Hertie School

Beyond Traditional Families: Lone Motherhood, Cohabitation and Child Development in Chilean Society

Addressing child development differences and their causes among different family structures with evidence from the Early Childhood Longitudinal Survey.

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Executive Summary

This research explores the relationship between family structures and child development within Chile, focusing particularly on lone motherhood and cohabitation. The study is driven by the need to understand how shifts in traditional family configurations influence early cognitive and psychomotor development among children. Incorporating theoretical insights from the Second Demographic Transition contrasted with the Patterns of Disadvantage, the study suggests that societal changes in family patterns, alongside economic conditions, contribute to the evolving dynamics of children's family life. Additionally, it examines the socioeconomic implications of non-marital childbearing, noting the challenges posed by cohabiting and lone parenthood in the realms of child welfare and development.

The methodological approach utilizes data from the Early Childhood Longitudinal Survey (ELPI), employing both the Battelle Development Inventory (BDI) to assess psychomotor development and the Peabody Picture Vocabulary Test (PPVT) to assess cognitive and language skills. Furthermore, for a comprehensive correlation analysis, it applies pooled cross-sectional and longitudinal data with linear regressions and fixed effects models.

The results reveal that children from lone mothers and cohabiting parent households generally exhibit lower scores in developmental assessments compared to their counterparts from two-parent married households but without a significant correlation when considering changes over time. The research also highlights that the negative impacts of such family structures on child development are mediated by factors such as family income and the quality of parental interaction.

The paper concludes with a discussion of the implications of the findings for practitioners and researchers working in the field of child development and family welfare. It also acknowledges the limitations of the study, such as sample size constraints and potential confounding variables, and calls for further research to deepen our understanding of the complex interplay between family structure and child well-being.

Overall, the paper provides valuable insights into the nuanced relationship between lone motherhood, cohabitation, and child development in Chilean society. By shedding light on the factors that shape children's early experiences and outcomes, the study contributes to ongoing efforts to promote positive developmental trajectories for all children, regardless of their family circumstances.

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List of Abbreviations

BDI	Battelle Development Inventory
CASEN	Encuesta De Caracterización Socioeconómica Nacional (National Socio-economic Characterisation Survey)
CHCC	Chile Crece Contigo (Chile Grows With You)
ELPI	Encuesta Longitudinal De Primera Infancia (Early Childhood Longitudinal Survey)
FE	Fixed Effects
OVB	Omitted Variable Bias
OLS	Ordinary Least Square
POD	Pattern of Disadvantage
PPVT	Peabody Picture Vocabulary Test
SD	Standard Deviation
SDT	Second Demographic Transition
SES	Socioeconomic Status

1 Introduction

1.1 Motivation

The brain's evolving development is influenced by cumulative experiences from prenatal stages and extending throughout. Hence, the role that parenting and caregiving play in the brain's early stimulation and overall development of a child is crucial (Shonkoff & Phillips, 2000). Furthermore, there is less evidence of malleability and substitutability for cognitive skills in later stages than in the early stages of a child's life cycle, while malleability for noncognitive skills is about the same at both stages (Cunha et al., 2010). From a sociopolitical perspective, investing in early childhood enhances future skill sets and provides underprivileged children with a socially just and economically viable way to benefit from future investments. This suggests that enriching early contexts can support children from disadvantaged backgrounds in their cognitive development as well as their overall health and well-being when combined with later enriched surroundings (Heckman & Corbin, 2016). Consequently, the home environment where the child grows is a determinant of his or her appropriate stimulation and subsequent cognitive development. A relevant component of this environment is the family structure and living arrangements of the parents. In this respect, the Second Demographic Transition describes the new diversity of family structures, including a decline in marriage, an increase in separation, and the proportion of lone mothers (Lesthaeghe, 2010). Accordingly, in Chile, which is the country of interest for this paper, cohabiting parents, lone-mother[1] families, and households led by females have increased in the last decade (Observatorio Social, 2020). These changes are relevant to address firstly because lone parenthood is associated with reduced economic well-being for children and families (Thomas & Sawhill, 2005), and secondly because parents' time with their children is important for supporting stimulation leading to their children's cognitive development (Del Boca et al., 2014; McLanahan, 2004). Evidence on the topic finds differences in child behaviour and consequential academic achievement among family arrangements (Patterson et al., 2024; Shaw et al., 1999) Additionally, parent interactions and time investment with the child prove to be strongly related to the impact of lower socioeconomic status (SES) on early language skills (Rodríguez Sánchez, 2023). Moreover, the marital status of parents is revealed to be a predictor of a child's intellectual quotient (IQ) when interacting with maternal IQ (Bacharach & Baumeister, 1998). From the perspective of how children's well-being cope with changes in family structure, previous literature shows that the departure of the biological father

[1] I use the term "lone mother" to refer to a woman living with her child under 18 years old and without the child's father because she is single, separated, or divorced, and has no cohabiting partner, regardless of other members in the household. Meanwhile, I use "single mother" to refer to mothers cohabiting (non-married).

from the household has a negative impact, which is greater than the differences when the father was never present and these effects are greater on kids' socioemotional growth than on their academic performance (Lee & McLanahan, 2015; Mariani et al., 2017). However, a study of this kind of transition in Chile does not observe such negative effects from the father's leaving the household (Reynolds et al., 2018). Finally, regarding cohabitation, unmarried-parent families tend to be less stable, often blending children from different partnerships and offering lower-quality parenting including less language stimulation (McLanahan, 2004).

Explanations for these drawbacks in child well-being among diverse family types are that cohabiting and lone parents experience multiple disadvantages (Nieuwenhuis & Maldonado, 2018). First, cohabiting single mothers and lone mothers tend to come from lower SES families being often younger and less educated than married mothers (Garfinkel & McLanahan, 1988; McLanahan, 2004). Besides, lone mothers face resource deprivation in the household due to lower income levels, limited job opportunities, or lack of support systems (Treanor, 2018). Evidence from Latin America shows that in many countries lone-parent (mainly mothers) families have higher poverty rates than two-parent households (Cuesta et al., 2018; Salinas, 2011). But this rate reduces when the mother receives child monetary support from the non-resident father (Cuesta & Meyer, 2014). Furthermore, while married fathers have been spending more time with their children over the years, non-resident fathers lack bonding with them leading to reduced social capital (McLanahan, 2004). In this sense, less engagement time spent by the leaving or non-resident parent explains some of the differences in well-being and cognitive achievement (Hofferth, 2006; Lee & McLanahan, 2015).

Given this, it is clear that early experiences shape cognitive and noncognitive development, with long-term implications. Accordingly, diverse family structures with their different SES and childcare arrangements are significantly correlated with children's outcomes. Consequently, cohabiting single mothers and lone mothers face greater challenges, affecting children's well-being and development.

1.2 Research Question

Considering the effect that the SDT has had on the composition of households, leading to an increase in cohabiting, lone-mother, and female-headed families, and its possible effect on children's development (Lesthaeghe, 2010; McLanahan, 2004), it is interesting to note that the literature has analysed the impact of the absence of the biological father on the well-being, behaviour, development and academic achievement of his children. The evidence is consistent in presenting detrimental relations between the absence of a father figure in the home with

development outcomes for children. However, it appears that in Chile, these consequences are not observed (Reynolds et al., 2018).

In this sense, there is no comprehensive analysis over time to identify the effect of household composition on child development for the Chilean population, specifically according to the parents' family arrangement. Therefore, taking advantage of longitudinal data on the Chilean child population collected on three occasions since 2010, I conduct pooled linear regression and longitudinal analyses identifying whether lone and single cohabiting motherhood has a detrimental relation to the psychomotor and language skills of children, that is, I check development differences among children who live with both married parents, with both parents but cohabiting and who live just with the mother (regardless other family members).

When addressing the effect of lone motherhood, the idea that lone mothers per se do not achieve proper development in their children may seem a stigmatization of their role. Nevertheless, as mentioned, they face challenges that could be acting as the mechanisms affecting children's outcomes. Therefore, I measure the mediator effect of income level and the number of interactions of the father in the child's development. This aims to provide policymakers with valuable insights and recommendations to ensure children have the support needed for their best development regardless of their family type.

The study is structured in two main sections. The first section provides, in Chapter 2, the theory that frames the changes in family structures and their consequences on children's outcomes, followed by a description of the Chilean welfare context, narrowing to lone-mother support by the state. Chapter 3 gives the context of Chile regarding household composition changes and lone mothers' challenges, followed by Chapter 4 with the literature review that shows prior findings on the relationship between family types and child development. Finally, in Chapter 5, the main insights are summarized and the hypotheses are presented. The second section displays the empirical analysis, providing Chapter 6 which describes the data and methodology of the investigation and Chapter 7 which presents the descriptive and analytical results of the research. The last chapter discusses conclusions and policy implications.

2 Theoretical Framework

2.1 Second Demographic Transition

The Second Demographic Transition (SDT) is a key theory in demography explaining recent changes in family structures and fertility, particularly prevalent in Western societies originally coined by Ron Lesthaeghe and Dirk van de Kaa (1986). It posits that cultural shifts, such as liberal and feminist values, influenced by advanced capitalism and consolidated democracies, led to variations in decision-making about family life (Lesthaeghe & Surkyn, 2007). Lesthaeghe (2010) mentions that the demographic implications of the SDT result in (1) a greater ageing of the population due to sub-replacement level fertility and thus more pressure on the welfare state, (2) more reliance on immigration, therefore, expansion of multiculturalism and ethnicity in societies, (3) less emphasis on social cohesion, and, more relevant to this paper, (4) a higher incidence of family instability and concomitant social problems (e.g. poverty among the unmarried), (3) less stress on social cohesion, and, of greater relevance to this research, (4) a higher incidence of family instability and concurrent social problems like poverty and exclusion, especially among lone-mother households (Lesthaeghe, 2010).

