wage gap.

While my paper gets closer to understanding the role of the father in early childhood development, there is still much to learn. Further research must be done on the specificities of the human capital production function. Looking at absence could not be enough as the quality of interactions between the father and the child also matters. Also interesting is to learn what kind of activities fathers perform with their children and if they are any different from the ones performed with the mother. A better understanding of how abilities are formed is the starting point to design efficient policies to reduce skill gap across socio-economic groups and fight against the intergenerational transmission of poverty.

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## Appendix

### A General

#### A.1 Age of siblings

Age in months was calculated as follows. As a general rule, I chose information from earlier rounds in order to limit recall issues. In the case of Peru, it was calculated based on the birthdate reported in 2009 or 2013. If unavailable, it was calculated based on the age in months reported in the last round (2016). For Ethiopia, ages in months were directly imputed from the dataset as they were included in round 3 and 5. For Vietnam, ages in months were calculated based on birthdates reported in 2009 or ages in years reported the same round or 2013 if unavailable (multiplied by 12). For India, age in months is calculated based on birthdates reported in the first or second round depending on the reliability of dates when compared to age reported in years. If birthdates are not available, then I impute age in years from the third round and for 2016 I impute age in months reported in that round or age in years from the third round (multiplied by 12).

Table A1: Age distribution: older and younger sibling, 2006 and 2009 respectively

Older sibling in 2006	Younger sibling in 2009							Total
	1	2	3	4	5	6	7	
4	0	3	77	189	218	83	0	570
5	2	54	263	429	662	498	5	1,913
6	0	2	8	9	7	9	0	35
Total	2	59	348	627	887	590	5	2,518

**Notes:** This table reports the age distribution between the older sibling in 2006 and the younger sibling in 2009. Age in months is rounded. Age is calculated from birth dates if available/reliable or age reported in the family roster otherwise.

## A.2 Psychosocial skills

Table A2: Psychosocial skills in Young Lives

	Round 3(index children) and round 4 (sibling)	Reversed	Agency Index (all)	Agency Index (excl. work)	Agency Index (excl. school/work)
Agency	1. If I try hard, I can improve my situation in life	No	X	X	X
Index	2. Other people in my family make all the decisions about how I spend my time	Yes	X	X	X
	3. I like to make plans for my future studies and work	No	X	X	X
	4. If I study hard at school, I will be rewarded by a better job in the future	No	X	X	
	5. I have no choice about the work I do I must do this sort of work	Yes	X		
Pride	1. I am proud of my shoes or of having shoes	No	X	X	X
Index	2. I am proud of my clothes	No	X	X	X
	3. I am never embarrassed because I do not have the right books, pencils or other equipment	No	X	X	
	4. I am proud that I have the correct uniform	No	X	X	
	5. I am proud of the work I have to do	Yes	X		

## B Descriptive Statistics

Table B3: Number of households per household type: absence in 2006 and absence in 2009

	Present in 2006	Absent in 2006	Total	Present in 2009	Absent in 2009	Total
Ethiopia	706.00	56.00	762.00	669.00	37.00	706.00
India	636.00	33.00	669.00	568.00	68.00	636.00
Peru	496.00	37.00	533.00	441.00	55.00	496.00
Vietnam	374.00	27.00	401.00	352.00	22.00	374.00
Total	2,212.00	153.00	2,365.00	2,030.00	182.00	2,212.00

**Notes:** This table reports the number of households in each subsample per country: (1) households that experienced the absence of the father in 2006 (but not in 2002) and those in which the father was present in both rounds (2) households that experienced the absence of the father in 2009 (but not in 2002 nor 2006) and those in which the father was present in the three rounds.



Table B4: Descriptive Statistics: Households with an absent father in 2006

	Absent father in 2006			No absent father in 2006			Diff	P-value
	N.	Mean	S.D.	N.	Mean	S.D.		
<b>Older sibling's characteristics</b>								
Age (in years)	153	0.96	0.28	2,212	0.97	0.29	-0.01	0.56
Female	153	0.43	0.50	2,212	0.49	0.50	-0.05	0.10
Birth order	153	2.20	1.51	2,212	2.25	1.69	-0.05	0.77
Birth weight (grams)	77	2,961.88	609.35	1,098	3,014.77	573.40	-52.89	0.43
Number of antenatal visits	112	5.09	2.68	1,583	4.79	2.47	0.30	0.33
Creche	153	0.05	0.21	2,212	0.04	0.19	0.01	0.54
<b>Mother's characteristics</b>								
Age of the mother	153	25.66	5.69	2,209	24.88	5.38	0.78	0.04
Mother- Primary or less	148	0.76	0.43	2,168	0.77	0.42	-0.01	0.86
Mother- Secondary education	148	0.17	0.38	2,168	0.19	0.39	-0.02	0.60
Mother- Higher education	148	0.07	0.25	2,168	0.04	0.20	0.03	0.18
Mother regularly takes care	152	0.96	0.20	2,209	0.96	0.20	0.00	0.91
Mother-financial support	153	0.63	0.49	2,199	0.63	0.48	-0.00	0.97
<b>Father's characteristics</b>								
Age of the father	153	31.43	7.18	2,205	30.57	7.43	0.86	0.22
Father- Primary or less	148	0.59	0.49	2,154	0.68	0.47	-0.09	0.06
Father- Secondary education	148	0.34	0.48	2,154	0.26	0.44	0.09	0.04
Father- Higher education	148	0.07	0.25	2,154	0.06	0.25	0.00	0.91
Father regularly takes care	152	0.63	0.49	2,211	0.60	0.49	0.02	0.72
Father-financial support	152	0.84	0.37	2,207	0.88	0.32	-0.05	0.41
Father in agriculture	149	0.62	0.49	2,168	0.68	0.47	-0.06	0.29
<b>Household's characteristics</b>								
Household size	153	5.37	2.25	2,212	5.39	2.20	-0.02	0.90
Rural	153	0.67	0.47	2,212	0.72	0.45	-0.05	0.38
Housing quality index (z)	153	0.22	1.05	2,211	-0.10	1.02	0.32	0.01
Housing service index (z)	153	-0.07	0.98	2,211	-0.16	1.02	0.09	0.41
consumer durable index (z)	153	-0.16	0.90	2,204	-0.23	0.90	0.07	0.39
Wealth index (z)	153	-0.00	0.79	2,202	-0.16	0.81	0.16	0.05
Anyone owns the house	153	0.73	0.45	2,211	0.77	0.42	-0.04	0.24
Experienced negative shock	153	0.62	0.49	2,212	0.50	0.50	0.12	0.00

**Notes:** This table provides descriptive statistics of the characteristics of older siblings, mothers, fathers and of the household, between households that experienced the absence of the father in 2006 but not in 2002 and households that did not experience the absence of the father in neither of those rounds. Children characteristics include: age in months, average of girls, birth order of the sibling, reported birth weight, reported number of antenatal visits during pregnancy, and whether the child had ever attended a creche for at least a whole morning, afternoon or evening almost every week. Mother's characteristics include: age of the mother in years and percentage of mother with primary education or less, secondary education and higher education. Education variables were homogenized for the four countries based on the reported number of years of education. Whether the mother regularly takes care of index children comes from the following question in the household roster: "Responsible for looking after NAME on a regular basis" and whether the mother provides financial support comes from the following question "Helped support NAME financially?". Father's characteristics include the same as the mother's plus whether one of the main economic activities is agriculture. Household's characteristics include: household size, whether they live in the rural area and whether anyone in the household owns the house. Moreover, three wealth indices are included (housing quality, access to services and consumer durables) as well as the overall index; all of them standardized at the country level. The percentage of households that experienced a bad event per household type comes from the following question: "Since you found you were pregnant with NAME have there been any big changes or events that decreased the economic welfare of your household?".

Table B5: Absence in 2006: descriptive statistics of outcomes between siblings when 5 years old

	Older Siblings						Younger Siblings						Siblings within household types			
	Absent father in 2006		No absent father in 2006		Diff older siblings		Absent father in 2006		No absent father in 2006		Diff younger siblings		Diff hh absence		Diff hh no absence	
	N.	Mean/(S.D.)	N.	Mean/(S.D.)	(2-4)	P-value	N.	Mean/(S.D.)	N.	Mean/(S.D.)	(8-10)	P-value	(2-8)	P-value	(4-10)	P-value
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
age	153	5.21 (0.32)	2,212	5.24 (0.35)	-0.03	0.22	150	5.21 (1.07)	2,165	5.04 (1.04)	0.17	0.05	-0.00	0.97	0.20	0.00
female	153	0.42 (0.50)	2,212	0.49 (0.50)	-0.06	0.06	150	0.47 (0.50)	2,165	0.51 (0.50)	-0.04	0.35	-0.05	0.33	-0.02	0.17
weight	153	16.34 (2.37)	2,208	15.87 (2.48)	0.47	0.05	150	16.18 (7.28)	2,151	15.54 (4.86)	0.64	0.32	0.16	0.78	0.33	0.01
weight-for-age	153	-1.09 (1.01)	2,208	-1.34 (1.06)	0.24	0.02	149	-1.41 (1.30)	2,149	-1.38 (1.19)	-0.03	0.80	0.32	0.00	0.05	0.14
height	153	104.36 (5.65)	2,208	103.28 (5.56)	1.08	0.02	150	103.23 (7.39)	2,147	102.01 (9.02)	1.23	0.05	1.13	0.13	1.28	0.00
height-for-age	152	-1.34 (1.02)	2,207	-1.63 (1.06)	0.28	0.00	149	-1.58 (1.18)	2,127	-1.60 (1.33)	0.03	0.79	0.24	0.07	-0.02	0.57
ppvt	115	23.39 (14.17)	1,513	24.44 (16.09)	-1.05	0.49	100	37.07 (22.65)	1,260	35.31 (22.92)	1.76	0.63	-13.68	0.00	-10.87	0.00
ppvt zscore	115	-0.96 (0.60)	1,513	-0.92 (0.64)	-0.04	0.62	100	-0.36 (0.71)	1,260	-0.45 (0.76)	0.09	0.39	-0.60	0.00	-0.47	0.00

