



**COGNITIVE AND SOCIO EMOTIONAL EFFECTS OF FAMILY
DISRUPTION DURING EARLY CHILDHOOD: A LONGITUDINAL
STUDY USING CHILEAN DATA**

**TESIS PARA OPTAR AL GRADO DE
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I. Introduction

Children's outcomes, and the link with the family structure they grew up in, has been deeply investigated by researches from different areas of science, including psychology, sociology, and economics, among others. There seems to be consensus that the *traditional* family structure, i.e. a birth mother and a birth father raising children together, is the healthiest environment for children to grow up in. (Cherlin, et al., 1997; Corak, 1998; Case, Lin and McLahan, 2000; Bertrand & Pan, 2011).

The Chilean family structure has changed in the last few decades: single parent households have become increasingly common, and for the first time, the country has a data set that allows us to investigate the possible effects this type of households may have on young children. The "Encuesta Longitudinal de la Primera Infancia" (ELPI) includes data about the family, child care, presence of the birth parents in the child's household, reasons for mother or father's absence, cognitive and psychological tests administered to both, the children and the mother or responsible adult, parent's occupational status, etc. Considering the latter, and the fact that early childhood has proven to be one of the most important stages of development (Bucarey, Ugarte and Urzua, 2014), suggests the importance of this analysis.

Using the first two waves available of the ELPI, we estimate the effect of family disruption on cognitive achievement and emotional status. Because there are individuals that belonged to intact families in the first wave, but belonged to a single parent household in the second one, we can use a fixed effects model to control for heterogeneity between families. We also, check for pre divorce outcomes and attempt to establish the mechanism through which the disruption affects children.

To study cognitive achievement we use a Hispanic version of the Peabody Picture Vocabulary Test (PPVT). This test measures the child's vocabulary abilities and has proven to be a successful proxy for future academic performance. A test score over 103 is considered high. Secondly, the test Child Behavior Checklist (CBCL) is used to measure children's socio emotional abilities. The answers to this test are given by their tutors during an interview. A CBCL score greater than 63 falls in the category of clinical emotional problems or distress, so the better the child is, the lower his or her score should be.

Section II studies international evidence of the importance of family structure on children's outcomes, section III describes the different family types and their characteristics, section IV presents our methodology and results, and section V discusses these results. Finally section VI concludes.

II. Literature Review.

According to Biblarz and Gottanier (2000) the single parent family structure is less capable of “fully” providing children, since there are fewer resources, the stay-at-home parent has less time to spend with the child, and there may be more conflicts between the parents, among other reasons. They also describe four different theories about how the family structure could affect outcomes later in life.

The first one, or *marital conflict theory*, is related to the different problems that arise inside a disrupted household. Difficult relationships between the child and the non-resident parent, conflict between parents after divorce, and eventually, problems with the resident parent’s new partner, create an adverse environment to grow up in, leading to worse results in comparison to children from intact households (Amato, 2005; Kelly & Emery, 2003).

A second theory tells us that people that end up getting divorced (or splitting up) are different from couples that stay together: this is known as the *parental fitness model* or auto selection, and according to it, it’s parent’s characteristics that lead up to divorce, what explain the differences in children’s outcomes later in life, not divorce itself (Bjorklund & Sundstrom, 2005).

According to a third theory, *the family structure model*, children coming from a disrupted or single parent household are less likely to obtain better results because they’re not exposed to successful relationships of authority. According to this theory, when one of the parents is not present, no matter why, the relationship between the resident parent and the child becomes more peer like and authority relations are not in the child’s mind later in life which will make it harder for the child to comply with rules in the future.

Finally, *the household economic model*, tells us that households act as a utility maximizing agent. In this utility function the head of the household incorporates the child’s human capital, so with two parents there are more resources and time available in order to develop this capital (Tartari, 2006).

International evidence tells us that there is a significant relationship between family structure and children’s outcomes in life. Family disruption is linked to worse income levels in adulthood (Corak, 1998), a greater probability of having psychological problems (Cherlin et al., 1997), tendency to initiate sexual life in early years (Demmo and Acock, 1987), leaving the household at an early age (Cherlin, Kiernan, Lansdale, 1995), less probability of achieving an “A” grade performance in school (Ermisch & Francesconi, 2001), low self-esteem during adolescence (Fergusson & Horwood, 2003), among other negative effects.

The problem with these results is determining causality. In our ideal scenario as researchers we would have a child with divorced parents, and the same child with the same parents living together, as impossible as that scenario is, researchers have turned to different strategies in order to accomplish something similar to the scenario described above. The main examples are the use of sibling studies, longitudinal data and comparison to families with the death of a parent (which is assumed to be exogenous).

Corak (1998) uses the death of a parent to compare children from divorced families and single-parent households due to death, since the latter is a form of single-parent household due to an exogenous factor that lacks the possible conflict between the non-resident parent and the resident parent or his/her child. According to his results, people from disrupted households have lower income levels than their widowed household peers and people who grew up in intact families. When controls are applied the differences between the income levels from people who grew up in intact families diminish, but remain significant. The same controls make the difference between single-parent households due to divorce and due to death insignificant. The latter would go against the family conflict model. Ginther & Pollak (2004) compare biological children from intact households to biological children from blended families; they find that the first ones perform better in school than the latter, which would support the household economic model.

Case, Lin & McLahan (2000) compare investment in children from families in which the biological mother is present in the household versus households in which she is not. They find that when the biological mother is not present in the house, there is less investment in food, clothing, and children have lower school attainment rates. This last study would support the household economic model, also developed by Tartari (2006) who sees the biological child as a public good to both the father and the mother, but not to the step father or step mother, explaining the lower investment rates.

Another important area of research is the study with siblings; Bjorklund & Sundstrom (2005) find that with the right controls and comparing the sibling who suffered divorce to the one that did not, divorce has a minimum negative effect in school assistance. This supports the theory that it is not divorce itself what is bad for children, but the environment created in a household that is going to experience divorce, reaffirming that a big portion of the effect attributable to divorce is due to the parents characteristics (Mackay, 2005).

If it is true that children living in households with high levels of stress due to parent conflict, divorce laws should be positive for this particular group (Morrison and Coiro, 2007). Demo and Acock (1988) note that there are also other positive effects of divorce, like higher self-evaluation compared to the pre divorce

scenario and vocal skills for boys. Also children from disrupted families spend more quality time with the resident parent (Astone & McLanahan, 1991).

International studies have focused on the results of children from divorced families later in life; however this study concentrates on the study of results in early childhood. The amount of information that ELPI gathers and the use of longitudinal data allows us to isolate the effect of divorce on children from 6 months to 7 years of age when it occurred between 2010 and 2012.

III. Data

For this study we use Chilean data from the “Encuesta Longitudinal de la Primera Infancia”, or ELPI. This is a longitudinal data set which in its first wave, in 2010, reached 15.000 children, while the 2012 wave incorporated 3.000 extra kids, reaching 18.000 kids nationwide. The complete database includes four different items, one called “*hogar*” or “home” where we can find information about the family and its members. The information in this item ranges from income, relationship with the selected child, to household composition, among others.