Although the SDT was initially observed in Northern Europe, its characteristics are now visible globally in countries wealthy enough to cover essential needs (Maslowian drift), including in non-Western societies experiencing economic development and thus shifts in societal norms (Lesthaeghe, 2010). In Latin America, distinct trends in cohabitation and lone motherhood deviate from those in Europe, influenced by unique historical contexts. Here, the increase in cohabitation (single mothers) as well as lone motherhood contribute to income inequalities. Moreover, these types of families tend to co-reside in intergenerational households, emphasising the importance of familial support (Esteve et al., 2012). These differences underscore the importance of considering regional specificities when analysing family structures and household arrangements.

In contrast to the explanation of changes in societal norms given by the SDT, the Pattern of Disadvantage (POD) approach links partnership and fertility patterns to socioeconomic stratification, highlighting a negative association between non-marital childbearing (from lone mothers or cohabiting couples) and education. Low education levels correlate with a higher likelihood of single cohabiting or lone motherhood due to factors like limited earning power and support networks. Consequently, these family types can lead to an array of challenges, including financial hardships, emotional stress, and instability in relationships (Perelli-Harris & Gerber,

2011). In this sense, it is possible to question whereas in Latin America, as the POD emphasises, economic difficulties act as a barrier to marriage rather than a shift in attitudes against it.

Indeed, lone and single motherhood in Latin America varies by education level, where lower-educated women face a higher likelihood of non-marital childbearing with limited earning power and support networks. This situation is associated with conflicts between work and childcare, contributing to poverty and income inequality. Nevertheless, as mentioned, these kinds of mothers often reside in extended households, indicating greater social capital. Therefore, despite challenges, Latin American families show resilience, largely due to extended family systems (Esteve et al., 2012).

Regarding the impact of the SDT on lone mothers' offspring, McLanahan (2004) discusses its repercussions, highlighting its influence on children's resource allocation and development. Variations in maternal age and employment status between socioeconomic groups have widened, affecting parenting quality and financial resources available to children. Older, more educated mothers generally offer better parenting, positively impacting children's cognitive and social development. However, disparities in these factors have grown between different socioeconomic groups, potentially affecting children unevenly. While maternal employment boosts financial resources for children, it may also reduce time spent with them, impacting their development. Single motherhood, especially among less-educated women, has increased, leading to potential losses in children's resources as they have lesser financial and emotional support from biological fathers, family instability, and lower educational attainment. These trends have exacerbated inequalities, with children from different socioeconomic backgrounds experiencing varying levels of resources and developmental outcomes. In essence, the SDT has reshaped family structures and resource allocation, affecting children's well-being and future opportunities disparately across socioeconomic groups.

2.2 Welfare state context and motherhood

The welfare state in Chile emerged in the early 20th century as a response to societal pressures, particularly from organized civil society groups like workers demanding labour rights and improved living conditions. This shift marked the end of the laissez-faire policy of the preceding era. However, the welfare state's development in Chile differed from other nations due to its unique political landscape. During the expansion of welfare initiatives in the 1960s-1973, the socialist administration faced societal divisions polarization and challenges in garnering support beyond its political faction, leading to difficulties in implementing its policies (Castiglioni, 2000). The military dictatorship from 1973 to 1989 brought about significant

transformations in social policy, focusing on poverty reduction and incorporating market mechanisms. This latter welfare state was not defined at the time, however soon Esping-Andersen (1990) coined a welfare state approach which includes it.

Esping-Andersen's typology of welfare states analyzes how social risks are managed and by whom. Thus, the *social democratic model* promotes the state's pre-eminence in providing universal and egalitarian social services. For its part, the *conservative model* is characterized by the segmented intervention of the State in the defence and maintenance of the family as a provider of public goods and services. Finally, the *liberal model* privileges the market as a provider of well-being, promoting private social protection and giving state intervention a subsidiary role that serves solely or mainly those who do not have the economic means to meet certain basic needs. Esping-Andersen identifies Chile in the latter category, with state intervention primarily addressing "market failures" (Pérez Ciudad, 2021). Regarding motherhood support, relevant to this paper, he highlights the importance of granting family benefits in the mother's name to ensure their effective use and providing childcare services for single mothers to promote female labour participation as key strategies (Escobar, 2021) to combat poverty. This relates to the evidence that lone-mother households face persistent poverty due to women's lower earnings, insufficient welfare benefits, and low rates of child support payments by the fathers. While welfare programs do not cause single parenthood, they contribute to its continuation. In fact, enforcing child support laws could potentially reduce poverty by 24% and Aid to Families with Dependent Children caseloads by 25% (Garfinkel & McLanahan, 1988). Therefore, strengthening child support enforcement and implementing child allowances are proposed solutions to alleviate poverty and against children in lone-parent homes.

In Chile, the social co-responsibility of childcare is structured across various governmental ministries to ensure comprehensive support for families, particularly those in vulnerable situations rather than single mothers. The Ministry of Social Development and Family (MDSF) coordinates the Intersectoral Subsystem of Social Protection. This includes the Chile Security and Opportunities Subsystem, within which children with incarcerated caregivers are supported, the National Support and Care Subsystem support caregivers of dependent children among other aids, and more importantly the Chile Crece Contigo Child Protection Subsystem (CHCC), offering a support network to caregivers from prenatal stages to age 9 in the areas of care, health, education, family conditions, among others. CHCC establishes guarantees of access to technical aids, daycare centres, kindergartens and preferential access to the network of State social services and benefits. In addition, CHCC incorporates within its objectives a

policy to promote parental co-responsibility, highlighting the importance of parental participation in the child development results of their children (ONU Mujeres, 2023).

Additionally, the Ministry of Education (Mineduc) oversees nursery education establishments and schools providing such education and the Ministry of Labor and Social Welfare (Mintrab) offers maternal-paternal subsidies, including prenatal and postnatal benefits and parental leave extensions, promoting gender-balanced caregiving and maternal allowance for a child's serious illness allows justified absences from work. Moreover, Article 203 of the Labor Code mandates companies with twenty or more workers to provide nurseries for children under two years old. The Ministry of Women and Gender Equality implements the 4 to 7 Program, supporting women's labour participation by offering care services for children aged 6 to 13 during afternoon hours (ONU Mujeres, 2023) and the Women Heads of Household program provides a set of tools that allow them to generate and manage their own income, access to public employment offers and opportunities to reconcile paid, domestic and care work (Servicio Nacional de la Mujer y la Equidad de, n.d.). While the policy assists all mothers, those raising children alone are particularly advantaged as they benefit more from requiring more childcare support.

In terms of social protection focused on single or lone mothers, we find the Housing Solidarity Fund (FSV). Historically, housing subsidies were awarded based on a needs-based assessment that favoured families headed by married men over lone mothers. However, post-1990, an inclusive shift occurred prioritizing the policy to mothers who are not married, trying to target women who are raising a child alone. In other words, the FSV intends to make lone women the largest beneficiaries of housing subsidies empowering them economically and providing residential autonomy, highlighting a positive change towards supporting vulnerable women and families. Nevertheless, many low-income mothers, who are not married but do have a male partner, for example, through cohabitation, report themselves as lone mothers and it is claimed that the policy could be an incentive to delay marriage (Gideon et al., 2022; Ramm, 2016).

Reviewing Chilean social policies toward motherhood in general, Gideon et al. (2022) express that they reveal contradictions across sectors. Housing policies recognize lone mothers' vulnerability belatedly, coinciding with technocratic interests. Labour policies assume empowering low-income mothers by encouraging their paid employment, yet normative motherhood ideals encourage women's paid labour alongside traditional unpaid work, increasing their obligations. Studies reveal this burden's mental health toll, making women more susceptible to issues compared to men, enduring stress from combining paid and unpaid care work throughout life. Finally, while public health policies progress in women’s protection but face deficits in quality services, private health provision opposes women's reproductive rights

but charges higher premiums to women at risk of becoming mothers. These contradictions underscore the tension between acknowledging motherhood and challenging gender responsibilities.

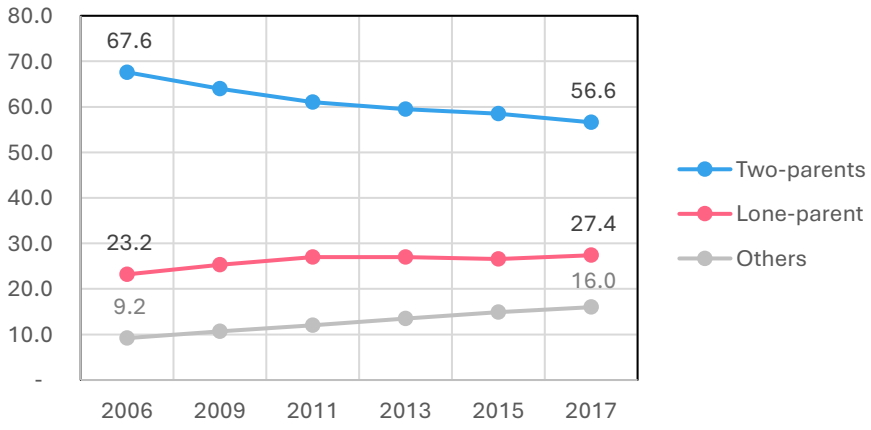
To summarise, Chile's welfare state has evolved uniquely marked by shifts in policies and ideologies resulting in a liberal model which in the last decade has made efforts to increase social protection, however, contradictions persist in social policies toward motherhood. These tensions underscore the complexity of Chilean social policy and the need for comprehensive support for vulnerable families, especially single mothers.

3 Demographic and Institutional Context

3.1 Family Forms in Chile

As in most Latin American countries, following the Second Demographic Transition, the socio-demographic landscape of Chile has witnessed profound changes in household composition and family arrangements over recent decades. These changes reflect shifting societal norms and economic realities shaping the lives of Chilean families.