**Notes:** This table reports outcomes statistics of older and younger siblings when aged 5 in households with and without an absent father in 2006. Outcomes are: age in years, weight, weight-for-age (standardized), height, height-for-age (standardized), PPVT and PPVT z-score (standardized). The first four columns exhibit information for the older sibling in households with an absent father (1-2) and households with no absent father (3-4). Columns 7-10 show information for the younger siblings in households with an absent father (7-8) and without (9-10). For each outcome, the number of observations, mean and standard deviations are provided. Columns 5 and 6 show the difference in mean of older siblings between household types and p-value respectively. Similarly, columns 11 and 12 show the difference for younger siblings. Columns 13 and 14 show the difference in outcomes and p-value for older versus younger siblings in households with an absent father. Columns 15 and 16 compare siblings in households with no absent father.

## C Results

Table C6: Nutritional and cognitive outcomes when 5, 8 and 12 years old, coefficients per country

VARIABLES	(1) Weight-for-age	(2) Height-for-age	(3) PPVT Z-Score
<b>5 years old</b>			
<i>Ethiopia</i>			
Younger sibling	0.597*** (0.193)	1.376* (0.745)	0.0667 (0.109)
HH w/absence in 2006 * younger sibling	-0.191 (0.131)	-0.0480 (0.248)	-0.0235 (0.0939)
Number of HH (treatment + control)	762	762	757
<i>India</i>			
Younger sibling	0.382 (0.301)	0.493 (0.519)	
HH w/absence in 2006 * younger sibling	-0.439*** (0.141)	-0.190 (0.207)	
Number of HH (treatment + control)	669	669	
<i>Peru</i>			
Younger sibling	0.101 (0.0866)	1.018*** (0.170)	1.920*** (0.184)
HH w/absence in 2006 * younger sibling	-0.0882 (0.189)	-0.426** (0.158)	0.207* (0.103)
Number of HH (treatment + control)	533	533	528
<i>Vietnam</i>			
Younger sibling	-0.705** (0.257)	-0.366 (0.333)	0.224 (0.176)
HH w/absence in 2006 * younger sibling	-0.0140 (0.220)	-0.261 (0.217)	0.436 (0.260)
Number of HH (treatment + control)	401	401	389
<b>8 years old</b>			
<i>Ethiopia</i>			
Younger sibling	0.484 (0.345)	0.863** (0.353)	-2.260*** (0.510)
HH w/absence in 2006 * younger sibling	-0.0643 (0.161)	-0.0924 (0.0863)	0.0494 (0.321)
Number of HH (treatment + control)	761	762	758
<i>India</i>			
Younger sibling	0.363 (0.262)	0.865*** (0.265)	
HH w/absence in 2006 * younger sibling	-0.0470 (0.249)	-0.216 (0.256)	
Number of HH (treatment + control)	669	669	
<i>Peru</i>			
Younger sibling	0.740 (0.466)	0.200 (0.271)	0.330* (0.181)
HH w/absence in 2006 * younger sibling	-0.168 (0.145)	-0.235 (0.159)	-0.0576 (0.134)
Number of HH (treatment + control)	533	533	532
<i>Vietnam</i>			
Younger sibling	1.185** (0.440)	1.005** (0.374)	-2.135*** (0.416)
HH w/absence in 2006 * younger sibling	-0.253 (0.190)	-0.117 (0.155)	0.0257 (0.157)
Number of HH (treatment + control)	400	401	398
<b>12 years old</b>			
<i>Ethiopia</i>			
Younger sibling		-0.789 (0.844)	0.452*** (0.0616)
HH w/absence in 2006 * younger sibling		0.0254 (0.0938)	0.0611 (0.0418)
Number of HH (treatment + control)		762	663
<i>India</i>			
Younger sibling		0.378** (0.137)	
HH w/absence in 2006 * younger sibling		-0.298 (0.222)	
Number of HH (treatment + control)		668	
<i>Peru</i>			
Younger sibling		0.974 (0.582)	-1.180*** (0.111)
HH w/absence in 2006 * younger sibling		-0.178 (0.190)	0.0360 (0.0942)
Number of HH (treatment + control)		533	533
<i>Vietnam</i>			
Younger sibling		-0.230 (0.713)	-0.155 (0.104)
HH w/absence in 2006 * younger sibling		-0.445* (0.244)	-0.152 (0.0892)
Number of HH (treatment + control)		401	400

**Notes:** Standard errors in parentheses, clustered at the sentinel site level. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Estimates are per country and outcomes are measured when aged 5, 8 and 12 years old. Each regression includes a household fixed effect. Variable *younger sibling* is equal to 1 if the individual is the *younger sibling* and 0 if the individual is the relatively older child. Variable *hh with absence in 2006* is equal to 1 if the pair of siblings under comparison belong to a household which experienced the absence in 2006 but not in 2002, and 0 if the father was present in both rounds. Dependent variables in column 1 and 2 are weight-for-age z-score and height-for-age z-score. Both anthropometric z-scores are based on the 2006 WHO child growth standards for children below 5 and 2007 WHO child growth standards for children aged 5-19 years (except for weight-for-age for children older than 10). Dependent variable in column 3 correspond to the standardized score of the Peabody Picture Vocabulary Test (PPVT) at the country level. For this outcome, India is excluded due to lack of data for younger siblings. All regressions are controlled for age, gender and birth order.

## D Difference in evolution

The second baseline econometric specification for the difference in evolution is represented by equation (2):

$$y_{iht} = \alpha + \gamma \text{younger sibling}_{ih} + \delta \text{age 2nd period}_{iht} + \zeta(\text{HH w/absence in 2006}_h \times \text{younger sibling}_{ih}) + \eta(\text{HH w/absence in 2006}_h \times \text{age 2nd period}_{iht}) + \theta(\text{younger sibling}_{ih} \times \text{age 2nd period}_{iht}) + \tau(\text{HH w/absence in 2006}_h \times \text{younger sibling}_{ih} \times \text{age 2nd period}_{iht}) + \text{HH}_h + \phi X_{iht} + \epsilon_{iht} \quad (2)$$

Where  $y_{iht}$  represents nutritional and cognitive outcomes when paired-siblings are 5 or 8 years old for the first trend and 8 or 12 for the second trend analysis.  $\text{younger sibling}_{ih}$  is equal to 1 if the outcome belongs to the younger sibling and 0 if the outcome belongs to the older sibling.  $\text{HH w/absence in 2006}_h$  equals to 1 if in the household the father was absent in 2006 (but not in 2002) and 0 if the father was present in both rounds. For the first trend analysis,  $\text{age 2nd period}_{iht}$  equals 1 if the outcome belongs to the child when she/he is 8 years old and 0 if the child is 5 years old (first period). For the second trend analysis,  $\text{age 2nd period}_{iht}$  equals 1 if the outcome belongs to the child when she/he is 12 years old and 0 if the child is 8 years old (first period).  $\text{HH}_h$  is the household fixed effect.  $X_{ih}$  includes age, gender and birth order of each child. In addition, two variables for age are included (one indicating the age in the first period and another in the second period). The reason for doing so is to avoid putting any restriction on the functional form of variable age. Again, standard errors are clustered at the sentinel site level. These specifications enable me to assess if the potential effects of having an absent father rather before than after increase or decrease over time.

Table D7: Evolution of nutritional outcomes when 5 and 8 and when 8 and 12 years old between younger and older sibling among households with and without absence in 2006

VARIABLES	5 (1st period) vs. 8 (2nd period)			8 (1st period) vs. 12 (2nd period)	
	(1) Weight	(2) Weight-for-age	(3) Height-for-age	(1) Weight	(2) Height-for-age
Younger sibling	0.989** (0.418)	0.150 (0.176)	0.428* (0.255)	2.921*** (0.626)	0.649*** (0.170)
2nd period	-2.634*** (0.773)	0.197 (0.210)	0.996*** (0.160)	-2.982 (1.990)	1.808*** (0.240)
HH w/absence in 2006 * younger sibling	0.0144 (0.553)	-0.105 (0.0890)	-0.205* (0.119)	-0.438 (0.336)	-0.160** (0.0789)
HH w/absence in 2006 * 2nd period	0.0742 (0.175)	0.0219 (0.0588)	-0.106* (0.0613)	0.623 (0.410)	0.0761 (0.0504)
Younger sibling * 2nd period	1.145*** (0.176)	0.365*** (0.0545)	0.355*** (0.0625)	0.778*** (0.287)	-0.245*** (0.0468)
HH w/absence in 2006 * younger sibling * 2nd period	-0.472 (0.665)	-0.00927 (0.0808)	0.0139 (0.115)	-0.966* (0.535)	-0.0117 (0.0847)
Observations	9,108	7,176	8,964	9,095	8,944
R-squared	0.650	0.072	0.080	0.571	0.087
Number of HH	2,277	1,794	2,241	2,275	2,236
Observations Control	2128	1688	2094	2127	2089
Observations Treatment	149	106	147	148	147