The second set is called “*entrevista*” or interview, and it contains information about the tutor or mother’s education, reason why the father or mother is not present in the household, frequency of the non-resident parent visitations, etc. The third set is called “*evaluaciones*” or “tests”. It contains different psychological and physical instruments used to analyze the tutor and child’s abilities in different areas, including cognitive development, emotional and nutritional status, among others. The last data set is called “*cuidado infantil*” or “child care” and it includes different questions about the child’s health, assistance to a preschool center and different measures of stimulation.

Using the first data set we’re able to classify the families in three different main groups, those with both birth parents living with the selected child: secondly, families where the selected child lives with only one of his/her birth parents, and: finally households where there’s no biological parent living at home¹. In the former group, we have household where the parents are married and those where parents cohabit, while in the second group we have four different household compositions, (i) mother single-parent household due to divorce or separation², (ii) father single-parent household due to divorce or separation, (iii) single-parent household due to the death of one of the parents, and (iv) single-parent household due

¹ We were also able to identify families with no biological parents living at home and blended families, both types were taken out of the sample, and represented a 0.67% and 0.57% of the sample in 2010, respectively, and a 1.15% and a 0.78% of the sample in 2012.

² For our analysis we won’t consider whether parents are legally divorced or just in a “de facto” separation.

to one of the parents living away. Finally the latter group, with no biological parents living with the selected child will not be considered in our analysis. Table 1 shows the different compositions and the percentage of the total each type of household represents.

Using the other data sets we're able to describe the different type of households. As we can see in Table 2, there are clear differences between households; two parent families have higher income levels, lower teenage pregnancy rates, and more educated mothers³.

Differences in income are a given, since two parent households are more likely to have two different set of incomes, therefore the average income should be higher among this group. However, an interesting result is that households where there's cohabitation, income is considerably lower than households where both biological parents are present and, also, married. The latter is also true for the mother's educational level: cohabitating mothers have lower educational indicators than both married and divorced mothers. Both of these indicators suggest that cohabitation should be more common among lower quintiles of income. Analyzing our data we can verify the latter: married or *traditional* households are more common among higher quintiles, 51.2% of the households that belong to the highest quintile are traditional households, while households where parents cohabit or single-parent households are less common among the fifth quintile, 30.7% and 17.2%, respectively⁴.

The mother's occupational status changes between household compositions: there are more working mothers, for obvious reasons, in single-parent households. There are also clear differences between cohabitating and married households, with the latter having higher occupation rates among mothers, which may explain why cohabitating households are less present in higher quintiles.

On another subject, Amato (2005) notes that the age of mother at birth is lower for cohabitating two-parent households and for separated or divorced mothers, something we can also see in our sample. The latter confirms the author's claim that younger mothers are more likely to divorce or separate (Bjorklund & Sundstrom, 2005) and suggests that young mothers are more likely to cohabit than the older ones.

³ The mother's educational indicator takes the value 0 if the mother had no education; 1 if she had 8 or less years of education; 2 if she had 12 or less years of education; 3 if she had more than 12 years of no college education; 4 if she had more than 12 years and it was college education and finally 5 if she has a Masters or Phd.

⁴ See Appendix tables 1.a and 1.b

TABLE 1: *Family Composition, years 2010 and 2012.*

Household composition		2010	2012
Both parents			
	Married	37.17	38.6
	Living together	32.59	32.62
Divorced/Separated			
	Living with the mother	26.59	26.64
	Living with the father	0.14	0.19
	Total	26.73	26.83
Widowed			
	Father or mother dead	0.36	0.6
Living away			
	Father or mother lives away	3.14	1.35
TOTAL		100.00	100.00

Source: Author's own elaboration based on ELPI
2010 & 2012

Finally, we study the percentage of households where the head of the household is a woman. Clearly within single parent households there's a higher percentage of women in charge; however it is only 57.01% in 2012, which is explained by the tendency of separated mothers to go back to their parents' home.

We then turn to the different tests applied to both kids and their mothers or tutors. To assess the cognitive development of the latter, the Wechsler Adults Intelligence Scale (WAIS) was implemented. This is a test designed to evaluate global intelligence, understood as IQ, among individuals regardless of their race, age, culture, etc. For ELPI only two dimensions were considered, vocabulary and digits retention. The latter measures mostly short term memory and capacity for retention, while the former is the best proxy for intelligence (Kaplan & Saccuzzo, 2005). It evaluates cultural level and receptiveness to new ideas and information.

The test was applied to individuals aged fifteen and up, the scale goes from 0 to 19, and a higher score translates into a higher IQ.

TABLE 2: *Household Description According to Family Type.*

Descriptive Analysis by type of household		2010	2012
Married	Average Income	\$612,333	\$695,016
	Mother's education	2.34	2.30
	Mother is occupied	44.8%	47.0%
	Age of the mother at birth	30.18	30.15
	Teenage pregnancy	1.21%	1.09%
	Head of the household is a woman	8.14%	9.64%
Biological parents living together	Average Income	\$447,178	\$524,093
	Mother's education	2.09	2.12
	Mother is occupied	42.6%	45.2%
	Age of the mother at birth	26.34	26.32
	Teenage pregnancy	8.56%	5.30%
	Head of the household is a woman	15.56%	20.46%
Separated or divorced	Average Income	\$402,305	\$460,559
	Mother's education	2.28	2.22
	Mother is occupied	52.3%	56.5%
	Age of the mother at birth	23.96	24.35
	Teenage pregnancy	17.90%	10.09%
	Head of the household is a woman	51.81%	57.01%
Widowed	Average Income	\$288,286	\$421,482
	Mother's education	1.89	1.84
	Mother is occupied	54.1%	46.1%
	Age of the mother at birth	27.00	27.48
	Teenage pregnancy	10.59%	12.09%
	Head of the household is a woman	67.02%	65.43%
One parent immigrated	Average Income	\$373,509	\$383,487
	Mother's education	2.31	2.11
	Mother is occupied	45.6%	58.8%
	Age of the mother at birth	23.63	24.85
	Teenage pregnancy	15.11%	11.22%
	Head of the household is a woman	49.25%	61.40%

Source: Author's own based on ELPI 2010 & 2012

On the other hand, the socio emotional state of the mother or tutor is assessed by the Big Five Inventory test (BFI). It is aimed to measure emotional state in five areas: (i) neurosis, (ii) extraversion, (iii) openness to new experiences, (iv) tendency to agreement and (v) conscientiousness. We'll focus exclusively on

neurosis, for this area the test is designed to identify the tendency to experience negative emotions such as sadness, anxiety, hostility, among others (Casullo, 2000).

The test is applied to adults and its scale ranges from one to five. A score under three is considered “low or diminished”, a score equal to three is considered “normal”, and, a score higher than three is considered “high or augmented”. Since we’re focusing on neurosis, a higher score will be considered as negative, since it will be an indicator of a worse emotional state of the mother or tutor.