Figure 1: Evolution of the percentage of household types out of total households in each year



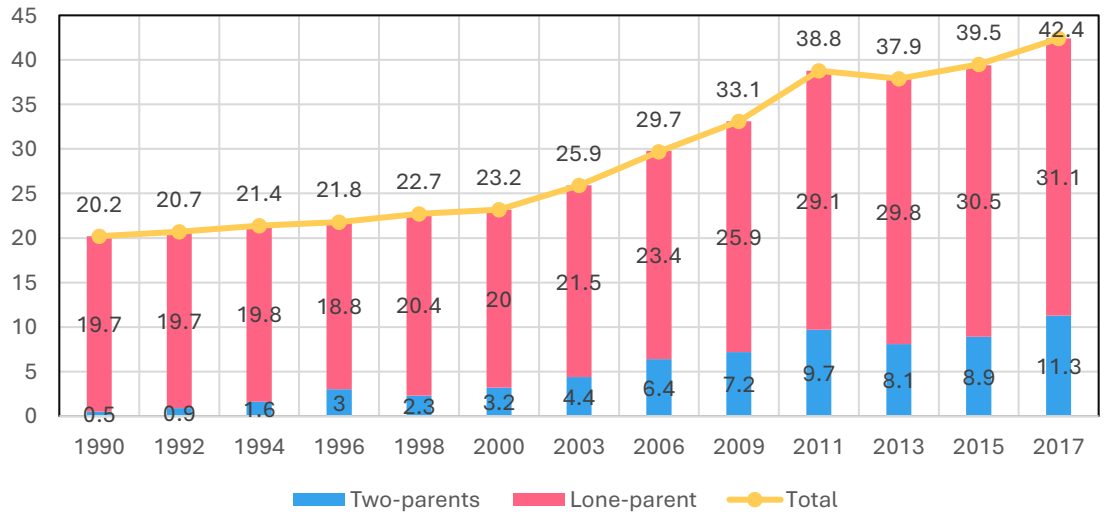
Note: “Others” include unipersonal households and households without a nucleus.
Source: Ministry of Social Development and Family, Casen Survey 2006-2017.

The crude marriage rate, which relates the number of marriages to the size of the population, has been declining significantly since 1988, being 8.1 per 1000 inhabitants at that time, dropping to 3.5 and 3.2 in 2010 and 2019 respectively (INE, 2019; OECD, n.d.-b). For its part, cohabitation among women rose from 10.4% to 28.0% between 1990 and 2011. This trend is accompanied by a substantial increase in out-of-wedlock births, which nearly doubled from 34.3% to 67.7% during the same period (Palma & Scott, 2020). Moreover, data from the Socioeconomic

Characterization Survey (CASEN), in Chile, presented in Figure 1, shows that in the last decade, lone-parent households have increased by 3 percentage points, reaching 27.4% of all households in the country in 2017 For their part, two-parent households have registered a decrease from 67.6% to 56.6% (Observatorio Social, 2020).

On the other hand, as seen in Figure 2, female heads of household, which in 1990 represented 20.2% of the country's households, have more than doubled by 2017, representing 42.4% of all households. Of these, 31.1% are lone mothers, indicating a notable shift in family structures (Observatorio Social, 2020).

Figure 2: Percentage of female-headed households out of total households in each year



Source: Ministry of Social Development and Family, Casen Survey 2006-2017.

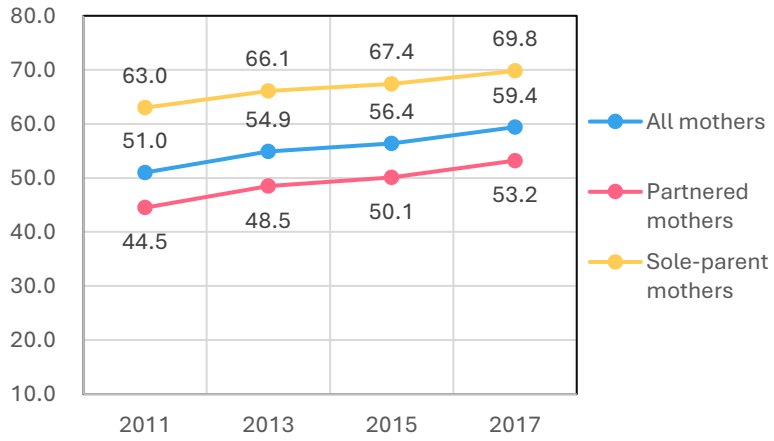
It is also important to consider that the SDT (declining marriage rates and rising rates of cohabitation and lone motherhood) and the increase in female employment, increased young mothers' need for extended family support (Palma & Scott, 2020), therefore, as in other Latin American countries, the percentage of intergenerational households has risen in Chile (Reynolds et al., 2018). Hence, the CASEN reveals that 15.4% of households live more of a family nucleus, that is, more than one family lives (co-residence). The most commonly given reason is that income does not allow one to maintain independent housing (Observatorio Social, 2018).

Taking the above into consideration, it is not an overstatement to say that indeed Chile's socio-demographic scene has shifted significantly with declining marriage rates, rising cohabitation, and an increase in single-parent households, reflecting evolving societal norms and economic factors over recent decades.

3.2 Economic and Caregiving Factors Affecting Lone Mothers

Economic factors considerably influence the circumstances of single and lone mothers in Chilean society. Regarding employment in Chile, despite unemployment rates for women decreasing from 10.9% in 2009 to 7.2% in 2017, and there has been an increase in female labour force participation over the years, levels remain relatively low compared to other Latin American countries since still, less than 50% of women participate in the labour force, whereas men show rates of over 71% (ECLAC & ILO, 2019). This gender gap remains pronounced, contributing to economic vulnerability among women, especially in the event of union instability affecting consequently children. Hence, in 2010, 56.8% of children aged between 0 and 14 lived in a household where all adults were working and 13.9% where none of them were. On the contrary, the proportion of children living in sole-parent households where the parent is in full-time employment was 23.3% and where the parent is not in employment was 49.2% (OECD, n.d.-b). Nevertheless, regarding maternal employment, since lone mothers are more obliged to provide at home, they present consistently a higher employment rate than partnered mothers as seen in Figure 3.

Figure 3: Employment rates (%) for mothers (15-64 year olds) with at least one child under 15



Note: Statistics presented by OECD as sole-parent mothers refer to lone mothers.
Source: OECD.Stat. Family Database

Related to the household changes, as it was mentioned, the number of households headed by women has been rising, and a significant portion of these homes are lone-mother households. These households exhibit the highest levels of income poverty and may be subject to increased work pressure to both generate income and manage the housework (Observatorio Social, 2020).

Moreover, challenges such as alimony debt further exacerbate the economic vulnerability of lone mothers. Hence, after three months of starting its operation, Chile's National Registry of

Alimony Debtors reached 30,357 registered people, of which 97.08% are men. In total, as of September of 2023, those registered had a debt of more than 98 billion Chilean pesos (around (MinMujeryEG, 2023), highlighting the financial challenges faced by lone mothers in obtaining support from absent partners.

Lone mothers also face disadvantages concerning the burden of caregiving. Despite legal reforms aimed at promoting gender equality within families, disparities persist in the division of unpaid domestic and care work. Women in general disproportionately shoulder the burden of unpaid work, dedicating significantly more time than men to domestic tasks and caregiving responsibilities. Hence, of the total number of inactive women, more than one-third indicate that the reason for their inactivity was permanent family reasons (caring for children and/or other dependants) (INE, 2016). Actually, according to the latest National Time Use Survey (ENUT) 2015, women dedicate on average three more hours a day than men to unpaid work (INE, 2016), still in 2023, while men spend 2.4 hours per day in unpaid care and domestic work, women spend 5.3 on average (OECD, n.d.). These observations are related to findings from the Early Childhood Longitudinal Survey (2017). In households with children, over 80% of mothers perform different care activities except changing diapers, bathing the child, or taking the child to preschool. While no activity is performed by more than 70% of fathers except for sharing a meal. Concerning the care provided by preschool education, 52% of the potential population is enrolled (Guzmán, 2023), and of the families with children enrolled more than 40% are female-headed (Fundación INTEGRA, 2022; JUNJI, 2019).

In summary, economic challenges impact lone mothers in Chile, with low female labour force participation and access to support networks, and high levels of income poverty. Alimony debt exacerbates their financial vulnerability, highlighting the need for greater support. Additionally, lone mothers disproportionately bear the burden of unpaid domestic and caregiving work, perpetuating gender disparities.

4 Prior findings

The structure of a family, whether it comprises lone mothers or both original parents, significantly impacts child development and well-being. Research consistently indicates that children raised by both parents tend to have advantages compared to those from divorced or lone-parent families across various domains, such as academic performance, behaviour, temperament, and social adjustment highlighting the crucial role of family structure in shaping child outcomes (McLanahan, 2004; Patterson et al., 2024; Shaw et al., 1999). Specifically, economic resources, parental behaviours, and the presence of non-resident fathers play key

roles in shaping child well-being (Thomson et al., 1994). The presence of both parents offers economic stability and emotional support, contributing to overall positive child development. Conversely, children from lone-mother households or those experiencing father absence, especially during early childhood, may face challenges in social-emotional development, particularly with increased externalizing behaviour However, the evidence of father absence on children's cognitive ability is weaker (Thomson et al., 1994). When considering childcare attendance, children who attend nurseries and whose lone mothers work full time present lower psychomotor development than the ones whose mothers have a complete working day but come from two-parent households (Santelices Alvarez et al., 2015). Therefore, the child's attendance at preschool education and the mother's employment status are aspects to reflect.