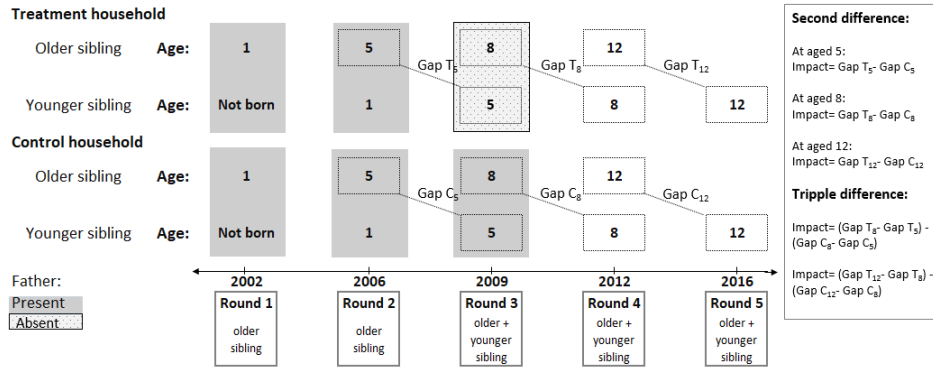
**Notes:** Standard errors in parentheses, clustered at the sentinel site level. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Each regression includes a household fixed effect and presents the evolution in the gap in the corresponding outcome between a child and his/her younger sibling in households that experienced the absence of the father in 2006 versus the gap in household that did not experienced his absence that year. The table exhibits in column 1-3 the evolution in nutritional outcomes between two periods, when both siblings are 5 and 8 years old (first and second period respectively). In column 5-6, it shows the evolution when both siblings are 8 and 12 years old (first and second period respectively). Variable *younger sibling* is equal to 1 if the individual is the younger sibling and 0 if the individual is the relatively older child. In column 1-3, variable *2nd period* is equal to 1 when both siblings are 8 and 0 when both siblings are 5 years old. In column 5-6, variable *2nd period* is equal to 1 when both siblings are 12 and 0 when both siblings are 8 years old. Variable *hh with absence in 2006* is equal to 1 if the pair of siblings under comparison belong to a household which experienced the absence in 2006 but not in 2002, and 0 if the father was present in both rounds. The coefficient of interest is variable *hh with absence in 2006 \* younger sibling \* 2nd period*, which is equal to 1 when the outcome corresponds to the younger sibling in the second period belonging to a household with absence in 2006. Dependent variables are the following: weight, weight-for-age z-score and height-for-age z-score. All anthropometric z-scores are based on the 2006 WHO child growth standards for children below 5 and 2007 WHO child growth standards for children aged 5-19 years (except for weight-for-age for children older than 10). All regressions are controlled for age (first and second period), gender and birth order. Interactions between each control and each country are included.

## E Absence in 2009: Paternal absence at age 5 versus at age 8

### E.1 Identification strategy

The identification strategy resembles the one from the previous exercise except that absence occurs in 2009, when the younger sibling is around 5 years old and the older sibling is around 8 years old. When both siblings are measured at age 5, only the younger one is experiencing paternal absence while the older has not experienced it yet (he will in the following round). Assuming the older sibling has not been treated yet, the hypothesis of this exercise is that having an absent father when around 5 years of life has an effect versus having a present father. When comparing outcomes between siblings when 8 and 12 years old, I test the hypothesis that having an absent father when around 5 years old is different than having it afterward in terms of children's development. Lastly, I test if effects accelerate or not over time.

Figure E5: Absence in 2009: timing of absence and measurement of children's outcomes



**Notes:** This figure shows the identification strategy for the second exercise. There are two types of households: (1) treated households, the father was present in the first and second round but was absent in 2009 (2) control households, the father was present in the first three rounds. In each household there is information on nutritional, cognitive and socio-emotional outcomes for a pair of siblings, a younger and an older sibling. Therefore, the sample includes those households with at least two siblings. Information on outcomes is only available for the younger sibling from 2009 onward. Two alternative analyses are performed. First, the difference (or gap) between the younger and older sibling in the treatment group when 5, 8 and 12 years old (Gap  $T_4$ ,  $T_8$  and  $T_{12}$  respectively) minus the gap between siblings in the control group (Gap  $C_4$ ,  $C_8$  and  $C_{12}$  respectively). Secondly, the difference in the evolution of the gap between siblings in the treatment group versus the control group when they are 8 versus 5 ((Gap  $T_8$  - Gap  $T_4$ ) - (Gap  $T_{12}$  - Gap  $T_8$ )) and 12 versus 8 ((Gap  $T_8$  - Gap  $T_4$ ) - (Gap  $T_{12}$  - Gap  $T_8$ )).

For this exercise I take those paired-siblings in households who had experienced the absence of the father in 2009 (but not before) and compare them against those in households whose fathers were present. As seen in figure E5, the treatment group includes those experiencing the absence in 2009 but not in 2006 nor 2002. The treatment is composed of 182 households while the control comprises 2,030 households (see table B3 for details on sample size per country). Again, the absence affects the younger sibling but unlike the previous exercise, it happens when she/he is around 5 years old, while it affects the older sibling when he/she is around 8 years old. While there is no information on the exact departure date, I know the father was present when the younger sibling was around 1 year old (in 2002).

### E.2 Econometric specification

$$y_{ih} = \alpha + \gamma \text{younger sibling}_{ih} + \delta (\text{HH w/absence in 2009}_h \times \text{younger sibling}_{ih}) + \text{HH}_h + \phi X_{ih} + \epsilon_{ih} \quad (3)$$

Where  $y_{ih}$  are nutritional (weight-for-age and height-for-age) and cognitive outcomes (standardized PPVT) when paired-siblings are around 5, 8 and 12 years old,

while it represents socio-emotional outcomes when children are 8 and 12 years old.  $youngersibling_{ih}$  is equal to 1 if the outcome belongs to the younger sibling and 0 if the outcome belongs to the older sibling.  $HHw/absence\ in\ 2009_h$  is equal to 1 if the household experiences absence in 2009 (but not in 2006 nor 2002) and 0 if there was no episode of absence in the first three rounds. The coefficient of interest is  $\delta$ .  $HH_h$  is the household fixed effect.  $X_{ih}$  includes age, gender and birth order of each child. Standard errors are clustered at the sentinel site level. With this specification, I examine the contemporaneous impact of having an absent father when around 5 years old versus having a present father until that age. I then explore the medium and long term effect when aged 8 and 12, when both siblings have experienced the absence of the father in the treated households.

### E.3 Descriptive statistics

The sample of analysis consists of a total of 2,212 households, in which 182 households experienced the absence of the father in 2009 but not in 2002 nor 2006 (treated households) and 2,030 households that had not experienced the absence of the father neither in 2002, 2006 nor 2009 (households in control group) (see table B3 for details on sample size per country). Table E8 reports information on the characteristics of older siblings, mothers, fathers and their households' characteristics at baseline (i.e 2002). Table E9 shows descriptive statistics of the outcomes of siblings when 5 years old in households with and without an absent father in 2009.

Table E8: Descriptive Statistics: Households with an absent father in 2009

	Absent father in 2009			No absent father in 2009			Diff	P-value
	N.	Mean	S.D.	N.	Mean	S.D.		
<b>Older sibling's characteristics</b>								
Age (in years)	182	1.00	0.29	2,030	0.97	0.29	0.04	0.10
Female	182	0.53	0.50	2,030	0.48	0.50	0.05	0.16
Birth order	182	2.01	1.44	2,030	2.27	1.71	-0.26	0.08
Birth weight (grams)	95	3,177.16	624.97	1,003	2,999.39	566.19	177.76	0.01
Number of antenatal visits	136	5.24	2.47	1,447	4.75	2.47	0.49	0.05
Creche	182	0.04	0.19	2,030	0.04	0.19	0.00	0.88
<b>Mother's characteristics</b>								
Age of the mother	181	24.12	5.03	2,028	24.95	5.40	-0.83	0.08
Mother- Primary or less	179	0.69	0.46	1,989	0.78	0.42	-0.09	0.05
Mother- Secondary education	179	0.25	0.44	1,989	0.18	0.39	0.07	0.07
Mother- Higher education	179	0.06	0.24	1,989	0.04	0.20	0.02	0.29
Mother regularly takes care	182	0.97	0.16	2,027	0.96	0.20	0.01	0.08
Mother-financial support	182	0.65	0.48	2,017	0.63	0.48	0.03	0.52
<b>Father's characteristics</b>								
Age of the father	181	29.29	7.59	2,024	30.68	7.40	-1.39	0.06
Father- Primary or less	179	0.64	0.48	1,975	0.68	0.47	-0.04	0.33
Father- Secondary education	179	0.27	0.45	1,975	0.26	0.44	0.02	0.66
Father- Higher education	179	0.09	0.29	1,975	0.06	0.24	0.03	0.24
Father regularly takes care	182	0.55	0.50	2,029	0.61	0.49	-0.05	0.25
Father-financial support	182	0.90	0.31	2,025	0.88	0.32	0.01	0.63
Father in agriculture	179	0.69	0.46	1,989	0.68	0.47	0.00	0.91
<b>Household's characteristics</b>								
Household size	182	5.21	2.16	2,030	5.41	2.20	-0.19	0.22
Rural	182	0.66	0.47	2,030	0.72	0.45	-0.06	0.30
Housing quality index (z)	182	-0.10	1.07	2,029	-0.10	1.01	0.00	0.97
Housing service index (z)	182	-0.27	1.05	2,029	-0.15	1.01	-0.12	0.24
consumer durable index (z)	182	-0.20	0.90	2,022	-0.24	0.90	0.04	0.65
Wealth index (z)	182	-0.19	0.83	2,020	-0.16	0.81	-0.03	0.75
Anyone owns the house	182	0.75	0.43	2,029	0.77	0.42	-0.02	0.71
Experienced bad event	182	0.41	0.49	2,030	0.51	0.50	-0.09	0.04