As we can see in Table 3, panel a, married mothers perform better both in cognitive tests (WAIS test of vocabulary and mathematics) and emotional tests (BFI for neurosis) than any other family type. Since there are no clear differences between cohabitating and single parent households, we turn to differences across quintiles, which may explain why the traditional households, with a higher representation in richer quintiles, have results that exceed any other family structure, including cohabitating biological parents. As we can clearly see in Table 3, panel b, the higher the quintile, the better both cognitive and emotional test scores, suggesting that family income may be more important than its structure (Zortea & Tokumaru, 2011).

Next we turn to children, as we have mentioned, to study cognitive achievement we will use a Hispanic version of the Peabody Picture Vocabulary Test (PPVT). It is a psychometric test that measures receptive and/or auditory vocabulary and has been proven to be a successful proxy for future academic performance. The test is traditionally designed for children between 30 and 60 months; however in our sample the oldest kid who the test is applied to is six years and eleven months. The scale goes from 55 to 145 points. From 55 to 70 points the child’s performance is considered “extremely low”, 71-85 is considered “moderately low”, 86-95 “low”, 96-103 is considered average, 104 to 115 is considered high, from a 116 to 130 and from 131-145 is considered “moderately high” and “extremely high” respectively.

On the other hand, we are going to use the test Child Behavior Checklist (CBCL) to measure socio emotional characteristics of children, the answers are given by their tutors during an interview and it is applicable to children 18 months and up. The test is designed to detect problems within two dimensions, internalization problems (i.e. problems related to the child with himself or herself such as anxiety, emotional reactivity, etc.) and also externalization problems (i.e. conflicts the child has with his or her peers or authority figures, including aggressive behaviors and attention deficit). We are able to obtain a general assessment by adding the scores in each syndrome analyzed.

A score greater than 63 falls in the clinic category of socio emotional problems, between 63 and 60 the child is considered at risk and below 60 the child’s emotional state is considered to be normal.

TABLE 3: *Mother or Tutor's Cognitive and Socio Emotional Tests According to Family Type.*

		Average scores by type of household		Average scores by quintiles		
		(a)		(b)		
		2010	2012		2010	2012
BFI neurosis	Married	2.93	2.86	Quintile I	3.14	3.03
	Cohabiting	3.11	2.97	Quintile II	3.13	3.01
	Separated/Divorced	3.08	2.97	Quintile III	3.07	3.03
	Widowed	3.03	3	Quintile IV	2.96	2.9
	Immigrated	3.08	2.93	Quintile V	2.73	2.76
WAIS numbers	Married	9.12	8.92	Quintile I	8.5	8.28
	Cohabiting	8.76	8.82	Quintile II	8.68	8.46
	Separated/Divorced	8.94	8.72	Quintile III	8.85	8.66
	Widowed	8.64	7.81	Quintile IV	9.23	8.88
	Immigrated	8.79	9.02	Quintile V	9.93	9.66
WAIS vocabulary	Married	37.44	32.17	Quintile I	29.19	22.11
	Cohabiting	32.07	26.33	Quintile II	30.85	24.12
	Separated/Divorced	32.76	25.97	Quintile III	33.24	26.47
	Widowed	30.38	32.36	Quintile IV	37.29	29.35
	Immigrated	32.98	24.19	Quintile V	46.43	36.29

Source: Author's own elaboration based on ELPI 2010 & 2012

As we can see in Table 4, panel (a), one again children from traditional households outperform children from any of the other type of households. Also, children’s scores from cohabitating households are considerably closer to children coming from single parent households. Panel (b) analyzes scores according to quintiles of income. Once again income proves to be a predictor and relevant variable when it comes to cognitive and emotional development, showing clear differences across the groups.

TABLE 4: *Children’s Cognitive and Socio Emotional Tests according to Family Type.*

Test	Average test scores by family type (a)		Average test scores by quintiles (b)			
	2010	2012	2010	2012		
CBCL	Married	47.84	40.31	Quintile I	56.74	47.26
	Cohabiting	56.04	45.11	Quintile II	56.04	46.83
	Separated/Divored	56.37	46.64	Quintile III	54.83	45.85
	Widowed	48.30	49.21	Quintile IV	49.9	43.7
	Immigrated	56.59	48.69	Quintile V	43.41	37.04
PPVT	Married	106.13	105.34	Quintile I	100.62	98.06
	Cohabiting	103.39	101.63	Quintile II	102	100.11
	Separated/Divored	102.98	101.41	Quintile III	104.15	101.77
	Widowed	102.38	102.66	Quintile IV	107.25	104.6
	Immigrated	102.98	102.37	Quintile V	111.27	108.95

Source: Author's own elaboration based on ELPI 2010 & 2012

As we’ve seen in this section there are clear differences between the types of households analyzed in this study, we’ve established that two-parent households have higher levels of income, their mothers are more educated, they do not work more frequently and they’re older (higher age at birth and less percentage of teen moms). They also perform better in cognitive tests and seem to be in a better state of mind than single-parent household’s mothers. The same happens when we compare children from this type of households, kids coming from traditional families (i.e. both parents, married) outperform children from any other type of household.

An important finding is the relevance income has in all of this. Cohabiting households, with lower resources and a higher presence in lower quintiles of income, perform much worse than their married counterparts even though both family structures have both birth parents at home.

IV. Methodology and Results

a. Methodology

As we have mentioned before, internationally the subject of family disruption has been studied from different perspectives. Common approaches include sibling studies, in which the researcher looks for families where one of the siblings grew up with both parents in the household while a younger sibling experienced disruption (Bjorklund & Sundstrom, 2005). A second approach is using widowed families as a control group, since they're also single-parent households but due to an exogenous factor and do not experience conflict with the non-resident parent (Corak, 1998). A third approach is using blended families, i.e. a household where at least one of the children has a step-mother or step-father. This approach is valid since they're also two-parent family structures but children growing up in those type of households are/were exposed to disruption, and its effects, but have another characteristics of two-parent households, such as higher income, exposure to successful relationships, among others (Ginther & Pollak, 2004).

Another approach is using longitudinal data: Bertrand & Pan, (2011) use the The Early Childhood Longitudinal Study: Kindergarten Cohort (ECLS-K), which follows a sample of 20.000, nationally representative students, until the eighth grade and link it to National Longitudinal Survey of Youth to compare whether boys from disrupted households have more externalization problems than their peers from non-disrupted households and how does the latter affect their results in multiple aspects later in life.

Cherlin, et al. (1997) using The National Child Development Study (NCDS), which is a longitudinal database that follows children who were born in England, Scotland and Wales during the first week of March, 1958. They focus on 11,759 children whose parents were married when they were seven years old. The data set incorporates follow up interviews to the parents and teachers at ages, seven, eleven and sixteen, while the subject were interviewed when they were twenty three and thirty three years old. The authors find a negative effect of family disruption on income levels during adulthood, which, according to them, were mostly due to pre-disruption effects.