Regarding economic resources, it has been well-studied that income levels and poverty play a pivotal role in shaping a child's cognitive development (Thomson et al., 1994). Families with higher income often provide more enriching home-learning environments, that have been linked to positive child outcomes and enhanced cognitive abilities (Shonkoff & Phillips, 2000). In turn, while marriage raises long-term family income, children of lone mothers due to father absence or parental union dissolution, generally have less family income and are more likely to be poor. This economic disadvantage hinders children's well-being and opportunities (Page & Stevens, 2004; Thomas & Sawhill, 2005) and, therefore, there is a positive relation between children's well-being and fathers' payment of child support (Amato & Gilbreth, 1999). Particularly in Chile, Abufhele et al (2022) show that household wealth is positively correlated with children's development. Although the difference in cognitive and socioemotional skills between the most extreme quintiles of the distribution gets smaller as children grow it remains relevant. The permanent component of receptive language and socio-emotional abilities demonstrates that socioeconomic disparities are significant in determining language, but not socioemotional skills and that these disparities are greater for girls than for boys during the early infancy years (Abufhele et al., 2022).

To understand how parents' interactions and stimulation impact children's cognitive development, it is crucial to recognise the significance of the quantity of quality of interactions within the parent-child relationship that have been consistently linked to positive outcomes in children's cognitive development. Encouraging exploration, providing a rich verbal environment, and offering nurture and warmth are additional aspects of parenting that play a crucial role in providing children with the necessary support and frame for optimal cognitive development (Shonkoff & Phillips, 2000). Nevertheless, in general, parental behaviour for a smaller proportion of disadvantages associated with stepfamilies and mother-partner families compared to single-

mother families (Thomson et al., 2024). And, although fathers' engagement (through helping children with homework, listening to children's problems, providing emotional support, and setting limits) is significantly associated with child outcomes, they have a relatively small effect size (Amato & Gilbreth, 1999).

Regarding cohabiting mothers, Bacharach and Baumeister (1998) show a high association between the marital status of the parents and children's cognitive development. Interestingly, it is possible to observe that this effect is greater among offspring of average-IQ mothers than for children born to low-IQ mothers, and it is mediated by family income and home environment quality (Bacharach & Baumeister, 1998), stressing the education of the mother as a variable to consider and economic and caregiving factors as mechanisms for the differences in children's outcomes. For its part, cohabiting couples are typically younger and economically disadvantaged, raising children with lower academic ratings and more behavioural problems, resembling outcomes seen in disrupted families (Thomson et al., 1994). Recent evidence indicates that cohabiting biological parents share similarities with cohabiting stepfamilies rather than married parents, characterized by economic challenges and lower-quality parenting. Despite higher separation rates, children of cohabiting parents appear to be less affected by parental separation compared to divorce, possibly due to lower economic and parenting standards within cohabiting households (Thomson & McLanahan, 2012). These findings underscore the complex interplay between marital status, economic resources, and parenting dynamics in shaping child development outcomes.

Finally, there are diverse conclusions of studies analysing the effects of family instability on child well-being depending on the type and number of transitions (Thomson & McLanahan, 2012). Hence, in Chile, evidence from Reynolds et al (2018) show there is no significant association between fathers separating from the household and child vocabulary, though father departure is associated with lower income per capita and no association between household transitions and child behaviour. Moreover, when fathers enter households there is a gain in income per capita but no association between the father's entrance and the child's vocabulary score. Nevertheless, when the mother leaves her parent's house, her children have on average worse age-normalized language skill test scores than children in households without such transitions but changes in income per capita do not explain these associations (Reynolds et al., 2018), highlighting the relevance of extended families, such as grandparents. Therefore, instability can impact economic resources and parenting experiences, and its precise influence on child well-being may vary depending on the type and frequency of transitions experienced within the family unit.

5 Summary and Hypotheses

This first section lays out the crucial role of early caregiving in shaping a child's cognitive and noncognitive development, emphasizing the significance of enriching early contexts for disadvantaged children. The increasing diversity of household compositions, particularly the rise in lone-mother families, has prompted examination into the effects of parental presence and household structure on child development, especially taking into account the lack of a second-parent income in the family and caregiving to the child. While the literature generally supports the detrimental relation of the absence of a father figure on children's outcomes, evidence from Chile is not conclusive on that. The research aims to fill this gap by investigating the relationship between family form, particularly lone motherhood versus partnered mothers but also married versus cohabiting mothers and children's psychomotor and vocabulary development in Chile. Additionally, when the father is not present in the household, it explores the mediating role of the family's income level and the father's interactions with the child on his or her development. Therefore, the research tests the following hypotheses:

Hypothesis 1. a: Children living in lone-mother households will exhibit lower psychomotor and language skills compared to those living with both parents.

Hypothesis 1. b: Family income level will mediate the relationship between lone motherhood and children's psychomotor and language skills, with higher income levels associated with better outcomes.

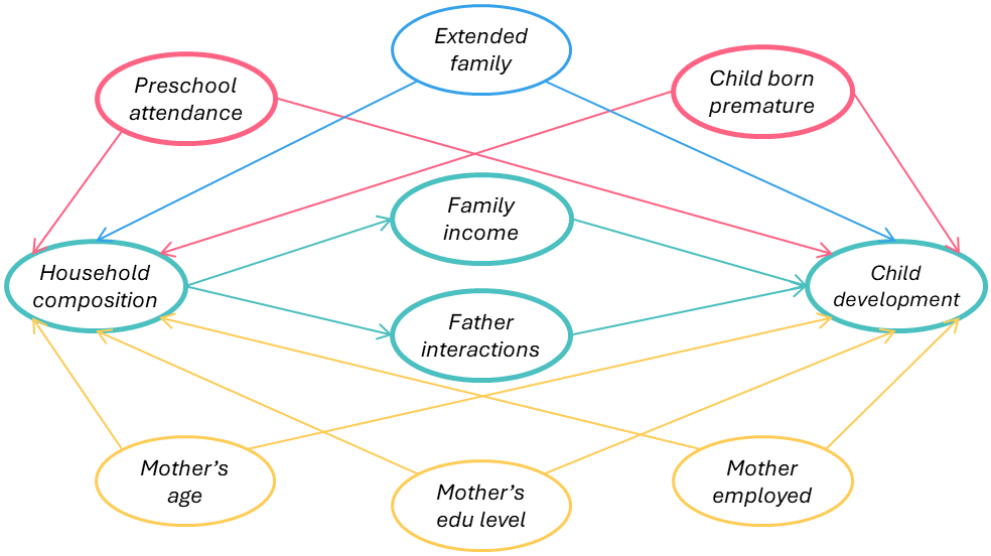
Hypothesis 1. c: The number of father-child stimulating interactions will mediate the relationship between lone motherhood and children's psychomotor and language skills, with a higher number of interactions associated with better outcomes.

Hypothesis 2: Children living in unmarried-cohabiting mother households will exhibit lower psychomotor and language skills compared to those in married mother households.

These hypotheses provide a framework for empirically testing the relationship between household composition, parental contact, socioeconomic factors, and child development outcomes, with a focus on the unique context of Chilean families. Figure 4 displays the directed acyclic graph (DAG) summarising the hypothesized relations derived from the theory, context and literature review[2]. Each variable exposed in the figure is described in the following section.

[2] The DAG representation omits other possible related variables to simplify visualization and does not intend to draw causal inferences from this paper.

Figure 4: DAG Representation of Variables Hypothesised Associations



Note: This diagram shows the relationship between household composition and child development mediated by family income and father-child quality interactions on the green lines. Children (rose lines), mother (yellow lines) and household factors (blue lines) represent potential confounders.

6 Data and Methods

6.1 Early Childhood Longitudinal Survey (ELPI)

The Early Childhood Longitudinal Survey (ELPI) is an ongoing research effort created to regularly track a sample of boys and girls from birth to determine their life trajectories and the pertinent variables that account for their development. ELPI was carried out in 2010, 2012, and 2017 and uses the same design process each year to provide representativeness at the national level and for age groups considered in the sample. Its fourth iteration will take place in 2024.

For the first round, in 2010, a sample of 30,000 children born between January 1, 2006, and August 31, 2009, was selected from the total birth records of the Civil Registry Service. This sample was oversized to achieve a target sample of 15,000 children and chosen to be representative of all children born between January 1, 2006, and August 31, 2009. A two-stage sampling strategy stratified by conglomerates was employed (clusters). The choice of children as second-stage variables and communes as first-stage units served as the foundation for the design. During the initial phase, communes with comparable socioeconomic status came together to form the strata. In the second phase, children living in the communes were selected at random methodically. Taking into account all 15 areas of the nation, the sample was distributed in a manner that was proportionate to the population of each stratum (Observatorio Social, n.d.).

The survey consists of a questionnaire administered to the primary caregiver of the selected child with questions on relevant topics such as the mother's pregnancy process, the child's immunization, and the father's participation in parenting, among others. Some modules of the questionnaire are directed to all members of the household to characterize the socio-familial environment in which the child is born and develops. On the other hand, children and main caregivers are evaluated in three areas: cognitive, socioemotional, and anthropometric development. For all of these areas, instruments were selected to meet the objective of evaluating each area according to the age of the selected child.

Regarding the latter, children's cognitive development tests are of interest to this study. Specifically, the Battelle Development Inventory (BDI) and the Peabody Picture Vocabulary Test in its Spanish-American adaptation (PPVT).

6.1.1 Battelle Development Inventory (BDI)

The assessment instrument in question evaluates various aspects of psychomotor development, encompassing Personal/Social, Adaptive, Motor, Communication, and Cognitive domains, each consisting of sub-areas. It employs a systematic approach to evaluate children's developmental progress, guided by specific criteria and methodologies (De la Cruz & González, 1998).

Starting the assessment process involves selecting the appropriate starting point, typically corresponding to the child's estimated developmental age. If no items are available at this starting point, evaluators proceed to the next age range. Items within each area are then scored according to predetermined criteria outlined in the manual authored by De la Cruz and González in 1998. Scores of 2, 1, or 0 are assigned based on the child's performance on each item.

Determining the threshold and ceiling for each sub-area is a crucial step in the assessment process. The threshold is identified as the lowest age level at which a child consistently scores 2 points across all items, while the ceiling is reached when two consecutive zero scores are obtained. This process entails advancing through items until the ceiling is established, signalling the point at which further progression within that level ceases. In cases where establishing the threshold proves challenging, evaluators may regress to the previous month's level to ascertain a clear threshold. Progression through the assessment continues once both the threshold and ceiling are determined for each sub-area.