**Notes:** This table provides descriptive statistics of the characteristics of older siblings, mothers, fathers and of the household, between households that experienced the absence of the father in 2009 but not in 2006 nor 2002 and households that did not experience the absence of the father in neither of those years. Children characteristics include: age in years, average of girls, birth order of the sibling, reported birth weight, reported number of antenatal visits during pregnancy, and whether the child had ever attended a creche for at least a whole morning, afternoon or evening almost every week. Mother's characteristics include: age of the mother in years and percentage of mother with primary education or less, secondary education and higher education. Education variables were homogenized for the four countries based on the reported number of years of education. Whether the mother regularly takes care of index children comes from the following question in the household roster: "Responsible for looking after NAME on a regular basis" and whether the mother provides financial support comes from the following question "Helped support NAME financially?". Father's characteristics include the same as the mother's plus whether one of the main economic activities is agriculture. Household's characteristics include: household size, whether they live in the rural area and whether anyone in the household owns the house. Moreover, three wealth indices are included (housing quality, access to services and consumer durables) as well as the overall index; all of them standardized at the country level. The percentage of households that experienced a bad event per household type comes from the following question: "Since you found you were pregnant with NAME have there been any big changes or events that decreased the economic welfare of your household?".

Table E9: Absence in 2009: descriptive statistics of outcomes between siblings when 5 years old

	Older Siblings						Younger Siblings						Siblings within household types			
	Absent father in 2006		No absent father in 2006		Diff older siblings		Absent father in 2006		No absent father in 2006		Diff younger siblings		Diff hh absence		Diff hh no absence	
	N. 1	Mean/(S.D.) 2	N. 3	Mean/(S.D.) 4	(2-4) 5	P-value 6	N. 7	Mean/(S.D.) 8	N. 9	Mean/(S.D.) 10	(8-10) 11	P-value 12	(2-8) 13	P-value 14	(4-10) 15	P-value 16
age	182	5.33 (0.35)	2,030	5.24 (0.35)	0.09	0.00	179	5.01 (1.09)	1,986	5.05 (1.04)	-0.03	0.69	0.32	0.00	0.19	0.00
female	182	0.53 (0.50)	2,030	0.48 (0.50)	0.05	0.18	179	0.60 (0.49)	1,986	0.50 (0.50)	0.09	0.03	-0.06	0.22	-0.02	0.28
weight	179	16.11 (2.79)	2,029	15.85 (2.45)	0.26	0.36	176	15.52 (3.02)	1,975	15.54 (4.99)	-0.02	0.95	0.59	0.07	0.31	0.01
weight-for-age	179	-1.31 (1.15)	2,029	-1.34 (1.05)	0.03	0.78	176	-1.28 (1.25)	1,973	-1.39 (1.18)	0.11	0.21	-0.03	0.76	0.05	0.11
height	179	104.01 (5.64)	2,029	103.22 (5.55)	0.79	0.10	175	101.73 (9.14)	1,972	102.03 (9.01)	-0.30	0.70	2.28	0.01	1.19	0.00
height-for-age	179	-1.56 (1.04)	2,028	-1.63 (1.06)	0.07	0.42	173	-1.48 (1.36)	1,954	-1.61 (1.33)	0.13	0.21	-0.08	0.39	-0.02	0.67
ppvt	108	27.39 (16.60)	1,405	24.21 (16.04)	3.18	0.11	92	39.01 (23.70)	1,168	35.02 (22.84)	3.99	0.22	-11.62	0.00	-10.81	0.00
ppvt zscore	108	-0.93 (0.60)	1,405	-0.92 (0.65)	-0.01	0.85	92	-0.44 (0.69)	1,168	-0.45 (0.76)	0.01	0.90	-0.49	0.00	-0.47	0.00

**Notes:** This table reports outcomes statistics of older and younger siblings when aged 5 in households with and without an absent father in 2009. Outcomes are: age in years, weight, weight-for-age (standardized), height, height-for-age (standardized), PPVT and PPVT z-score (standardized). The first four columns exhibit information for the older sibling in households with an absent father (1-2) and households with no absent father (3-4). Column 7-10 show information for the younger siblings in households with an absent father (7-8) and without (9-10). For each outcome, the number of observations, mean and standard deviations are provided. Column 5 and 6 show the difference in mean of older siblings between household types and p-value respectively. Similarly, column 11 and 12 show the difference for younger siblings. Column 13 and 14 show the difference in outcomes and p-value for older versus younger siblings in households with an absent father. Column 15 and 16 compare siblings in households with no absent father.



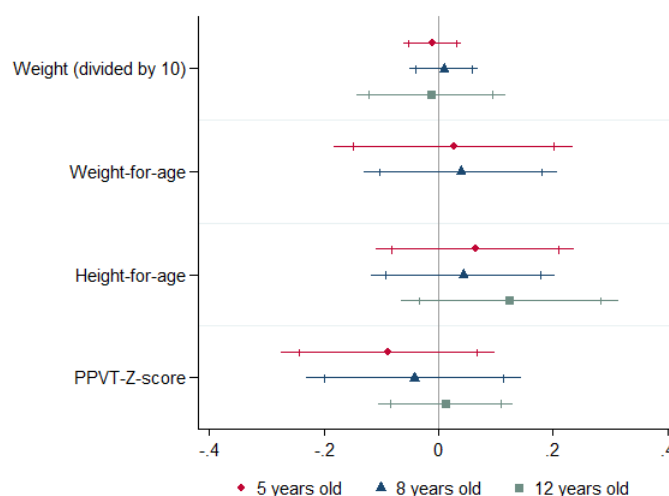
## E.4 Results

Table E10: Nutritional and cognitive outcomes when 5 years old between younger and older siblings among households with and without and without absence in 2009

VARIABLES	(1) Weight-for-age	(2) Height-for-age	(3) PPVT Z-Score
Polling all countries			
Younger sibling	0.161 (0.259)	0.388 (0.347)	0.439** (0.204)
HH w/absence in 2009 * younger sibling	0.0265 (0.105)	0.0639 (0.0873)	-0.0898 (0.0572)
With country interactions			
Younger sibling (Ethiopia)	0.571*** (0.197) [0.010]	1.358* (0.745) [0.090]	0.0898 (0.106) [0.413]
Younger sibling * India	-0.198 (0.367) [0.251]	-0.957 (0.921) [0.475]	
Younger sibling * Peru	-0.435* (0.222) [0.210]	-0.334 (0.767) [0.000]	1.781*** (0.276) [0.000]
Younger sibling * Vietnam	-1.115*** (0.338) [0.069]	-1.628** (0.808) [0.411]	0.111 (0.207) [0.285]
HH w/absence in 2009 * younger sibling (Ethiopia)	0.0969 (0.203) [0.645]	0.0951 (0.190) [0.628]	-0.0881 (0.0934) [0.364]
HH w/absence in 2009 * younger sibling * India	0.0941 (0.270) [0.303]	-0.0650 (0.218) [0.787]	
HH w/absence in 2009 * younger sibling * Peru	-0.165 (0.279) [0.731]	-0.106 (0.267) [0.956]	-0.0348 (0.123) [0.145]
HH w/absence in 2009 * younger sibling * Vietnam	-0.434 (0.272) [0.083]	0.246 (0.317) [0.206]	0.0597 (0.185) [0.864]
P-value younger sibling	.013	.005	.000
P-value HH w/absence in 2009 * younger sibling	.188	.69	.862
Observations	4,290	4,244	2,438
R-squared	0.077	0.036	0.535
Number of HH	2,145	2,122	1,219
Observations control	1,972	1,952	1,131
Mean control	-1.34	-1.64	-.88
Observations treatment	173	170	88
Mean treatment	-1.31	-1.59	-.94
Includes India	Yes	Yes	No
Age polynomial	No	No	No

**Notes:** Standard errors in parentheses, clustered at the sentinel site level. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Each regression includes a household fixed effect and presents the gap in the corresponding outcome between a child and his/her younger sibling in households that experienced the absence of the father in 2009 versus the gap in household that did not experienced his absence that year. In 2009, the relatively older child is around 5 years old and the younger sibling is in her/his early years. All outcomes are measured when both siblings are around 5 years old. Variable *younger sibling* is equal to 1 if the individual is the younger sibling and 0 if the individual is the relatively older child. Variable *hh with absence in 2009* is equal to 1 if the pair of siblings under comparison belong to a household which experienced the absence in 2009 but not in 2006 nor 2002, and 0 if the father was present in the first three rounds. Dependent variables in columns 1-2 are weight-for-age z-score and height-for-age z-score. Both anthropometric z-scores are based on the 2006 WHO child growth standards for children below 5 and 2007 WHO child growth standards for children aged 5-19 years (except for weight-for-age for children older than 10). Dependent variable in column 3 corresponds to the standardized Peabody Picture Vocabulary Test (PPVT) at the country level. For cognitive outcomes, India is excluded due to lack of data for younger siblings. All regressions are controlled for age, gender and birth order. Interactions between each control and each country are included.