Even though our data allows us to identify family members, we only have psychological and cognitive instruments of the child and his or her mother or tutor. Since we do not have available data from siblings, and diseased and blended households represent only 0.6% and 0.78% of our sample in 2012, we are not able to implement any of these approaches. Therefore, we decided to implement a longitudinal approach using the fixed effects model.

The fixed effects model assumes that unobservable characteristics such as the child’s cognitive ability or his genetic predisposition to experience mental illnesses do not vary over time, something more than plausible. This model relies on the variation of the independent variable, in this case, family structure. With this in mind, Table 5 presents us with the variation of household types within our sample (transition matrix). As we can see, a 7.54% of families that were two-parent households (i.e. cohabitating or married) transition to single parent households between the first and second wave of ELPI.

TABLE 5: *Transition Matrix.*

		2012			
		Both parents	Single-parent household	Widowed	Immigrated
2010	Both parents	92.15	7.54	0.32	0
	Single-parent household	16.34	79.34	0.64	3.69
	Widowed	0	0	100	0
	Immigrated	31.58	60.06	1.55	6.81

Source: Author's own based on ELPI 2010 & 2012

We also rely on the use of fixed effects model using the Hausman test, which rejected the use of random effects, significant at a 1%, confirming our intuition that the fixed effects model is the correct approach in this case. We will only compare children living in single parent households due to separation or divorce to children from two-parent households. In order to do so, our model will have two dependent variables, the CBCL score for socio emotional state, and the PPVT for cognitive achievement (these tests were described in the previous section). A higher score in the CBCL will translate into a worse emotional estate while a higher score in the PPVT is associated to a higher cognitive development. Our model translates into equation 1:

$$y_{i,t}^j = \beta_0^j + \beta_1^j SingleParentHousehold_{i,t} + \beta_2^j X_{i,t} + \varepsilon_{i,t} \quad (1)$$

Where $y_{i,t}^j$ is the test score of test “j”, which may be the PPVT for cognitive achievement or the CBCL for socio emotional state, for the child “i”, during the year “t”. Our variable of interest is $SingleParentHousehold_{i,t}$, which is a dummy that takes the value 1 when the child “i” belongs to a single parent household, in the year “t”, due to divorce or separation, and 0 if the child comes from a two-parent household. We will also control for other relevant variables according to our intuition and previous literature, these are contained in a $X_{i,t}$ vector. Finally, $\varepsilon_{i,t}$ is the error.

Our controls include income, since it has been found to diminish of the effects of divorce (Biblarz & Gottanier, 2000; Amato & Gilbreth, 1999; Corak, 1998; Ginther & Pollak, 2004). We also control for mother's education, area where the child lives (urban or rural), mother's occupational status, and assistance to a preschool center. Our data set also allows us to construct two measures of stimulation. The first one is a cognitive measure and refers to the existence of ten or more visible books: if there are more 10 or more books in the house the dummy variable takes the value 1, 0 if it doesn't. The second one is an emotional measure and it refers to the mother's relationship with her child, observed during the interview. There are four points considered to construct this variable: (i) talking to the child while the interview is being done, (ii) saying nice things about the child, (iii) touching, hugging or holding the child during the interview and finally, (iv) not yelling at him during the interview. With those four indicators we build an indicator that is basically the sum of the answers, 1 if the parent meets the criteria, 0 if they don't. Households with two biological parents are significantly more likely to have ten books or more, and also have a higher probability of exhibiting all four behaviors described earlier, during the interview.

b. Results

Table 6 summarizes our findings. When we just control for family structure, model (1), signs are intuitive; however family structure is not significant for cognitive development. The latter is not true when we focus on socio emotional state measured by the CBCL test. Belonging to a single parent household adds 1.613 points to the CBCL score.

In model (2) we control for mother's characteristics: cognitive development does not seem to be affected by our controls, but for socio emotional abilities the effect of the mother's occupational status is significant, with a negative sign showing that working mothers have children with better socio emotional conditions, while a mother with higher education tends to deteriorate her children's emotional state.

Model (3) controls for household income and area, while models (4) and (5) include variables of stimulation and assistance to preschool as controls. The final specification shows that family structure is only significant for emotional state but does not have a relevant impact on cognitive achievement, even though it has the expected sign. Assistance to preschool seems to be one of the few significant variables for cognitive development, the other one being area of residence. On the other hand, our cognitive and emotional proxies have a significant and positive effect on emotional state (i.e. negative sign, lower test score), assistance to preschool is also significant and improves a child's emotional well-being.

TABLE 6: Results using the Fixed Effects Model, cohorts 2010 and 2012.

Tests	(1)		(2)		(3)		(4)		(5)	
	PPVT	CBCL	PPVT	CBCL	PPVT	CBCL	PPVT	CBCL	PPVT	CBCL
Single parent household==1	-1.141 (0.737)	1.613*** (0.437)	-1.064 (0.741)	1.691*** (0.438)	-1.029 (0.741)	1.620*** (0.438)	-1.048 (0.740)	1.497*** (0.433)	-0.966 (0.739)	0.988** (0.415)
Income (log)					0.2 (0.123)	-0.331*** (0.0794)	0.183 (0.123)	-0.291*** (0.0785)	0.103 (0.124)	-0.0611 (0.0758)
Mother's Occupational Status (1 if she works)			0.345 (0.565)	-1.448*** (0.343)	0.284 (0.567)	-1.344*** (0.343)	0.278 (0.567)	-1.290*** (0.339)	0.107 (0.566)	-0.556* (0.326)
Mother's education+			-0.00936 (0.0270)	0.0368** (0.0154)	-0.0073 (0.0270)	0.0350** (0.0153)	-0.00717 (0.0270)	0.0331** (0.0152)	-0.00204 (0.0269)	0.0202 (0.0145)
Area (1 if countryside)					2.166** (1.012)	0.692 (0.620)	2.112** (1.012)	0.805 (0.613)	2.170** (1.010)	0.714 (0.586)
Cognitive Stimulation Proxy (1 if >10 books)							1.142** (0.481)	-3.375*** (0.292)	0.712 (0.488)	-2.164*** (0.285)
Emotional Proxy							0.00702 (0.212)	-0.0372 (0.133)	0.185 (0.215)	-0.591*** (0.130)
Assistance to Preschool=1									2.080*** (0.430)	-5.042*** (0.228)
Observations	13,279	14,303	13,274	14,297	13,274	14,297	13,274	14,297	13,274	14,297
R-squared	0.001	0.003	0.001	0.007	0.002	0.01	0.004	0.035	0.009	0.116

Notes: robust standard errors in parenthesis, variables significant at 1% ***; variables significant at 5% **; variables significant at 10%*.

(+) This indicator takes the value of 0 if the mother has no education, 1 if she has 8 or less years (elementary), 2 if she had 12 years or less (highschool), 3 if she has more than 12 years in a professional institute, 4 if she has a bachelor's degree and 5 if she has a post graduate degree.