The direct score, or raw score, for each sub-area, is computed by summing the scores of all items within the range from the threshold to the definitive ceiling. Additionally, maximum scores corresponding to items below the threshold are added to the raw score calculation. The total

raw scores for each area are then derived by summing the scores across all sub-areas. These raw scores are subsequently converted into T scores, a standardized scoring system, based on the child's age, that classifies results into “strong points”, “normal” and “weak points”.

6.1.2 Peabody Picture Vocabulary Test, Spanish American adaptation (PPVT)

The adaptation of the Peabody Picture Vocabulary Test assesses receptive vocabulary in Spanish. It serves educational, clinical, and research purposes. Initially, a practice session, spanning series A to E, ensures understanding. The child receives explanations for correct answers and repeats items until mastering three consecutive words unassisted. The evaluation follows the practice, starting from item one and progressing through subsequent sheets. Scoring entails assigning 1 for correct answers and 0 for incorrect ones. The assessment ceases if 6 errors occur within 8 consecutive items (Dunn et al., 1986).

Scoring involves subtracting errors from the top item within the subject's critical range. Items below the highest base are deemed correct, while those above the lowest ceiling are incorrect. Raw scores are converted to T scores using tables provided by Dunn, Padilla, Lugo, and Dunn (1986), indicating performance levels from "extremely low" to "extremely high."

6.2 Analytical sample

The following section presents descriptions of the ELPI sample in its three versions. The total sample constitutes unbalanced panel data since the second and third years of the survey have attrition from their previous years and include refreshment samples. That is, there are not the same number of observations in all three years.

Hence, in 2010, 15175 caregivers of the selected children were interviewed regarding the information about the child, their caregivers and household members. However, not all the children could be evaluated, therefore, the database containing children who are assessed for psychomotor, socio-emotional and anthropometric development in the first year originally includes 14161 children. In the second year, the ELPI evaluation data set contains 14438 children, where 11198 are followed from 2010 (20.9% of attrition) and 3240 are refreshment sample. The third year has 15827 observed children, where 9018 are follow-ups either from 2010 or 2012 (36.5% of attrition), and 4782 are fresh sample. Just 7671 children could be contacted on all 3 occasions. Therefore, the dataset including all children-year that will be used for the pooled OLS encompasses 44426 observations, where 23391 have the BDI test done and 33702 have the PPVT, and it considers 22183 unique children.

Regarding the family structure, for analysis purposes, it only considers children living with their biological mothers, excluding children with adoptive or stepmothers, biological mothers not living with them, or deceased biological mothers. It also considers only children whose biological parents, regardless of whether they live with them or not, are alive and are able to see them (that is, it excludes parents who are deprived of their liberty or who do not live in the same city or country as the child, among other cases). Additionally, households with other parental figures such as adoptive parents and step-parents are excluded.

Concerning development outcomes, children-year observations who were not measured with either the BDI or the PPVT instruments were deleted from the sample. In addition, only observations with valid information on the control variables are considered. Regarding mediators, atypical observations in family income, that is, with a total income lower than €10 and the highest 1%, were deleted from the sample. Children-years with missing values in terms of the quality interactions of the father were not deleted from the sample but were not considered in the estimation with this variable. The variable descriptions are explained in the following section.

Considering the selection of valid data for the variables and listwise deletion, the final dataset has 18828 unique children and 31711 children-year observations. From these, 17937 have the BDI test and 25417 the PPVT.

6.3 Variables

As mentioned, the dependent variable of interest of this study corresponds to the child's cognitive development which is characterized by the general psychomotor development, measured by the BDI instrument, and the language skills measured with the PPVT. According to the characteristics of both, explained in section 6.1, the analysis considers the score standardized to the child's age.

The explanatory variable is household composition. Using the information of each member of the household, it was possible to determine which relatives live with the child and create a factor variable that categorizes three family types: *two married parents* as the reference category, *two cohabiting parents*, and *lone mother*. As mentioned, households without the biological mother and other types of parental family structures were deleted from the sample.

Within the control variables, I take into account children's factors as if they attend a preschool institution (Santelices Alvarez et al., 2015) and if the child was born prematurely (Carter & Msall, 2017). Since the outcome variable is standardized to it, children's age is not considered as a covariate.

In addition, as mentioned, intergenerational households are prominent in Chile (Observatorio Social, 2018; Palma & Scott, 2020), and extended families are relevant for lone mothers' support and a determinant of the child's stimulation (Briones et al., 2021; Reynolds et al., 2018), therefore, I include a variable whether the mother and her child live in one family unit or live in an extended family (more than one family unit in the household).

Other confounders considered are the mother's factors such as her age, employment status as whether she is working or not (Santelices Alvarez et al., 2015), and educational level (Shonkoff & Phillips, 2000) divided into no education or low-level, school-level or higher-level (Statistics explained, n.d.).

Finally, I analysed the possible mediators. First, I consider the family's monthly income measured as the sum of all the reported incomes by family members and the individual income of the mother. This income is equivalised according to the modified OECD scale which assigns a value of 1 to the first family member, 0.5 to each additional adult, and 0.3 to each child below the age of 14. Then the family income was generated by dividing the family net income by the equivalence scale weight (OECD, 2009). Since the income reflects the family, the one from mothers living in extended families is measured within their own nucleus and not the total household. Therefore, the effect of extended family living represents caregiving but no economic support. The income is reported in Chilean pesos but the conversion to euros is presented for the sample statistics and hundreds of euros for the estimations.

Second, the questionnaire asks the main caregiver, in the case of this sample, the mother, about the activities made with the child in the last 7 days. Thus, the mother answers for herself and the father. For the mediator variable, I count the number of quality interactions by the father. This variable is measured as the sum of whether the father did four activities with the child: reading books or tales, telling stories, singing, and spending time talking or drawing, therefore, it goes from 0 to 4. These activities in particular were selected because they were common in the three surveys conducted. For the first round, the response is presented as a dummy variable if each activity was done by the mother, the father, another family member or no one and there was no missing information. The 2012 survey asked the mother about the frequency of the activity by the mother and the father including "Not applicable" as an option, with is it included 1763 missing values. Finally, the third round did not ask for the activity mother or father but for primary and/or secondary caregiver within the household, therefore, this variable is not available for 2017. As mentioned, the estimation that includes this variable does not take into account the children-year observations with missing values.

6.4 Research Strategy

The empirical analysis to understand the relation between household composition and child development consists of two estimation models for each outcome measured. First, I perform linear regression estimations by conducting a pooled ordinary least square (OLS) with the three different rounds of the survey (Eq. 1). With this method, each children-year is counted as one observation in the sample.

$$Y_{it} = \beta_0 + \beta_1 H_{it} + \beta_1 X_{it} + M_{it} + \epsilon_{it} \quad (1)$$

Where the dependent variable Y_{it} is the BDI or PPVT scores of the child *i* in the year *t*. The independent variables H_{it} are dummies for two-cohabiting parent and lone-mother households, two-married-parent households are omitted since are the reference for comparison. X_{it} is the vector of the covariates described in 6.3, M_{it} the mediators, and ϵ_{it} is the idiosyncratic error term. This analysis allows us to identify associations but, since family structures do not occur randomly, the paper does not claim a causal relationship with this analysis. Therefore, the assessment of mediators is relevant to identifying the causes of a potential correlation between household composition and child development measures.

Secondly, I address different longitudinal analyses with a fixed-effect (FE) model considering the three periods (Eq. 2) determining the relevance of disparities of family types in child development of a permanent skill component. This model subtracts the period mean for each individual, for each time-varying variable, therefore, it eliminates time-invariant errors.

$$Y_{it} = \beta_1 H_{it} + \beta_1 X_{it} + Y_t + \theta_i + \varepsilon_{it} \quad (2)$$

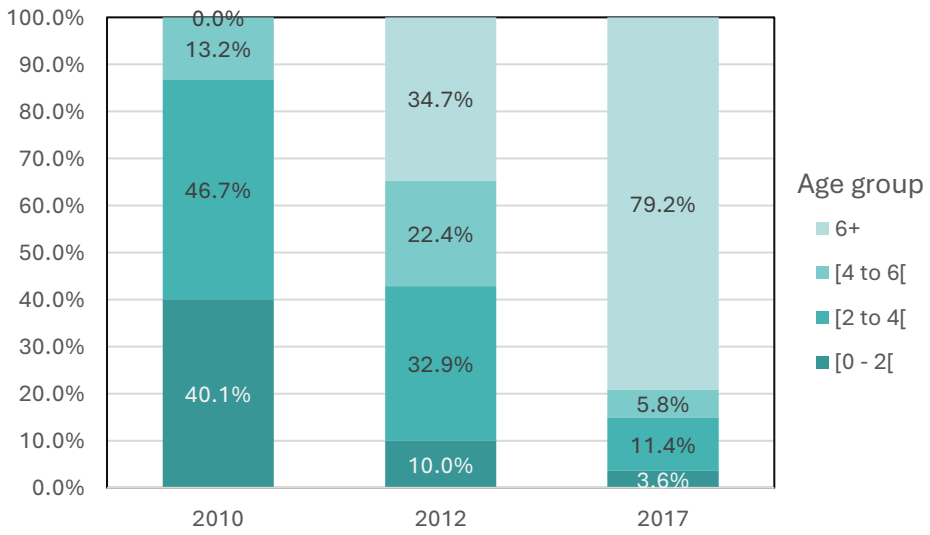
Here the outcome and explanatory variables are the same as in the pooled OLS estimation. Now, the time effects (the year of the survey) Y_t and individual effects θ_i are included. As the estimation observes changes within each child, taking into account their unique characteristics, the model controls for time-invariant factors, including unobserved or unmeasured factors, for instance, personality traits, which allows for the elimination of time-invariant error from the evaluation. Therefore, the vector of covariates X_{it} now includes only the variables that change over time since constant variables are already controlled for with FE. Finally, ε_{it} is the error, which should be smaller than the one on the pooled OLS due to the elimination of the time-invariant error.