Figure E6: Estimates when siblings are 5, 8 and 12 years old for nutritional and cognitive outcomes



**Notes:** This figure reports the estimates of interest (hh with an absent father in 2009 and outcomes for the younger sibling) obtained from the estimation of equation (1), when siblings are 5, 8 and 12 years old when pooling Ethiopia, India, Peru and Vietnam. The figure includes 90% and 95% confidence intervals. Estimates represent the gap in the corresponding outcome between a child and his/her younger sibling in households that experienced the absence of the father in 2009 versus the gap in household that did not experienced his absence that year. Dependent variables are the following: weight (divided by 10 for exhibition purpose), weight-for-age z-score, height-for-age z-score and Peabody Picture Vocabulary Test (PPVT) standardized at the country level. All anthropometric z-scores are based on the 2006 WHO child growth standards for children below 5 and 2007 WHO child growth standards for children aged 5-19 years (except for weight-for-age for children older than 10). For the cognitive outcome, India is excluded due to lack of data for younger siblings. All regressions include a household fixed effect and are controlled for age, gender and birth order. Interactions between each control and each country are included.

Table E11: Nutritional and cognitive outcomes when 5, 8 and 12 years old, coefficients per country

VARIABLES	(1) Weight-for-age	(2) Height-for-age	(3) PPVT Z-Score
<b>5 years old</b>			
<i>Ethiopia</i>			
Younger sibling	0.571** (0.201)	1.358* (0.760)	0.0898 (0.107)
HH w/absence in 2009 * younger sibling	0.0969 (0.207)	0.0951 (0.193)	-0.0881 (0.0948)
Number of HH (treatment + control)	706	706	701
<i>India</i>			
Younger sibling	0.374 (0.316)	0.401 (0.550)	
HH w/absence in 2009 * younger sibling	0.191 (0.180)	0.0301 (0.110)	
Number of HH (treatment + control)	636	636	
<i>Peru</i>			
Younger sibling	0.136 (0.105)	1.024*** (0.182)	1.870*** (0.260)
HH w/absence in 2009 * younger sibling	-0.0680 (0.195)	-0.0106 (0.191)	-0.123 (0.0808)
Number of HH (treatment + control)	496	496	491
<i>Vietnam</i>			
Younger sibling	-0.544* (0.281)	-0.269 (0.320)	0.200 (0.182)
HH w/absence in 2009 * younger sibling	-0.338* (0.184)	0.341 (0.260)	-0.0285 (0.163)
Number of HH (treatment + control)	374	374	362
<b>8 years old</b>			
<i>Ethiopia</i>			
Younger sibling	0.457 (0.352)	0.841** (0.354)	-2.370*** (0.515)
HH w/absence in 2006 * younger sibling	0.0926 (0.155)	0.0484 (0.190)	0.0305 (0.230)
Number of HH (treatment + control)	706	706	702
<i>India</i>			
Younger sibling	0.374 (0.267)	0.860*** (0.276)	
HH w/absence in 2006 * younger sibling	0.0481 (0.159)	0.0267 (0.0991)	
Number of HH (treatment + control)	636	636	
<i>Peru</i>			
Younger sibling	0.740 (0.480)	0.187 (0.287)	0.372* (0.184)
HH w/absence in 2006 * younger sibling	0.0594 (0.172)	0.0351 (0.192)	-0.0642 (0.0815)
Number of HH (treatment + control)	496	496	495
<i>Vietnam</i>			
Younger sibling	1.400*** (0.453)	1.151*** (0.374)	-2.160*** (0.442)
HH w/absence in 2006 * younger sibling	-0.189 (0.151)	0.123 (0.168)	-0.159 (0.177)
Number of HH (treatment + control)	373	374	371
<b>12 years old</b>			
<i>Ethiopia</i>			
Younger sibling		-0.791 (0.854)	0.435*** (0.0606)
HH w/absence in 2009 * younger sibling		0.0376 (0.153)	0.0923 (0.0810)
Number of HH(treatment + control)		706	613
<i>India</i>			
Younger sibling		0.398*** (0.138)	
HH w/absence in 2009 * younger sibling		0.0511 (0.151)	
Number of HH(treatment + control)		635	
<i>Peru</i>			
Younger sibling		0.956 (0.596)	-1.179*** (0.120)
HH w/absence in 2009 * younger sibling		0.109 (0.216)	-0.0335 (0.0998)
Number of HH (treatment + control)		496	496
<i>Vietnam</i>			
Younger sibling		-0.283 (0.714)	-0.170 (0.110)
HH w/absence in 2009 * younger sibling		0.495* (0.259)	0.00359 (0.115)
Number of HH (treatment + control)		374	373

**Notes:** Standard errors in parentheses, clustered at the sentinel site level. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Estimates are per country and outcomes are measured when aged 5, 8 and 12. Each regression includes a household fixed effect. Variable *younger sibling* is equal to 1 if the individual is the younger sibling and 0 if the individual is the relatively older child. Variable *hh with absence in 2009* is equal to 1 if the pair of siblings under comparison belong to a household which experienced the absence in 2009 but not in 2002 nor 2006, and 0 if the father was present in neither of those rounds. Dependent variables in column 1 and 2 are weight-for-age z-score and height-for-age z-score. Both anthropometric z-scores are based on the 2006 WHO child growth standards for children below 5 and 2007 WHO child growth standards for children aged 5-19 years (except for weight-for-age for children older than 10). Dependent variable in column 3 correspond to the standardized score of the Peabody Picture Vocabulary Test (PPVT) at the country level. For this outcome, India is excluded due to lack of data for younger siblings. All regressions are controlled for age, gender and birth order.

Table 12: Socio-emotional outcomes when 5 years old between younger and older siblings among households with and without absence in 2009

VARIABLES	Agency Index			Pride Index		
	(1)	(2)	(3)	(1)	(2)	(3)
<b>8 years old</b>						
HH w/absence in 2009 * younger sibling (Ethiopia)	0.757*** (0.233) [0.005]	0.647*** (0.232) [0.013]	0.487** (0.198) [0.026]	-0.156 (0.244) [0.537]	0.338 (0.357) [0.365]	0.369 (0.243) [0.153]
HH w/absence in 2009 * younger sibling * India	-0.711 (0.748) [0.949]	-0.605* (0.312) [0.843]	-0.546 (0.331) [0.828]	-0.174 (0.451) [0.402]	-0.315 (0.414) [0.914]	-0.378 (0.332) [0.971]
HH w/absence in 2009 * younger sibling * Peru	-0.686* (0.390) [0.826]	-0.479 (0.344) [0.523]	-0.363 (0.330) [0.651]	0.0417 (0.294) [0.499]	-0.363 (0.392) [0.881]	-0.257 (0.291) [0.502]
HH w/absence in 2009 * younger sibling * Vietnam	-0.473 (0.541) [0.576]	-0.609 (0.389) [0.906]	-0.541 (0.464) [0.902]	0.638 (0.472) [0.257]	-0.367 (0.507) [0.938]	-0.485 (0.349) [0.654]
Observations	1,894	3,380	3,808	1,239	2,764	4,032
R-squared	0.031	0.023	0.022	0.106	0.079	0.083
Number of HH	954	1,709	1,924	624	1,398	2,036
Observations control	884	1,565	1,768	573	1,275	1,867
Observations treatment	70	144	156	51	123	169
P-value younger sibling	.063	.056	.026	.200	.151	.001
P-value HH w/absence in 2009 * younger sibling	.311	.223	.331	.481	.829	.534
<b>12 years old</b>						
HH w/absence in 2009 * younger sibling (Ethiopia)	-0.0114 (0.251) [0.965]	0.0644 (0.228) [0.784]	0.0667 (0.223) [0.773]	0.0280 (0.292) [0.926]	0.0251 (0.325) [0.940]	0.0136 (0.233) [0.955]
HH w/absence in 2009 * younger sibling * India	0.0672 (0.396) [0.860]	-0.145 (0.274) [0.610]	-0.0471 (0.262) [0.890]	0.0234 (0.393) [0.850]	-0.0741 (0.373) [0.795]	-0.00547 (0.282) [0.961]
HH w/absence in 2009 * younger sibling * Peru	-0.189 (0.346) [0.419]	-0.258 (0.321) [0.412]	-0.260 (0.316) [0.407]	0.105 (0.325) [0.377]	0.0591 (0.357) [0.582]	0.0747 (0.268) [0.522]
HH w/absence in 2009 * younger sibling * Vietnam	0.626 (0.499) [0.180]	0.355 (0.368) [0.173]	0.609* (0.362) [0.032]	-0.0672 (0.437) [0.907]	-0.0373 (0.402) [0.960]	-0.0869 (0.336) [0.770]
Observations	3,244	4,145	4,189	2,581	3,419	4,220
R-squared	0.024	0.026	0.023	0.020	0.016	0.015
Number of HH	1,632	2,088	2,110	1,301	1,726	2,127
Observations control	1,502	1,917	1,939	1,191	1,576	1,954
Observations treatment	130	171	171	110	150	173
P-value younger sibling	.094	.094	.011	.000	.000	.001
P-value HH w/absence in 2009 * younger sibling	.433	.371	.118	.958	.950	.940

**Notes:** Standard errors in parentheses, clustered at the sentinel site level. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Each regression includes a household fixed effect and presents, by country, the gap in the corresponding outcome between a child and his/her younger sibling in households that experienced the absence of the father in 2009 versus the gap in household that did not experienced his absence that year. While the upper panel exhibits outcomes when both siblings were 8 years old, the bottom one shows them when they are 12 years old. The reference country corresponds to Ethiopia. Dependent variables in column 1-3 are the following subindices: (1) agency index including all questions, (2) agency index excluding those related to work and (3) agency index excluding those related to work and school. Dependent variables in column 4-6 are the following subindices: (1) pride index including all questions, (2) pride index excluding those related to work and (3) pride index excluding those related to work and school. These indices were calculated as explained in section 3. All regressions are controlled for age, gender and birth order. Interactions between each control and each country are included.