Source: Author's own elaboration based on ELPI 2010 & 2012

As we can see in Table 7, children from two-parent household that will suffer disruption in the future perform considerably, and significantly, worse than their two-parent household counterparts that will not experience disruption. The latter may be product of: (i) parents that will divorce are different from parents that will stay together, therefore, the results of their children are different, which would be captured by our fixed effect or (ii) the hostile environment that leads to a divorce or separation affects the child before the divorce takes place. The latter would suggest that our results may be biased downward, since we're only measuring the effect of divorce or separation once it happens, and we're not able to identify the effect to its full extent.

TABLE 7: *Test Scores Comparing Children and Mothers from Families that will experience Divorce vs. those that won't.*

Test Scores	Families that WILL NOT experience divorce		Families that WILL experience divorce before 2012		<i>t-test</i>
	Mean	Std. Dev.	Mean	Std. Dev.	
CBCL	58.94	9.70	61.38	9.38	4.92***
TVIP	105.04	15.73	103.00	13.69	-2.12**
BFI (parents)	3.00	0.83	3.23	0.80	6.05***

Notes: differences significant at 1% ***; variables significant at 5% **; variables significant at 10%*.

Source: Author's own elaboration based on ELPI 2010 & 2012.

The CBCL test score is higher for children growing up in families that will experience divorce, proving that their emotional state worsens before the disruption takes place. Something similar happens to mothers, comparing their BFI test scores for neurosis shows that mothers from households that will not experience disruption have better neurosis levels, even though both groups are over the threshold of neurosis. The mother's state of mind is a relevant variable, since mothers with normal or good psychological states contribute to the development of their children (Tomlinson et al., 2014); however, we were not able to include it in our specification due to the lack of observations in 2012 and lack of variation, something vital for our approach, the fixed effects model

Another way in which disruption could affect a kid's development is through stimulation. Having two birth parents at home should translate into higher levels of stimulation, since both parents are interested in investing in the child (Tartari, 2006). Due to data limitations, we're not able to perform an analysis similar to the previous one using the frequency of stimulation, the 2010 cohort does not ask parents for

frequency, but it does tell us if a child was exposed to different stimulus that should enhance his/her performance both in cognitive and emotional tests.

Considering that only 0.14% of single parent households, are father-headed households we compare, in 2010, if fathers from two-parent families that will not divorce are different from those fathers that will divorce in the future. In Table 8, we can see that the effects of divorce or separation start before the disruption takes place; fathers that will leave the house before the 2012 cohort are significantly less likely to perform different stimulation activities.

TABLE 8: *Child Stimulation According to Future Divorce.*

Did the child receive the following stimulus from his/her father?	Child WON'T experience divorce		Child WILL experience divorce		t-test
	Mean	Std. Dev.	Mean	Std. Dev.	
Reading books/stories	31.4%	46.4%	24.47%	43.0%	3.43***
Telling him/her stories	31.4%	46.4%	29.4%	45.6%	0.95
Singing songs to him/her	44.8%	49.7%	37.4%	48.4%	3.32***
Going to parks/museums/etc	64.1%	48.0%	60.3%	49.0%	1.72*
Talk/Draw with him/her	50.2%	50.0%	43.4%	49.6%	2.99***

Notes: differences significant at 1% ***; variables significant at 5% **; variables significant at 10%*.
Source: Author's own elaboration based on ELPI 2010 & 2012.

The latter coincides with Garriga's (2008) results using the British Cohort Study, indicating that mother from families that will experience divorce have worse indicators related to neurosis when we compare them to mothers from intact families that will not divorce before the second wave. However, unlike the author, we're also able to establish that the children from families that will divorce have worse emotional statuses and are less exposed to stimulation than their two-parent household peers who will not experience divorce.

Results according to gender

Bertrand and Pan (2011) use "The Early Childhood Longitudinal Study: Kindergarten Cohort" data to establish that family composition has a direct impact on externalization problems later in boys' lives; however the latter is not true for girls. According to the authors, this result could be influenced by the fact that single mother invest more time in their daughter, leaving the boys less attended.

TABLE 9: Results According to Gender using the Fixed Effects Model, cohorts 2010 and 2012.

Tests	(1)		(2)		(3)		(4)	
	PPVT	CBCL	PPVT	CBCL	PPVT	CBCL	PPVT	CBCL
Single Parent Household (Single=1)	-2.006**	1.436**	-1.986*	1.555**	-1.969*	1.303**	-1.916*	0.830
	(1.022)	(0.606)	(1.028)	(0.607)	(1.027)	(0.599)	(1.025)	(0.574)
Interaction (Single parent=1; Girl=1)	1.801	0.370	1.914	0.283	1.914	0.406	1.974	0.330
	(1.475)	(0.875)	(1.481)	(0.876)	(1.480)	(0.864)	(1.476)	(0.827)
Income (log)					0.183	-0.290***	0.102	-0.0607
					(0.123)	(0.0785)	(0.124)	(0.0758)
Mother's Occupational Status (1 if she works)			0.358	-1.447***	0.292	-1.289***	0.122	-0.556*
			(0.565)	(0.343)	(0.567)	(0.339)	(0.566)	(0.326)
Mother's education+			-0.01000	0.0367**	-0.00781	0.0330**	-0.00269	0.0201
			(0.0270)	(0.0154)	(0.0270)	(0.0152)	(0.0269)	(0.0145)
Area (1 if countryside)					2.140**	0.806	2.199**	0.715
					(1.012)	(0.613)	(1.010)	(0.587)
Cognitive Stimulation Proxy (1 if >10 books)					1.132**	-3.377***	0.701	-2.166***
					(0.481)	(0.292)	(0.488)	(0.285)
Emotional Proxy					0.00612	-0.0375	0.185	-0.591***
					(0.212)	(0.133)	(0.215)	(0.130)
Assistance to Preschool=1							2.085***	-5.042***
							(0.430)	(0.228)
Observations	13,279	14,303	13,274	14,297	13,274	14,297	13,274	14,297
R-squared	0.001	0.003	0.001	0.006	0.003	0.034	0.008	0.116

Notes: robust standard errors in parenthesis, variables significant at 1% ***; variables significant at 5% **; variables significant at 10%*.

(hishschool), 3 if she has more than 12 years in a professional institute, 4 if she has a bachelor's degree and 5 if she has a post graduate degree.

Source: Author's own elaboration based on ELPI 2010 & 2012

With this study in mind, we decided to perform the previous analysis according to the gender of the studied child. Since we're using panel data with fixed effects, and biological gender is a variable that does not vary between 2010 and 2012, we interact the child's gender with our variable of interest, which is family composition. Table 9 shows our results, as we can see the gender and family type interaction variable is not significant.

Area and assistance to preschool maintain its significance for our cognitive measure, the PPVT test, while our cognitive and emotional proxies maintain its sign and significance for our socio emotional variable, the CBCL test. The same happens with assistance to preschool and mother's occupational status.

Since Bertrand and Pan's (2011) results are apparently linked to the fact that mothers invest more time in their daughters, we perform a similar analysis to the one with fathers in the previous section.