7 Results

7.1 Descriptives

Below I present descriptive results for the three-year pooled sample. The distribution of the population of children evaluated by age group each year is shown in Figure 5, where is possible to see the ageing of the sample. Nevertheless, for the pooled sample the biggest proportion are children-year observations between 2 and 4 years of age.

Figure 5: Children's age group distribution per survey year



Source: ELPI Dataset (2010-2017)

Looking within each family structure, Table 1 below shows the main children and mothers' characteristics, whether they live with an extended family and the mechanisms variables to test. Regarding the household composition categories, 39% of the pooled sample includes two married parents (12440), 33% cohabiting parents (10440), and just 28% lone mothers (8831). Across family types, there is no main difference in the number of premature children but, although the majority of children attend preschool, the percentage varies between groups, with children of cohabiting parents having the lowest preschool attendance rate (67.6%) compared to married parents (72%) and lone-mothers who have the highest (75.3%) revealing their greater need for childcare.

As expected, lone mothers are more likely to live in extended families, with more than half of the group living in a household with more than one family unit (54.2%), compared to two cohabiting parents (23.6%) and two married parents (13.8%). This may relate to the fact that lone and single-cohabiting mothers two tend to be younger, with a mean age of 30.1 years of

30.7 years respectively, while married mothers' mean age is 34.8 years. Noticeably, single cohabiting mothers have the lowest proportion of mothers with higher educational levels (15.6%) and the highest proportion with no or low educational level (19.1%), while married mothers have the greatest proportion of higher educational level (21.5%) and lone mothers of school level (67.6%). Finally, while most lone mothers are working (67%), just 47.6% of single cohabiting mothers and 47.1% of married mothers work.

Table 1: Sample descriptives by household composition

	1. Two married parents (N=12440)	2. Two cohabiting parents (N=10440)	3. Lone mother (N=8831)
Child goes to preschool			
1. No	3477 (28.0%)	3387 (32.4%)	2182 (24.7%)
2. Yes	8963 (72.0%)	7053 (67.6%)	6649 (75.3%)
Child was born premature			
1. No	2165 (17.4%)	1601 (15.3%)	1699 (19.2%)
2. Yes	10275 (82.6%)	8839 (84.7%)	7132 (80.8%)
Live in an extended family			
1. No	10719 (86.2%)	7975 (76.4%)	4041 (45.8%)
2. Yes	1721 (13.8%)	2465 (23.6%)	4790 (54.2%)
Mother's age			
Mean (SD)	34.8 (6.68)	30.7 (7.31)	30.1 (7.77)
Median [Min, Max]	35.0 [17.0, 61.0]	30.0 [15.0, 56.0]	29.0 [15.0, 58.0]
Mother's educational level			
1. No or Low level	2034 (16.4%)	1999 (19.1%)	1081 (12.2%)
2. School level	7690 (61.8%)	6772 (64.9%)	5970 (67.6%)
3. Higher level	2674 (21.5%)	1629 (15.6%)	1748 (19.8%)
Mother is working			
1. No	6431 (51.7%)	5318 (50.9%)	2771 (31.4%)
2. Yes	5857 (47.1%)	4965 (47.6%)	5919 (67.0%)
Family's OECD equivalised income in €			
Mean (SD)	281 (251)	235 (204)	187 (175)
Median [Min, Max]	200 [10.0, 1570]	174 [10.0, 1570]	144 [10.0, 1560]
Father quality interactions			
Mean (SD)	2.14 (1.58)	2.04 (1.58)	0.805 (1.37)
Median [Min, Max]	2.00 [0, 4.00]	2.00 [0, 4.00]	0 [0, 4.00]

Regarding the potential mediator variables, families with two married parents have the highest mean and median of equivalised family income (€281 and €200 respectively) followed by families with two cohabiting parents (€235 and €174) and lone mothers (€187 and €144). The family's income variability is relatively similar. Since the sample was cut to start from 10€, all family types start their income there, however, the top for lone mothers is 10€ less than cohabiting and married parents. Regarding quality interactions, on average, families with two

married parents and families with two cohabiting parents report a similar mean number of activities (2.14 and 2.04 respectively). In contrast, as might be expected, children from lone mothers report a substantially lower mean number of quality interactions with their fathers (0.805).

When the disparities of lone mothers compared to two parents in the household in the means of family equivalise income and number of father-child quality interactions with the child are tested, the results show that they are significant[3], providing insights into the economic and relational dynamics within these families as mechanisms for the differences in children's outcomes instead of implying that just the fact of being a lone mother will lead to being a worse caregiver[4].

7.2 Child Development Outcomes

Below I present the descriptive results of the outcome variables of interest. Both instruments present a raw score based on their different components. As mentioned in 6.1, the standard score or percentile is constructed from the normalization used by the authors.

7.2.1 Battelle Development Inventory Descriptives

For the BDI, which as mentioned, aims to measure the general psychomotor development of the child, Table 2 outlines the descriptive statistics. The mean score is 155.6, indicating the average level of development across the assessed domains. The standard deviation (SD) of 44.8 suggests notable variability in developmental levels within the sample. Scores range from a minimum of 0 to a maximum of 340, illustrating the breadth of developmental abilities observed. In contrast, for the BDI percentile, adjusted to the child's age, the mean percentile score is 51.8, implying that, on average, individuals in the sample scored at the 51.8th percentile relative to the normative population. The standard deviation (SD) of 9.2 indicates comparatively less variability in percentile scores compared to raw scores. Percentile scores range from a minimum of 5 to a maximum of 95, suggesting a narrower distribution of performance relative to the normative sample.

Figure 5 presents the distribution for the percentiles BDI scores by household composition where is possible to notice a positive difference in the distribution and mean of psychomotor

[3] Statistical test results are provided in Appendix 1.

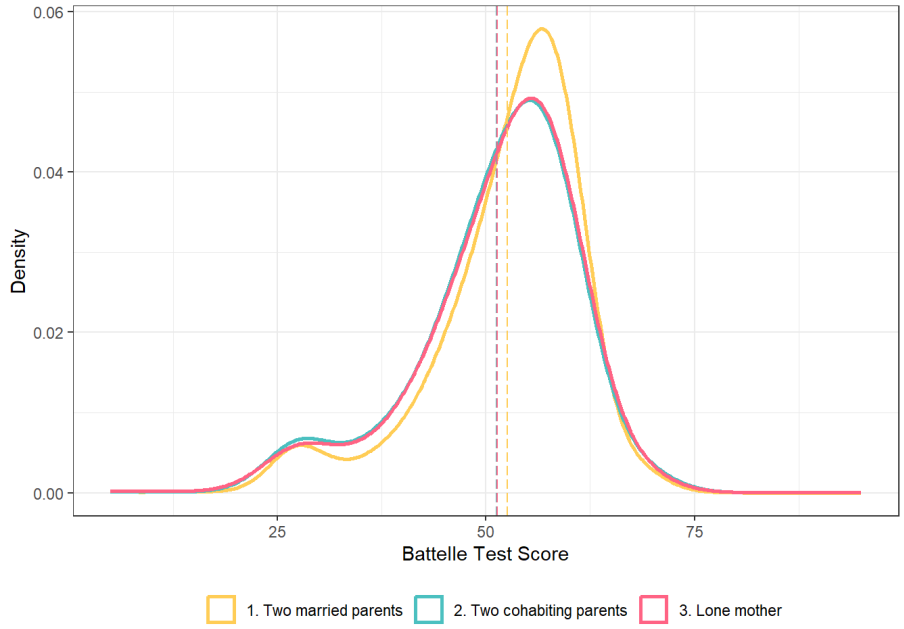
[4] Indeed during the visit, interviewers measured no differences across family types in mothers' attitude with the child with the Home Observation Measurement of the Environment (HOME). A detailed description of the HOME evaluation and its results for this sample are provided in Appendix 2.

development of the children living with their two-married parents, while children from single cohabiting or lone mothers have similar results.

Table 2: BDI Descriptive Results

	N	Mean	SD	Min	Max
BDI Raw	17937	155.6	44.8	0	340
BDI Percentile	17937	51.8	9.2	5	95

Figure 5: BDI Percentile Score Density Distribution



Note: Distribution plot uses a bandwidth adjustment of 3. Dashed lines represent the mean of each category.
Source: ELPI (2010 – 2017).

7.2.2 Peabody Picture Vocabulary Test Distribution

Table 3 provides descriptive statistics for the PPVT that measure children's language skills. The raw mean score is 46.8, indicating that, on average, participants answered approximately 46.8 items correctly. The standard deviation (SD) is 34, suggesting considerable variability in scores around the mean. Scores ranged from a minimum of 0 to a maximum of 124. The mean percentile PPVT score is 107.4, indicating that, on average, participants' raw scores correspond to the 107th percentile compared to the normative sample. The standard deviation (SD) is 18.4, suggesting less variability in percentile scores compared to raw scores. Percentile scores ranged from a minimum of 55 to a maximum of 145.