## F Mechanisms

### F.1 Income effect

Table F13: Evolution of food, non-food and total expenditures pre and post paternal absence in 2009

VARIABLES	(1) Food expenditure	(2) Non-food expenditure	(3) Total expenditure
HH w/absence in 2009	0.0313 (0.0773)	-0.0405 (0.0805)	-0.0156 (0.0809)
yr 2009	0.153*** (0.0480)	0.106*** (0.0318)	0.141*** (0.0392)
HH w/absence in 2009 * yr 2009	-0.129* (0.0737)	-0.0356 (0.0766)	-0.0816 (0.0693)
India	0.0197 (0.118)	-0.0107 (0.109)	0.00332 (0.118)
Peru	-0.00392 (0.133)	-0.0127 (0.135)	-0.00887 (0.143)
Vietnam	0.00447 (0.174)	-0.000152 (0.158)	0.00323 (0.179)
Constant	-0.0794 (0.0940)	-0.0461 (0.0814)	-0.0689 (0.0868)
Observations	4,424	4,424	4,424
R-squared	0.005	0.003	0.005
Observations Control	2,030	2,030	2,030
Observations Treatment	182	182	182

**Notes:** Standard errors in parentheses, clustered at the sentinel site level. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . No household fixed effects were included. Variable *yr 2009* is equal to 1 if the outcome corresponds to the year 2009 and 0 if it corresponds to 2006. Variable *hh w/absence in 2009* is equal to 1 if the father was absent in 2009 (but not in 2006 nor 2002) and 0 if present the three rounds. Food, non-food and total expenditures are reported monthly expenditures per capita in real 2006 local currency. In order to make values comparable, they were standardized at the country level. Negative values were reported as missing.

Table F14: Change in economic situation pre-absence of the father in households with absence in 2009

VARIABLES	(1) Same	(2) Worse	(3) Better
HH w/absence in 2009	-0.0341 (0.0368)	0.0693* (0.0361)	-0.0351 (0.0343)
India	0.0937** (0.0418)	-0.0119 (0.0311)	-0.0818** (0.0382)
Peru	0.289*** (0.0546)	-0.144*** (0.0314)	-0.145*** (0.0469)
Vietnam	0.0625 (0.0656)	-0.158*** (0.0304)	0.0951 (0.0668)
Constant	0.322*** (0.0364)	0.223*** (0.0250)	0.455*** (0.0348)
Observations	2,212	2,212	2,212
R-squared	0.047	0.038	0.028
Observations Control	2,030	2,030	2,030
Mean Control	.422	.161	.417
Observations Treatment	182	182	182
Mean Treatment	.418	.225	.357

**Notes:** Standard errors in parentheses, clustered at the sentinel site level. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . Variables are constructed from the following question in round 2 (2006): “During the period (current/four year ago), how would you describe the household you were living in?” (1) very rich (2) rich (3) comfortable-manage to get by (4) struggle-never have quite enough (5) poor (6) destitute. Variable same is equal to 1 if the situation has no changed and 0 otherwise. Variable worse is equal to 1 if current situation reported is higher (as the higher the poorer) than the one four years ago and 0 otherwise. Variable better is equal to 1 if current situation reported is lower than the one four years ago and 0 otherwise.

## F.2 Family structure

Table F15: Probability of belonging to a nuclear family

VARIABLES	(1) Absence in 2006	(2) Absence in 2009
HH w/absence	0.125** (0.0604)	-0.0224 (0.0795)
HH w/absence * India	-0.130 (0.110)	0.103 (0.0979)
HH w/absence * Peru	-0.203* (0.120)	-0.0193 (0.106)
HH w/absence * Vietnam	0.00736 (0.126)	0.0337 (0.101)
India	-0.327*** (0.0361)	-0.337*** (0.0383)
Peru	-0.0235 (0.0283)	-0.0201 (0.0288)
Vietnam	-0.162*** (0.0318)	-0.164*** (0.0321)
Constant	0.697*** (0.0167)	0.698*** (0.0182)
Observations	2,365	2,212
R-squared	0.083	0.080
Observations Control	2212	2030
Mean Control	.57	.57
Observations Treatment	153	182
Mean Treatment	.64	.56

**Notes:** This table reports the difference in the probability of belonging to a nuclear family between households that experienced absence either in 2006 or 2009 and the control group. Estimates are interacted with each country being Ethiopia the baseline. Nuclear family is defined as a household in which no other adult member apart from the father and the mother lives at home at baseline (2002). I consider adult any member older than 14.

Table F16: Absence in 2006: results including interaction with family structure

VARIABLES	(1) Weight	(2) Weight-for-age	(3) Height-for-age	(4) PPVT Z-Score
<b>5 years old</b>				
Younger sibling	0.645 (0.568)	0.117 (0.255)	0.366 (0.343)	0.436** (0.206)
Younger sibling * nuclear family	-0.208 (0.206)	-0.00900 (0.0574)	0.0915 (0.0664)	0.107*** (0.0349)
HH w/absence in 2006 * younger sibling	-0.710* (0.389)	-0.171 (0.150)	-0.202 (0.138)	0.234 (0.143)
HH w/absence in 2006 * younger sibling * nuclear family	1.135 (1.000)	-0.0235 (0.198)	-0.00475 (0.228)	-0.159 (0.132)
Number of HH	2,297	2,294	2,270	1,314
Observations control	2,147	2,145	2,122	1,219
Observations control- nuclear families	1,227	1,227	1,210	800
Observations treatment	150	149	148	95
Observations treatment- nuclear families	97	96	96	68
<b>8 years old</b>				
Younger sibling	2.484*** (0.537)	0.631*** (0.181)	0.804*** (0.189)	-1.737*** (0.388)
Younger sibling * nuclear family	-0.0575 (0.222)	0.0283 (0.0651)	0.104** (0.0516)	0.178** (0.0679)
HH w/absence in 2006 * younger sibling	-0.855 (0.535)	-0.284 (0.173)	-0.152 (0.118)	0.417** (0.168)
HH w/absence in 2006 * younger sibling * nuclear family	0.617 (0.710)	0.235 (0.240)	-0.0222 (0.144)	-0.584** (0.257)
Number of HH	2,293	1,806	2,281	1,456
Observations control	2,144	1,700	2,132	1,347
Observations control- nuclear families	1,224	968	1,216	876
Observations treatment	149	106	149	109
Observations treatment- nuclear families	96	71	96	77
<b>12 years old</b>				
Younger sibling	3.463*** (1.095)		0.113 (0.220)	-0.256 (0.156)
Younger sibling * nuclear family	0.444 (0.522)		0.0769 (0.0640)	0.0653* (0.0326)
HH w/absence in 2006 * younger sibling	-1.932** (0.875)		-0.195 (0.131)	0.0721 (0.105)
HH w/absence in 2006 * younger sibling * nuclear family	0.729 (1.369)		0.0273 (0.175)	-0.0967 (0.120)
Number of HH	2,294		2,265	1,525
Observations control	2,145		2,117	1,415
Observations control- nuclear families	1,223		1,211	920
Observations treatment	149		148	110
Observations treatment- nuclear families	96		96	78
Includes India	Yes		Yes	No

**Notes:** Standard errors in parentheses, clustered at the sentinel site level. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . The table reports the main results interacted with dummy variable *nuclear family* which is equal to 1 if the household is a nuclear family at baseline and 0 otherwise. Nuclear family is defined as a household in which no other adult member apart from the father and the mother lives at home at baseline (2002). I consider adult any member older than 14. Outcomes are measure when siblings are 5 (upper panel), 8 (middle panel) and 12 (bottom panel) years old. Variable *younger sibling* is equal to 1 if the individual is the younger sibling and 0 if the individual is the relatively older child. Variable *hh with absence in 2006* is equal to 1 if the pair of siblings under comparison belong to a household which experienced the absence in 2006 but not in 2002, and 0 if the father was present in both rounds. Dependent variables in column 1 and 2 are weight-for-age z-score and height-for-age z-score. Both anthropometric z-scores are based on the 2006 WHO child growth standards for children below 5 and 2007 WHO child growth standards for children aged 5-19 years (except for weight-for-age for children older than 10). Dependent variable in column 3 corresponds to the standardized score of the Peabody Picture Vocabulary Test (PPVT) at the country level. For this outcome, India is excluded due to lack of data for younger siblings. All regressions are controlled for age, gender and birth order. Interactions between each control and each country are included.