There are three interesting results we can extract from Table 10. First, mothers are considerably more involved in the stimulation of their sons and daughters. As we can see, mothers are far more likely to be involved in different activities with their children than fathers.

TABLE 10: *Child Stimulation According to Future Divorce and Child's Gender*

Did the child receive the following stimulus from his/her mother?	No divorce		Divorce	
	Girl	Boy	Girl	Boy
Reading books/stories	68.9%	65.6%	65.0%	59.3%
Telling him/her stories	66.6%	64.6%	69.6%	58.2%
Singing songs to him/her	91.9%	90.2%	91.8%	87.8%
Going to parks/museums/etc	95.8%	93.4%	93.6%	93.3%
Talk/Draw with him/her	92.4%	90.7%	91.6%	88.2%

Source: Author's own elaboration based on ELPI 2010 & 2012

Secondly, mothers that will experience divorce do stimulate their sons and daughters less than their peers that will not experience divorce, suggesting that is not only the parent that will leave, predominantly the father, who is less likely to under stimulate his sons and/or daughters, but also the resident parent, predominantly the mother, generating once again evidence of auto-selection.

Finally, we can see that both mothers that will experience divorce are significantly less likely to stimulate their children compared to mothers that won't⁵, repeating the same pattern found for the father.

Lundberg et al. (2006) focus on the mother's time allocation differences according to the gender of their children. They establish that single mothers spend more time with daughters relative to sons than married mothers, which according to the authors is consistent with a preference for the *same sex child*. Unlike the authors, we're only able to establish that difference within the group of mothers that will not divorce⁶. This might explain Acock (1988)'s findings that there are positive effects of divorce, such as, higher vocal skills for boys.

As we have seen in this section, unlike Bertrand and Pan's (2011) results, we did not find a significant difference in the effects of family disruption according to sex. This could be due to the fact that unlike the authors, we focus on cognitive achievement and socio emotional state as a whole, considering possible externalization and internalization problems.

Results according to age

Another important aspect of our study that differentiates it from others, is that we focus on the short term effect of family disruption at an early age, at least until new waves of ELPI are available. Since stimulation at this age plays an important role in cognitive achievement (Bucarey, Ugarte and Urzua, 2014) and socio emotional development, especially the former, we perform our analysis considering different age thresholds.

In order to establish our thresholds, we turn to neuroscience literature and studies of brain development. Werker and Hensch (2015) find that the brain's plasticity before twenty four months makes interventions at this age considerably more useful than interventions later in life. On the other hand, Reiss (1996) establishes, using MRIs and their images correlation to IQ, that after five years of age there does not seem to be considerable increases in brain volume, but replacement of grey and white matter, this corroborates Reiss' (1996) findings that suggest that the brain reaches its adult size around this age.

⁵ Mothers that will not divorce in the future are more like to read to their children, sign songs with them and talk or draw with their sons or daughter, significant at a 1%, finally they're more likely to go to parks/museums significant at a 10%.

⁶ Mothers that will not divorce are more likely to read and talk to their daughters relative to their sons, significant at a 1%. They're also more likely to sing to them or take them to parks at a 5%, and more likely to tell stories to their daughters relative to their sons, significant at a 10%.

TABLE 11: *Results According to Age using the Fixed Effects Model, cohorts 2010 and 2012.*

Tests	(1)		(2)		(3)		(4)	
	PPVT	CBCL	PPVT	CBCL	PPVT	CBCL	PPVT	CBCL
Single Parent Household (Single=1)	0.911 (1.237)	-5.326*** (1.071)	0.859 (1.240)	-5.011*** (1.072)	0.758 (1.245)	-4.790*** (1.060)	0.0436 (1.252)	-2.797*** (1.022)
Interaction (Single parent=1; <25 months=1)		10.97*** (1.492)		10.53*** (1.492)		9.996*** (1.478)		5.349*** (1.435)
Interaction (Single parent=1; <60 months=1)	-3.178** (1.540)	7.601*** (1.198)	-2.988* (1.545)	7.351*** (1.198)	-2.803* (1.555)	6.868*** (1.185)	-1.572 (1.574)	4.336*** (1.144)
Income (log)					0.182 (0.123)	-0.288*** (0.0782)	0.105 (0.124)	-0.0655 (0.0757)
Mother's Occupational Status (1 if she works)			0.311 (0.565)	-1.324*** (0.342)	0.251 (0.567)	-1.177*** (0.338)	0.0982 (0.566)	-0.516 (0.326)
Mother's education+			-0.00750 (0.0270)	0.0318** (0.0153)	-0.00551 (0.0270)	0.0286* (0.0151)	-0.00129 (0.0269)	0.0181 (0.0145)
Area (1 if countryside)					2.145** (1.012)	0.754 (0.610)	2.187** (1.010)	0.696 (0.586)
Cognitive Stimulation Proxy (1 if >10 books)					1.076** (0.482)	-3.287*** (0.291)	0.691 (0.488)	-2.144*** (0.285)
Emotional Proxy					0.0444 (0.213)	-0.113 (0.133)	0.200 (0.216)	-0.619*** (0.130)
Assistance to Preschool=1							2.008*** (0.433)	-4.967*** (0.229)
Observations	13,279	14,303	13,274	14,297	13,274	14,297	13,274	14,297
R-squared	0.001	0.009	0.001	0.013	0.004	0.040	0.009	0.118

Notes: robust standard errors in parenthesis, variables significant at 1% ***; variables significant at 5% **; variables significant at 10%*.

(hishschool), 3 if she has more than 12 years in a professional institute, 4 if she has a bachelor's degree and 5 if she has a post graduate

Source: Author's own elaboration based on ELPI 2010 & 2012

With this in mind, we establish two thresholds, one before 24 months and a second one between 25 and 60 months.

Since the PPVT is only applied to children 30 months and older, the first threshold will only be valid for socio emotional state. Both tests will be analyzed in the second threshold that considers children from 25 to 60 months of age as well as a third, implicit threshold, sixty one months and up.

Table 11 shows us that just like our previous analyses, family disruption does not seem to have a significant impact on cognitive development; however it has a significant effect on socio emotional state throughout the different age stages analyzed. An important result is that the effect seems to weaken as the child gets older, reversing for the third threshold, 61 month and up.

The latter, is in sync with Bucarey, Ugarte and Urzua (2014), but could also be due to the fact that older children are more aware of family conflict and since a big portion of the effect associated with divorce seems to be linked to the environment previous to the divorce (Cherlin et al., 1997), less stimulation and mother's worse emotional state, it would be natural to assume that for many older children the divorce itself may come as a relief.

We also perform similar analyses for children of teen mothers and children who belong to an indigenous group but neither of the analyses show significant effect for the interaction variables⁷.

V. Discussion

As we stated in the previous section, there is a negative effect on socio emotional state associated with disruption. However, we have not discussed the mechanisms through which divorce may affect children. In section II, we described four main theories about how disruption may affect children: (i) the parental fitness model, (ii) the family structure model, (iii) the household economic model and, finally, (iv) the marital conflict theory.