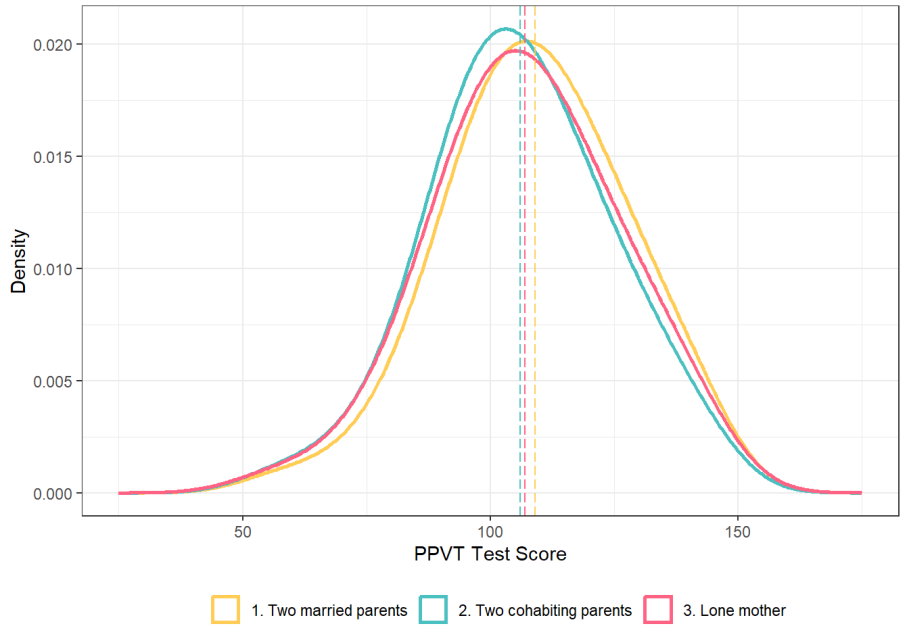
The distribution for the percentiles PPVT score of each family structure presented in Figure 6 also shows better language skill outcomes for children living with their two married parents.

However, in this test, children from lone mothers perform slightly better than children from single cohabiting mothers.

Table 3: PPVT Descriptive Results

	N	Mean	SD	Min	Max
PPVT Raw	25423	46.8	34	0	124
PPVT Percentile	25423	107.4	18.4	55	145

Figure 6: PPVT Percentile Score Density Distribution



Note: Distribution plot uses a bandwidth adjustment of 3. Dashed lines represent the mean of each category.
Source: ELPI (2010 – 2017).

7.3 Analysis Results

In this section, I present the results of the pooled OLS and longitudinal analyses of household composition on the two development outcomes: BDI and PPVT. For both estimations, the reference category for the family type is two married parents in the household. Regarding the factor control variables included in the analysis, the reference categories for each are the child does not attend preschool, the child was not born prematurely, the mother and child do not live with an extended family, the mother has no or low education and the mother is not working. Finally, as mentioned, in order to present a measurable coefficient, family income is presented in hundreds of euros.

7.3.1 Pooled OLS for Psychomotor Development

To identify family structure in child psychomotor development relationship, I conducted five different pooled OLS models including the child-year observations from the three years. The results are presented in Table 4. The first model displays the naïve linear regression (1) and for the second child factors are incorporated as potential confounders (2). Model (3) includes living in an extended family. The fourth model includes the characteristics of the mother (4) and finally, model (5) tests for change coefficients of lone mothers on psychomotor development by including the potential mediators of family income and father-child quality interactions (expecting to get a smaller coefficient when including them).

Table 4: Pooled OLS of household composition on BDI

	Dependent variable: Battelle Test				
Variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*
Household composition					
1. Two married parents	—	—	—	—	—
2. Two cohabiting parents	-1.3***	-1.1***	-1.1***	-0.78***	-0.50***
3. Lone mother	-1.2***	-1.3***	-1.4***	-1.3***	-0.04
Child goes to preschool					
1. No		—	—	—	—
2. Yes		5.2***	5.2***	4.9***	5.8***
Child was born premature					
1. No		—	—	—	—
2. Yes		-0.54***	-0.54***	-0.60***	-0.14
Live in an extended family					
1. No			—	—	—
2. Yes			0.35**	0.58***	0.31*
Mother's age				0.08***	0.10***
Mother's educational level					
1. No or Low level				—	—
2. School level				1.5***	1.6***
3. Higher level				1.5***	0.79***
Mother is working					
1. No				—	—
2. Yes				0.27*	-0.04
Family's OECD equivalised income in €					0.27***
Father quality interactions					0.64***
Observations	17,937	17,937	17,937	17,687	13,282
p<0.1; **p<0.05; **p<0.01					

The coefficient for two cohabiting parents is statistically significant and negative in all preceding models. This suggests that compared to children with two married parents, children

with cohabiting parents tend to have lower psychomotor development scores, confirming hypothesis 2. Children with lone mothers have significantly lower psychomotor development scores compared to those with two married parents in most of the models and this negative effect is greater than for single cohabiting mothers' children, ratifying hypothesis 1. a. Preschool attendance is associated with greater psychomotor development scores significantly and in sum with the child being born premature, which is negatively related to BDI score, they slightly increase the negative effect size for lone mothers. Living in an extended family has a relevant positive effect on the BDI score, however it marginally increases the lone-mother coefficient. Finally, mothers' characteristics decrease cohabiting parents' effect size but do not change especially the coefficient of lone mothers. In particular, higher mother's age and educational level and being working increase the BDI score. When testing for change by including potential mediators, it is possible to see that the father's quality interactions have a positive association with Battelle Test scores, indicating its relevance in child stimulation. Moreover, family income is positive and significantly associated with psychomotor development. Interestingly, the coefficient for lone mothers becomes smaller and non-significant in this model, suggesting that the influence of being a lone mother on child development may be strongly mediated by these factors, confirming hypotheses 1. b and 1. c.

Overall, these results suggest that family structure has an important relation with child psychomotor development. While preschool attendance and child and maternal characteristics (age and education) are relevant factors associated with psychomotor development they almost do not variate household composition size effects. On the other hand, family income and father-child number of interactions mediate the family structure effect.

7.3.2 Pooled OLS for Language Skills

Following the same models as before, Table 5 presents the results of five different pooled OLS regression models on child language skills. The coefficient for two cohabiting parents is statistically significant and negative in all subsequent models. This suggests that again marriage represents an advantaged status regarding cohabiting parents in terms of developing vocabulary. Furthermore, children with lone mothers also have significantly lower language skills compared to those with two married parents in all models. Therefore, is possible to say hypotheses 1. a and 2 are confirmed for this test.

Once more, children who attend preschool have significantly higher PPVT scores than those who do not, highlighting the importance of preschool attendance for child language development. Although both child factors included in the second model slightly decrease the cohabiting parents' coefficient, they increase the effect size for lone mothers. While living in an

extended family is negatively associated with language skills, controlling for this variable reduces the effect size related to family structure. Mothers' characteristics, particularly educational level, positively correlate with the reduced negative effect sizes for cohabiting parents and lone mothers. Finally, in Model (5), although family income and fathers' quality interactions show a significant positive relationship with PPVT scores, they do not reduce the effect sizes for single cohabiting and lone mothers compared to the previous models (4), nor do they eliminate significance. Therefore, the model itself is inconclusive regarding the mediator effect of these variables and does not confirm Hypotheses 1.a and 1.b.

Table 5: Pooled OLS of household composition on PPVT

	Dependent variable: Peabody Picture Vocabulary Test				
Variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*
Household composition					
1. Two married parents	—	—	—	—	—
2. Two cohabiting parents	-3.3***	-3.2***	-3.0***	-1.2***	-1.5***
3. Lone mother	-2.0***	-2.3***	-1.6***	-0.93***	-1.8***
Child goes to preschool					
1. No		—	—	—	—
2. Yes		8.3***	8.2***	6.2***	2.9***
Child was born premature					
1. No		—	—	—	—
2. Yes		0.60**	0.62**	0.75***	2.4***
Live in an extended family					
1. No			—	—	—
2. Yes			-1.9***	-0.69**	1.7***
Mother's age				0.37***	0.14***
Mother's educational level					
1. No or Low level				—	—
2. School level				7.0***	5.9***
3. Higher level				13***	9.0***
Mother is working					
1. No				—	—
2. Yes				1.6***	1.1***
Family's OECD equivalised income in €					0.97***
Father quality interactions					0.25***
Observations	25,417	25,417	25,417	24,983	13,860
p<0.1; **p<0.05; **p<0.01					

It is interesting to note the difference in the results of the variables tested as potential mediators of the effect of single parenting on child development. While for the effect on psychomotor development, there seems to be no effect of lone motherhood if not through family

income or the amount of father-child activities, for vocabulary development, the coefficient for lone mothers does not change. However, as mentioned in 7.1, there is a significant difference in means of family income and father quality interactions between lone mothers and two-parent households. Furthermore, when testing the correlation of household composition with these two variables using linear regression, a significant association is also observed[5], and, as the models show, there is a relevant relationship between these variables and developmental outcomes, revealing a mediating relationship.

7.3.3 Fixed effect model

The longitudinal analysis, presented in Table 6 utilizes fixed-effect models to examine the effect of household composition on the two different development outcome variables over time. The first model (1) presents the analysis of psychomotor development and (2) includes living in an extended family and the mother's employment status as time-varying variables. The third (3) and fourth (4) models repeat these estimations for language skills development. All four models take into account period effects by adding the year of the survey, therefore mother's age is not included. Other covariates do not, or most likely do not change over time, then they are not included.