### F.3 Temporary versus more permanent paternal absence

Table F17: Absence in 2006: results including interaction with absence in 2009 (next round)

VARIABLES	(1) Weight-for-age	(2) Height-for-age	(3) PPVT Z-Score
Younger sibling	0.114 (0.256)	0.402 (0.343)	0.490** (0.205)
younger sibling * absence in 2009	0.0269 (0.105)	0.0672 (0.0872)	-0.0875 (0.0568)
HH w/absence in 2006 * younger sibling	-0.238* (0.124)	-0.189 (0.186)	0.106 (0.105)
HH w/absence in 2006 * younger sibling * absence in 2009	0.0994 (0.235)	-0.0788 (0.289)	0.120 (0.120)
Age (Ethiopia)	-0.395*** (0.0508)	-0.309*** (0.0476)	-31.73 (26.11)
Age * India	0.158** (0.0708)	0.0988 (0.0743)	
Age * Peru	0.316*** (0.0647)	0.361*** (0.0746)	52.32 (59.25)
Age * Vietnam	0.157* (0.0868)	0.0988 (0.0746)	-146.8** (67.07)
Female (Ethiopia)	-0.135*** (0.0482)	-0.0490 (0.0685)	-0.0667* (0.0337)
Female * India	0.189** (0.0840)	0.131 (0.113)	
Female * Peru	-0.0805 (0.0816)	-0.0108 (0.103)	0.0520 (0.0527)
Female * Vietnam	0.167** (0.0737)	0.199** (0.0970)	0.130* (0.0696)
Birth order (Ethiopia)	-0.304 (0.254)	-0.371 (0.347)	-0.310 (0.202)
Birth order * India	0.196*** (0.0689)	-0.0927 (0.106)	
Birth order * Peru	0.199*** (0.0628)	0.149 (0.106)	0.914*** (0.0655)
Birth order * Vietnam	0.0421 (0.0784)	-0.169* (0.101)	0.0171 (0.128)
Observations	4,588	4,540	2,628
Number of HH	2,294	2,270	1,314
Observations control with absence in 2009	173	170	88
Observations treatment with absence in 2009	63	63	41
Includes India	Yes	Yes	No

**Notes:** Standard errors in parentheses, clustered at the sentinel site level. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . The table reports the main results interacted with dummy variable *absence in 2009* which is equal to 1 if the household experienced absence in 2009 and 0 otherwise. Outcomes are measure when siblings are 5 years old. Variable *younger sibling* is equal to 1 if the individual is the younger sibling and 0 if the individual is the relatively older child. Variable *hh with absence in 2006* is equal to 1 if the pair of siblings under comparison belong to a household which experienced the absence in 2006 but not in 2002, and 0 if the father was present in both rounds. Dependent variables in column 1 and 2 are weight-for-age z-score and height-for-age z-score. Both anthropometric z-scores are based on the 2006 WHO child growth standards for children below 5 and 2007 WHO child growth standards for children aged 5-19 years (except for weight-for-age for children older than 10). Dependent variable in column 3 corresponds to the standardized score of the Peabody Picture Vocabulary Test (PPVT) at the country level. For this outcome, India is excluded due to lack of data for younger siblings. All regressions are controlled for age, gender and birth order. Interactions between each control and each country are included.



## G Robustness checks

Table G18: Absence in 2006: controlling for bad events in 2002

VARIABLES	(1) Weight-for-age	(2) Height-for-age	(3) PPVT Z-Score
Younger sibling	0.0427 (0.265)	0.335 (0.348)	0.659*** (0.197)
Younger sibling * bad event in 2002	0.0448 (0.0488)	0.0795 (0.0726)	0.00133 (0.0550)
HH w/absence in 2006 * younger sibling	-0.165 (0.176)	-0.0792 (0.195)	0.183 (0.132)
HH w/absence in 2006 * younger sibling * negative shock in 2002	-0.0935 (0.195)	-0.247 (0.219)	-0.00912 (0.139)
Number of HH	2,294	2,270	1,314
Observations Control	2,145	2,122	1,219
Mean Control	-1.34	-1.64	-.89
Observations Treatment	149	148	95
Mean Treatment	-1.1	-1.37	-.97
Reference from main exercise			
HH w/absence in 2006 * younger sibling	-0.187** (0.0870)	-0.199 (0.120)	0.126 (0.0942)

**Notes:** Standard errors in parentheses, clustered at the sentinel site level. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . The table reports the main results interacted with dummy variable *negative shocks 2002* which is equal to 1 if the household reports to had experienced at least one of a listed shocks in 2002 and 0 otherwise. Negative shocks include a wide variety of events (economic, environmental, changes in family structure, agricultural shocks, etc). Variable *younger sibling* is equal to 1 if the individual is the younger sibling and 0 if the individual is the relatively older child. Variable *hh with absence in 2006* is equal to 1 if the pair of siblings under comparison belong to a household which experienced the absence in 2006 but not in 2002, and 0 if the father was present in both rounds. Dependent variables in column 1 and 2 are weight-for-age z-score and height-for-age z-score. Both anthropometric z-scores are based on the 2006 WHO child growth standards for children below 5 and 2007 WHO child growth standards for children aged 5-19 years (except for weight-for-age for children older than 10). Dependent variable in column 3 corresponds to the standardized score of the Peabody Picture Vocabulary Test (PPVT) at the country level. For this outcome, India is excluded due to lack of data for younger siblings. All regressions are controlled for age, gender and birth order. Interactions between each control and each country are included.

Table G19: Absence in 2006: results with alternative controls

	Weight-for-age			Height-for-age			PPVT Z-score		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	All	No future absence	Future absence	All	No future absence	Future absence	All	No future absence	Future absence
<b>5 years old</b>									
Younger sibling	0.113 (0.255)	0.152 (0.248)	-0.365 (0.454)	0.407 (0.341)	0.420 (0.369)	0.500 (0.781)	0.479** (0.202)	0.311 (0.195)	1.498*** (0.291)
HH w/absence in 2006 * younger sibling	-0.187** (0.0870)	-0.185** (0.0882)	-0.192* (0.100)	-0.199 (0.120)	-0.196 (0.127)	-0.238** (0.119)	0.126 (0.0942)	0.115 (0.0935)	0.175* (0.103)
Observations Control	2,145	1,784	360	2,122	1,765	356	1,219	1,017	201
Mean Control	-1.34	-1.33	-1.37	-1.64	-1.63	-1.67	-.89	-.88	-.95
Observations Treatment	149	149	149	148	148	148	95	95	95
Mean Treatment	-1.1	-1.1	-1.1	-1.37	-1.37	-1.37	-.97	-.97	-.97
<b>8 years old</b>									
Younger sibling	0.645*** (0.170)	0.602*** (0.169)	0.512 (0.476)	0.853*** (0.182)	0.726*** (0.163)	1.364** (0.599)	-1.659*** (0.388)	-1.774*** (0.383)	-1.164* (0.673)
HH w/absence in 2006 * younger sibling	-0.125 (0.0924)	-0.126 (0.0913)	-0.122 (0.108)	-0.160** (0.0775)	-0.166** (0.0796)	-0.151 (0.0907)	0.0138 (0.154)	0.0242 (0.155)	-0.0681 (0.157)
Observations Control	1,700	1,414	285	2,132	1,769	362	1,347	1,119	227
Mean Control	-1.45	-1.45	-1.42	-1.38	-1.37	-1.43	.78	.83	.51
Observations Treatment	106	106	106	149	149	149	109	109	109
Mean Treatment	-1.19	-1.19	-1.19	-1.21	-1.21	-1.21	.87	.87	.87
<b>12 years old</b>									
Younger sibling				0.147 (0.220)	0.0546 (0.286)	0.670 (0.686)	-0.228 (0.153)	-0.175 (0.153)	-0.464 (0.401)
HH w/absence in 2006 * younger sibling				-0.173* (0.0890)	-0.164* (0.0906)	-0.236** (0.108)	0.00669 (0.0457)	0.00410 (0.0475)	0.00482 (0.0550)
Observations Control				2117	1760	357	1415	1177	237
Mean Control				-1.44	-1.43	-1.52	.28	.27	.32
Observations Treatment				148	148	148	110	110	110
Mean Treatment				-1.21	-1.21	-1.21	.32	.32	.32

**Notes:** Standard errors in parentheses, clustered at the sentinel site level. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . The table reports the main results varying the definition of the control households. Columns 1, 4 and 7 keeps the original definition, fathers are present in 2002 and 2006 with no restriction afterward. Column 2, 5 and 8 impose that the father has also to be present in 2009, 2013 and 2016 for the control households. Column 3, 6 and 9 impose that the father can be absent either in 2009 or 2013 or 2016. No extra restrictions are imposed to the treated households given the small sample size. Outcomes are measured when 5 (upper panel), 8 (middle panel) and 12 (bottom panel) years old. Variable *younger sibling* is equal to 1 if the individual is the younger sibling and 0 if the individual is the relatively older child. Variable *hh with absence in 2006* is equal to 1 if the pair of siblings under comparison belong to a household which experienced the absence in 2006 but not in 2002, and 0 depending on the definition for the control group. Dependent variables in column 1 and 2 are weight-for-age z-score and height-for-age z-score. Both anthropometric z-scores are based on the 2006 WHO child growth standards for children below 5 and 2007 WHO child growth standards for children aged 5-19 years (except for weight-for-age for children older than 10). Dependent variable in column 3 corresponds to the standardized score of the Peabody Picture Vocabulary Test (PPVT) at the country level. For this outcome, India is excluded due to lack of data for younger siblings. All regressions are controlled for age, gender and birth order. Interactions between each control and each country are included, being Ethiopia the country of reference.