Taking advantage of the information that our data set has, and the fact that we are able to identify different characteristics of the two-parent households that will eventually become single-parent households, we defined different strategies to establish the channel through which family disruption affects children.

⁷ See Appendix Tables 2 & 3.

First, we turn to the parental fitness model. According to this theory parents who will divorce have certain characteristics that are detrimental for the development of children. One could argue that one of these characteristics should be neurosis. We should expect that mothers with a higher neurosis level would be more likely to divorce, but once the disruption takes place, they should not be significantly different than their peers that will divorce, since according to this theory it is the characteristics of both the father and the mother, regardless of their marital status, what affects the development of children.

As we can see in Table 12, the latter does not occur. Both mothers that are already divorced or separated and single mothers have significantly lower neurosis level compared to their “still married” peers. It is important to note, that all the groups of mothers, including traditional mothers that will not divorce between 2010 and 2012, exhibit high levels of neurosis (a score over three is considered clinical).

TABLE 12: *Test Scores Comparing Children and Mothers from Families that will experience Divorce vs. Single Mothers vs. Already Disrupted Families.*

Test Scores	(1) Families where the father was never present		(2) Families that ARE divorced in 2010		(3) Families that WILL experience divorce before 2012		<i>t-test</i>	<i>t-test</i>
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	(1)-(3)	(2)-(3)
CBCL	61.32	9.32	62.34	10.19	61.38	9.38	0.09	-1.31
TVIP	104.51	14.40	103.81	16.07	103.00	13.69	-1.19	-0.61
BFI (parents)	3.09	0.80	3.13	0.85	3.23	0.80	2.84***	1.77*

Notes: differences significant at 1% ***; variables significant at 5% **; variables significant at 10%*.

Source: Author's own elaboration based on ELPI 2010 & 2012.

Table 12 also allows us to check for the family structure model. According to this theory, children from disrupted households have problems developing later in life, because the relationship with the resident parent, in most cases the mother, becomes more peer like. If the latter was true, there should be significant differences for children from already disrupted families, compared to children whose parents will divorce in the future, who have not experienced this peer-like relationship yet.

Even when we do not see proof of this theory yet, it is likely that these peer like relationships manifest themselves later in life, i.e. the child's adolescence, due to clear data limitations; we are not able to deepen our analysis about this theory.

We then turn to the household economic level. This theory tells us that the non-resident parent has incentives to adopt free-riding conducts and under invest in his or her child, due to the fact that he or she knows that the resident parent will invest in the child. To assess this theory we analyze the results of children from disrupted households according to the non-resident parent's involvement, in our case the father. To analyze this theory we turn to free-riding conducts, such as not giving alimony or not visiting the child. If we find significant differences, the non-resident parent's free-riding conducts may have a direct impact on the child's development.

We define as heavily involved non-resident parents those parents who give alimony and have child visitations at least once a week⁸. On the other hand, free-rider non-resident parents will be defined as those who do not meet these criteria. As we can see in Table 13, there are no significant differences between children from disrupted households where the father adopts a free-riding behavior compared to heavily involved parents.

TABLE 13: *Test Scores Comparing Children and Mothers from Families that will experience Divorce vs. Already Disrupted Families Controlling for Father Involvement.*

Test Scores	(1) Divorced Families where the father is NOT involved*		(2) Divorced Families where the father is heavily involved**		(3) Families that WILL experience divorce before 2012		<i>t-test</i> (2) -(1)	<i>t-test</i> (3) -(2)
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.		
	CBCL	62.30	9.95	61.03	9.37	61.38		
TVIP	102.54	15.85	104.15	15.50	103.00	13.69	0.82	-0.88
BFI (parents)	3.20	0.79	3.06	0.83	3.23	0.80	-1.80***	3.19***

*We'll assume that a father is not involved when he does not give alimony nor visits the child.

**We'll assume a father is heavily involved when he gives alimony and visits the child at least weekly

Notes: differences significant at 1% ***; variables significant at 5% **; variables significant at 10%*.

Source: Author's own elaboration based on ELPI 2010 & 2012.

We established in the previous section that in families where disruption will occur, fathers are significantly less likely to stimulate their children or accompany them in different activities, in order to address that, we perform the same analysis with a stricter measurement of involvement.

⁸ All our specifications of heavily involved include alimony; however we control for differences according to the frequency of the father's visitations.

Table 14 shows that when we restrict our involvement variable to fathers who visit their children or have contact with them at least three times a week, not only mothers exhibit significantly lower levels of neurosis, but children perform significantly better in the PPVT test compared to their peers in two-parent households whose parents will eventually divorce.

TABLE 14: *Test Scores Comparing Children and Mothers from Families that will experience Divorce vs. Already Disrupted Families Controlling for Father Involvement II.*

Test Scores	(1) Divorced Families where the father is NOT involved*		(2) Divorced Families where the father is heavily involved**		(3) Families that WILL experience divorce before 2012		<i>t-test</i> (1)-(2)	<i>t-test</i> (3)-(2)
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.		
	CBCL	62.30	9.95	61.04	9.02	61.38		
TVIP	102.54	15.85	106.32	15.41	103.00	13.69	-1.67*	-2.05**
BFI (parents)	3.20	0.79	3.06	0.80	3.23	0.80	1.73*	2.78***

*We'll assume that a father is not involved when he does not give alimony nor visits the child.

**We'll assume a father is heavily involved when he gives alimony and visits the child at least three times a week

Notes: differences significant at 1% ***; variables significant at 5% **; variables significant at 10%*.

Source: Author's own elaboration based on ELPI 2010 & 2012.

Considering all of the above we cannot discard the possibility that free-riding attitudes by the non-resident parent may play a role in the worse results obtained by children who have suffered disruption compared to their peers who haven't; however an important aspect of these free-riding attitudes is that they begin before the disruption takes place. As we saw in the previous section, both mothers and fathers are less likely to do outdoors and indoors activities with their children, which may explain why there are no significant cognitive or socio emotional differences between the groups who have not suffered the disruption, compared to the group of children who have suffered divorce but have weekly visitations. Another important aspect is that even when we use a stricter measurement of involvement for the non-resident father, emotionally, we are not able to significantly distinguish between the group that already suffered the disruption with the one that hasn't. The latter may be an indicator that there is another effect in play, which brings us to the last theory, the marital conflict model.

As Table 8 showed us, mothers that will experience divorce have a higher level of neurosis and children from families that will experience divorce perform significantly worse compared to their peers from non-disrupted households that will not experience divorce before the 2012 cohort. We established that if the latter was due to the parental fitness model, these differences were taken into account and they would not bias our results. However, the analysis of this section showed that once the divorce occurs, or even when the non-resident parent never lived with the child, the mother's level of neurosis significantly improves.

The latter, goes against the parental fitness model and may be considered evidence of a pre-disruption marital conflict effect, which would support Cherlin et al. (1997)'s findings that a large portion of the effect of disruption on emotional state is due to pre-disruption household conditions.