Table 6: FE of household composition on BDI and PPVT

	BDI		PPVT	
Variable	*(1)*	*(2)*	*(3)*	*(4)*
Household composition				
1. Two married parents	—	—	—	—
2. Two cohabiting parents	-0.29	-0.36	0.30	0.35
3. Lone mother	-1.1	-1.3	-0.48	-0.58
Live in an extended family				
1. No		—		—
2. Yes		0.34		0.34
Mother is working				
1. No		—		—
2. Yes		0.32		0.32
Year	Included	Included	Included	Included
Id	Included	Included	Included	Included
p<0.1; **p<0.05; **p<0.01				

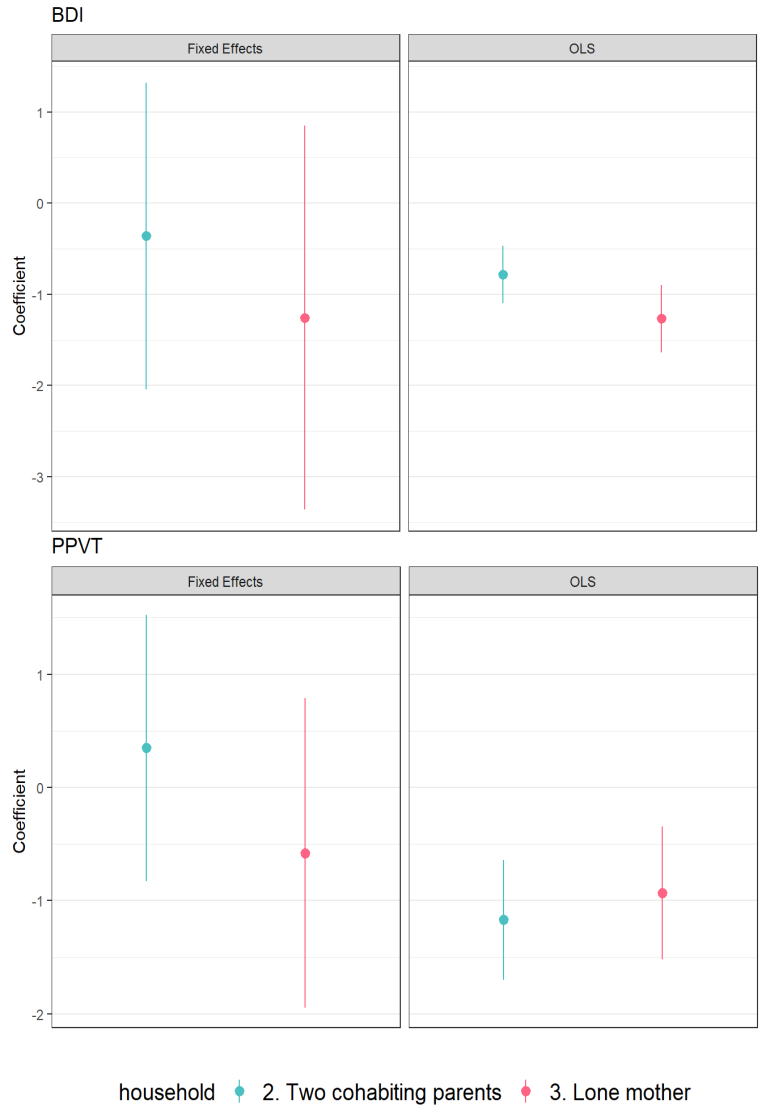
Regarding children from single cohabiting mothers, while the coefficients for BDI are negative compared to married parent's children, they are positive for PPVT. Nevertheless, the effect sizes

[5] Results of linear regression estimations of household composition on family income and father-child interactions are presented in Appendix 3.

are small and not significant. For both psychomotor and language development, compared to children with two married parents, lone mothers' children present a negative coefficient compared with married parents, and they have a greater negative effect size on BDI, indicating their children perform even worse than those of single cohabiting mothers. Yet once more, none of the results are statistically significant.

While FE models are more accurate than the pooled OLS by eliminating the time-invariant error, the quality of the estimation relies on the degree of variation of the regressors over time, that is, if there is only limited variation in the time series ("within") the FE is not precise, which may be the case for the household composition in a three-period panel data.

Figure 7: Coefficients of household composition on BDI and PPVT scores in pooled OLS and FE



Note: Pooled OLS consider models (4) of each outcome and FE models (2) and (4).
Source: ELPI Dataset (2010-2017)

Figure 7 summarizes the results obtained in both the pooled OLS and the FE models for both developmental tests. It is possible to visualize that, except for the PPVT score for cohabiting households in the FE model, the results are negative. However, while the results are significant for the pooled OLS, it is evident that the FE confidence intervals are larger and include zero, precluding conclusions about a correlation between family types and child development.

As mentioned, FE models offer advantages over pooled OLS by addressing time-invariant errors. Nevertheless, their precision depends on the degree of variation in the regressors over time. Therefore, limited variation can affect the accuracy of the estimation and this may be feasible for variables relevant to the time scope of the data.

8 Conclusion

8.1 Discussion

This paper presents evidence about the association between family structure on child development. Using panel data from Chile, through linear regressions and longitudinal methods and measuring developmental outcomes with the Battelle Development Inventory and Peabody Picture Vocabulary Test, I show that, although children living with two married parents consistently exhibit better results compared to those living with cohabiting parents or lone-mothers, these differences are not relevant when analysing over time.

In the pooled OLS models, lone-mother households show the most significant negative impact on psychomotor and language development, indicating that children in these households face greater challenges compared to those in households with both parents present. Furthermore, family income and the number of interactions quality interactions between fathers and children are tested as potential mediators. The statistical tests show that these variables may act as mechanisms for the effect of lone motherhood. However, is possible to notice a change in the effect size for psychomotor but not vocabulary development.

Once more, the longitudinal analysis through the fixed effects model reveals a negative relationship between being a single-cohabiting (only in the case of the BDI) or a lone mother and child development. Therefore, previous literature that applies cross-sectional analysis and finds such an effect may not be considering variables that the fixed effects model captures. However, since this analysis eliminates time-invariant errors, it addresses omitted variable bias (OVB) that the pooled OLS cannot, thus eliminating the significance of the negative effect compared to married-parent families.

These results suggest the need for a better understanding of the complex and unique needs of cohabiting and lone-mother families. Moreover, to deeply understand how the economic and caregiving context lone mothers face with factors such as the family income and interactions between the father and the child may play a role in the relationship between family structure and child psychomotor development since the analysis shows statistical disparities of these two aspects among different family types. Specifically, is relevant to know how higher family income and more quality interactions with the father tend to mitigate the negative effects on psychomotor development associated with lone-mother households, proposing potential avenues for intervention and support.

8.2 Limitations

The study primarily relies on linear regression estimations and longitudinal analyses, which can identify associations but cannot establish causality. While efforts were made to control for potential confounders and mediators, the possibility of unobserved variables influencing the results cannot be fully eliminated. Furthermore, in the case of the fixed effects model, in the time scope, is possible that the explanatory variable of the family structure had not enough variation over time limiting to take a precise conclusion.

The analysis is based on data from the Early Childhood Longitudinal Survey (ELPI), which, while comprehensive, relies on information reported by the person interviewed, therefore some variables, such as the income of the family members may not be accurate. Additionally, while the number of father-child quality interactions was considered, the third year's sample did not include this information. Moreover, rather than the number of activities the information of interest would be how is the actual quality of those interactions. This and other parenting style information may not be fully captured. Additionally, while the sample selection facilitates the analysis and interpretation of the results, it does not capture the complexity of diverse existing family structures such as the role of adoptive or stepmothers, fathers, same-sex parents or other family members.

Addressing these limitations through further research, including more robust study designs and interdisciplinary approaches, can provide a deeper understanding of the complex interplay between family structure, socioeconomic factors, and child development outcomes, ultimately informing more effective policies and interventions to support children and families.[6]

[6] This paper uses R Core Team (2021). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/. Code is available in Appendix 4.

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10 Appendix

Appendix 1: Statistical differences of mediators across family types

T-Test Household income: Lone mothers vs Two-parents

t	p-value	CI low	CI high	alt
-30.21769	0	-77.76726	-68.29302	two.sided

T-Test Household income: Lone mothers vs Married-parents

t	p-value	CI low	CI high	alt
-32.27417	0	-100.2501	-88.77049	two.sided

T-Test Father's interactions: Lone mothers vs Two-parents

t	p-value	CI low	CI high	alt
-52.94222	0	-1.34843	-1.25214	two.sided

Appendix 2: HOME Evaluation

During the visit, the evaluator measure mother-child interaction with the Home Observation Measurement of the Environment (HOME), which contains a set of binary questions designed to evaluate the emotional nurturing and cognitive enrichment provided to children within their home setting. I consider whether the mother talks to the child at least twice and if maternal kissing or caressing can be observed at least once during the visit because these measures were included in the three survey rounds. Seeing the descriptives in the following table and statistical tests is possible to say that there are no significant differences in their attitude to the child, therefore being a lone mother is not detrimental to the child per se but by the mentioned mediators.

During the visit the mother:	1. Two married parents (N=12439)	2. Two cohabiting parents (N=10437)	3. Lone mother (N=8829)
Talks to the child at least twice			
1. No	212 (1.7%)	204 (2.0%)	191 (2.2%)
2. Yes	11941 (96.0%)	9957 (95.4%)	8293 (93.9%)
Missing	287 (2.3%)	279 (2.7%)	347 (3.9%)
Gives kisses, cuddles, or hugs the child at least once			
1. No	1833 (14.7%)	1700 (16.3%)	1443 (16.3%)
2. Yes	10320 (83.0%)	8463 (81.0%)	7041 (79.7%)
Missing	287 (2.3%)	277 (2.7%)	347 (3.9%)

Appendix 3: Linear regression models to test mediators

	Correlation of household composition with	
Variable	Family income	Father interactions
Household composition		
1. Two married parents	—	—
2. Two cohabiting parents	-46***	-0.10***
3. Lone mother	-94***	-1.3***
Observations	31,711	19,178
p<0.1; **p<0.05; **p<0.01		

	Correlation of variables with			
Variable	*BDI*	*PPVT*	*BDI*	*PPVT*
Family's OECD equivalised income in €	0.29***	2.0***		
Father quality interactions			1.0***	0.71***
Observations	17,937	25,417	13,420	14,018
p<0.1; **p<0.05; **p<0.01				

Appendix 4: Code for data management and analysis

https://github.com/coteosimani/MA-project-MPP-Hertie-2024/blob/main/ELPI-ANALYSIS

Statement of Authorship

I hereby confirm and certify that this master thesis is my own work. All ideas and language of others are acknowledged in the text. All references and verbatim extracts are properly quoted and all other sources of information are specifically and clearly designated. I confirm that the digital copy of the master thesis that I submitted on 27/08/2024 is identical to the printed version I submitted to the Examination Office on 29/04/2024.

27 Apr. 24

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