Table G20: Absence in 2009: results with alternative controls

	Weight-for-age			Height-for-age			PPVT Z-score		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	All	No future absence	Future absence	All	No future absence	Future absence	All	No future absence	Future absence
<b>5 years old</b>									
Younger sibling (Ethiopia)	0.571*** (0.197)	0.544*** (0.201)	1.193*** (0.341)	1.358* (0.745)	1.328* (0.749)	3.536*** (0.490)	0.0898 (0.106)	0.0490 (0.0958)	0.632** (0.240)
Younger sibling * India	-0.198 (0.367)	-0.171 (0.383)	-1.681* (0.987)	-0.957 (0.921)	-0.935 (0.974)	-4.029*** (1.275)			
Younger sibling * Peru	-0.435* (0.222)	-0.403* (0.230)	-0.920* (0.508)	-0.334 (0.767)	-0.456 (0.768)	-2.105*** (0.656)	1.781*** (0.276)	1.567*** (0.227)	1.251*** (0.382)
Younger sibling * Vietnam	-1.115*** (0.338)	-1.051*** (0.355)	-2.157*** (0.517)	-1.628** (0.808)	-1.457* (0.849)	-5.302*** (0.573)	0.111 (0.207)	0.0803 (0.221)	
HH w/absence in 2009 * younger sibling (Ethiopia)	0.0969 (0.203)	0.112 (0.208)	0.00204 (0.232)	0.0951 (0.190)	0.110 (0.207)	0.00792 (0.186)	-0.0881 (0.0934)	-0.0835 (0.0944)	-0.155 (0.140)
HH w/absence in 2009 * younger sibling * India	0.0941 (0.270)	0.0512 (0.273)	0.484 (0.361)	-0.0650 (0.218)	-0.111 (0.235)	0.378 (0.353)			
HH w/absence in 2009 * younger sibling * Peru	-0.165 (0.279)	-0.161 (0.286)	-0.179 (0.330)	-0.106 (0.267)	-0.101 (0.285)	-0.118 (0.344)	-0.0348 (0.123)	-0.0604 (0.123)	0.226 (0.208)
HH w/absence in 2009 * younger sibling * Vietnam	-0.434 (0.272)	-0.435 (0.271)	-0.493 (0.387)	0.246 (0.317)	0.248 (0.326)	0.137 (0.394)	0.0597 (0.185)	0.0387 (0.185)	0.355 (0.250)
Observations Control	1972	1784	187	1952	1765	186	1131	1017	113
Mean Control	-1.34	-1.33	-1.42	-1.64	-1.63	-1.74	-.88	-.88	-.95
Observations Treatment	173	173	173	170	170	170	88	88	88
Mean Treatment	-1.31	-1.31	-1.31	-1.59	-1.59	-1.59	-.94	-.94	-.94
P-value Sibling	.013	.032	.001	.005	.109	0	0	0	.002
P-value Household type * Sibling	.188	.223	.116	.690	.609	.649	.862	.805	.315
<b>8 years old</b>									
Younger sibling (Ethiopia)	0.457 (0.345)	0.382 (0.359)	1.291*** (0.261)	0.841** (0.347)	0.829** (0.325)	1.123** (0.562)	-2.370*** (0.507)	-2.497*** (0.545)	-1.272*** (0.357)
Younger sibling * India	-0.0823 (0.434)	-0.0655 (0.448)	-1.000 (1.164)	0.0195 (0.440)	-0.146 (0.403)	1.071 (1.527)			
Younger sibling * Peru	0.283 (0.584)	-0.146 (0.526)	0.317 (0.487)	-0.654 (0.447)	-0.907** (0.348)	-0.448 (0.665)	2.742*** (0.538)	2.977*** (0.586)	1.643*** (0.366)
Younger sibling * Vietnam	0.943* (0.562)	1.058* (0.599)	-0.342 (0.540)	0.310 (0.505)	0.199 (0.516)	1.580** (0.622)	0.211 (0.667)	0.381 (0.691)	-1.051 (0.925)
HH w/absence in 2009 * younger sibling (Ethiopia)	0.0926 (0.152)	0.0911 (0.158)	0.0906 (0.160)	0.0484 (0.187)	0.0351 (0.185)	0.162 (0.241)	0.0305 (0.227)	0.0634 (0.222)	-0.208 (0.313)
HH w/absence in 2009 * younger sibling * India	-0.0445 (0.218)	-0.0415 (0.218)	-0.0563 (0.360)	-0.0216 (0.211)	-0.0133 (0.209)	-0.116 (0.369)			
HH w/absence in 2009 * younger sibling * Peru	-0.0332 (0.227)	-0.0351 (0.232)	0.105 (0.278)	-0.0133 (0.266)	-0.0119 (0.257)	-0.0158 (0.371)	-0.0947 (0.240)	-0.122 (0.238)	0.0797 (0.327)
HH w/absence in 2009 * younger sibling * Vietnam	-0.281 (0.212)	-0.295 (0.218)	-0.0739 (0.282)	0.0748 (0.249)	0.102 (0.244)	-0.242 (0.342)	-0.190 (0.285)	-0.204 (0.279)	-0.128 (0.408)
Observations Control	1,556	1,414	141	1,957	1,769	187	1,243	1,119	123
Mean Control	-1.46	-1.45	-1.48	-1.38	-1.37	-1.44	.8	.83	.49
Observations Treatment	144	144	144	175	175	175	104	104	104
Mean Treatment	-1.36	-1.36	-1.36	-1.42	-1.42	-1.42	.54	.54	.54
P-value Sibling	.243	.192	.599	.156	.001	0	0	0	0
P-value Household type * Sibling	.531	.501	.951	.967	.938	.894	.792	.764	.76

	Weight-for-age			Height-for-age			PPVT Z-score		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	All	No future absence	Future absence	All	No future absence	Future absence	All	No future absence	Future absence
<b>12 years old</b>									
Younger sibling (Ethiopia)				-0.791 (0.838)	-0.841 (0.832)	0.891*** (0.330)	0.435*** (0.0596)	0.428*** (0.0595)	0.239 (0.252)
Younger sibling * India				1.189 (0.849)	1.292 (0.861)	-1.271 (1.160)			
Younger sibling * Peru				1.747* (1.022)	1.197 (0.903)	1.375** (0.533)	-1.613*** (0.132)	-1.484*** (0.116)	-1.220*** (0.353)
Younger sibling * Vietnam				0.508 (1.091)	0.273 (1.041)	1.980*** (0.545)	-0.604*** (0.123)	-0.632*** (0.122)	
HH w/absence in 2009 * younger sibling (Ethiopia)				0.0376 (0.151)	0.0580 (0.156)	-0.122 (0.159)	0.0923 (0.0796)	0.0911 (0.0783)	0.0865 (0.0896)
HH w/absence in 2009 * younger sibling * India				0.0135 (0.211)	-0.0189 (0.214)	0.305 (0.335)			
HH w/absence in 2009 * younger sibling * Peru				0.0711 (0.259)	0.0485 (0.261)	0.240 (0.344)	-0.126 (0.126)	-0.122 (0.131)	-0.170 (0.152)
HH w/absence in 2009 * younger sibling * Vietnam				0.457 (0.295)	0.455 (0.300)	0.419 (0.331)	-0.0887 (0.138)	-0.0879 (0.136)	-0.0651 (0.182)
Observations Control				1,941	1,760	181	1,307	1,177	129
Mean Control				-1.44	-1.43	-1.55	.27	.27	.22
Observations Treatment				176	176	176	108	108	108
Mean Treatment				-1.48	-1.48	-1.48	.44	.44	.44
P-value Sibling				.287	.241	.001	0	0	.001
P-value Household type * Sibling				.445	.425	.554	.585	.612	.541

**Notes:** Standard errors in parentheses, clustered at the sentinel site level. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ . The table reports the main results varying the definition of the control households. Columns 1, 4 and 7 keeps the original definition, fathers are present in 2002, 2006 and 2009 with no restriction afterward. Column 2, 5 and 8 impose that the father has also to be present in 2013 and 2016 for the control households. Column 3, 6 and 9 impose that the father can be absent either in 2013 or 2016. No extra restrictions are imposed to the treated households given the small sample size. Outcomes are measured when 5 (upper panel), 8 (middle panel) and 12 (bottom panel) years old. Variable *younger sibling* is equal to 1 if the individual is the younger sibling and 0 if the individual is the relatively older child. Variable *hh with absence in 2009* is equal to 1 if the pair of siblings under comparison belong to a household which experienced the absence in 2009 but not in 2002 nor 2006, and 0 depending on the definition for the control group. Dependent variables in column 1 and 2 are weight-for-age z-score and height-for-age z-score. Both anthropometric z-scores are based on the 2006 WHO child growth standards for children below 5 and 2007 WHO child growth standards for children aged 5-19 years (except for weight-for-age for children older than 10). Dependent variable in column 3 corresponds to the standardized score of the Peabody Picture Vocabulary Test (PPVT) at the country level. For this outcome, India is excluded due to lack of data for younger siblings. All regressions are controlled for age, gender and birth order. Interactions between each control and each country are included, being Ethiopia the country of reference.