VI. Conclusions

Our study centers on the effects of family disruption using longitudinal data and the fixed effects model. There is plenty of international evidence that suggests that separation or divorce has a long term negative effect on children; however our study focuses on the short term effects of disruption during early childhood.

First, we identify five different types of families, (i) two-parent households where parents are married, or *traditional*, (ii) two-parent households where parents cohabitate and single parent households due to (iii) divorce or separation, (iv) death of one of the parents and (v) immigration of one of the parents. We discover that traditional households are richer, have mother with higher education, older mothers, a lower percentage of mothers who were teens when their children were born and lower neurosis levels. At the same time, children from traditional households outperform their peers from other type of households both in cognitive and socio emotional test scores. To measure the former we use a Hispanic version of the PPVT, a test applied to children thirty months old and up, that measures language abilities and is believed to be a great predictor of cognitive abilities. On the other hand, to measure socio emotional state we use the CBCL, a test applied to children eighteen months and up, that focuses on internalization and externalization problems, while a better cognitive development translates into a higher PPVT score, a higher CBCL score will indicate a worse emotional state.

We use the fixed effects model, which assumes that unobservable relevant characteristics are constant through time, in our case cognitive abilities and genetic predisposition to depression, anxiety and other psychological illnesses, and control for other characteristics chosen according to related literature and our framework. The model also needs variation of the relevant variable, in our case family composition. In order to confirm the latter we construct a transition matrix and discover that a 7.54% of our sample went from a two-parent household to a single parent household due to divorce or separation.

Next, we turn to control variables, the ones used in this study were income (in logarithmic form), the mother's occupational status, an index constructed based on her education, area where the child lives, whether she or he assists to a preschool center and two proxies, an emotional proxy constructed based on behaviors of the caregiver towards the child observed by the interviewer and, finally, a cognitive stimulation proxy based on whether the child had ten or more books available in the house.

Incorporating all the control variables shows us that there is not a significant effect of family composition for cognitive development, but there's a significant and negative effect of disruption for socio emotional well-being. Experiencing disruption between 2010 and 2012 increases the CBCL test score by 0.988 points, significant at a 5%.

The fact that we do not find a significant effect for cognitive achievement motivated us to study families that will experience divorce before it takes place. Comparing two parent households, that will end up in divorce to the ones that won't shows us that there are clear differences between the two. First, mothers from the former group are considerably more "neurotic", measured using the BFI test, and are less likely to stimulate their children compared to their two-parent household peers that won't experience divorce. Secondly, fathers that will experience divorce are less likely to stimulate their children before the disruption. Finally, children from households that will experience divorce show worse cognitive test scores and socio emotional states, previous to the disruption. There are two possible explanations for these phenomena: (i) it may be seen as proof of the auto-selection theory, which establishes that the worse results obtained by children coming from single-parent households are due to the fact that parents that end up getting divorced or separated have certain characteristics that are not likely to promote a child's healthy development, hence the worse results among children and higher neurosis levels and lower stimulation among parents that will experience divorce or (ii) marital conflict starts before disruption takes place and affecting the mother's neurosis levels and the child's cognitive development and socio emotional state, the latter would suggest that there may be downward bias in our results which would explain why we don't find any significant effects for cognitive development; however this theory would not explain why fathers that will experience divorce do not engage in activities with their children, unless conflict drives him away from both the mother and the child.

We then focus on differences by gender; unlike other studies we find that the effect of family disruption does not vary significantly between boys and girls. We perform a similar analysis, and compare differences for stimulation between boys and girls and discover that mothers are significantly more likely to stimulate their daughters rather than their sons.

Then, we focus on differences according to the child's age. To establish thresholds we turn to neuroscience literature and we construct three groups, children younger than twenty four months due to the brain plasticity before this age, children between twenty five and 60 months, since the brain appears to reach its adult volume at this age, and children older than 60 months. We find that for all three groups there's no significant effect for cognitive achievement, as we have found in our previous analyses; however all three groups show a significant effect of family disruption in socio emotional state, and it is

decreasing over time. For the first two groups, before twenty four and sixty months, the effect of family disruption is negative since this group show higher CBCL test scores, while for the oldest group the effect of family disruption is positive, i.e. lower CBCL test score. We hypothesize that it may be due to exposure to family conflict, which we have proof starts before the disruption. Older kids may be more susceptible to arguments and may experience disruption as a relief, instead of a stressful event.

Even though ELPI has only two waves, we're able to establish a short term effect of family disruption. We see that there's a negative effect for cognitive development among children, in spite of their gender, and that effect decreases over time. We're also able to establish that the effects of disruption are previous to the divorce or separation, which may be due to two different reasons: (i) auto selection, parents that will divorce are different from their peers that won't, hence their children perform worse when we compare them to children from traditional households that will stay together or (ii) the effects of divorce in the family environment the place before the disruption itself, so our variable for disruption does not capture the whole effect of it. It is important to note that while the former does not affect our results, since the fixed effects model controls for heterogeneity between families, the latter would suggest that disruption has a greater effect than the one we are finding.

In order to investigate the dilemma presented above, we observe different types of single-parent households in 2010 and compare them to households in 2010 that have not suffered disruption yet, but eventually will. When comparing mothers from already disrupted households to those that will experience divorce we are able to establish evidence that goes against the parental fitness model. Then we compare children's results between these two groups and are not able to establish evidence supporting the family structure model, although we understand that this theory may require of more cohorts and older children to show some evidence.

Due to data limitations, we're not able to establish the effect of family disruption on stimulation frequency, but we're able to establish that children that will experience divorce are less likely to experience different stimulus from their father, or their mother weekly. To address this issue we compare children from disrupted households with higher levels of non-resident parent involvement to children who will experience divorce but during 2010 lived in a two-parent household and children from disrupted households where the father was not involved in their upbringing. The analysis shows that there is a significant positive effect of the father's active involvement in the cognitive development of the child, when we use the stricter measurement for involvement, and there's also a positive effect on the neurosis levels of the mothers.

Finally, considering that we found evidence against the parental fitness model and viewing the mother's neurosis score as a measurement of the conflict within the child's household, we believe that the conflict level where a child grows up has a fundamental role in his development; however, this conflict does start before the disruption and may continue after it, but since the BFI is not available in 2012 for mothers who participated in the survey in 2010, we're not able to include this variable in our analysis.

Since there are only two available waves of ELPI we're only able to establish disruption's short term effects; however with new waves of the survey we'll be able to determine family disruption's effects for longer periods and whether these effects attenuate over time. Some of the hypotheses about the way in which family structure affects children, such as the family conflict model or the family structure model, may also require of longer periods of time for researchers to discover evidence that support them; however within a two year period, we're able to establish evidence that goes against the parental fitness model and supports the household economic model. We believe that our analysis is an important contribution to the public policy both domestically and internationally, because as evidence shows, even though the negative effects of disruption, appear before the disruption takes place, there's still a negative socio emotional effect of the disruption once it takes place, suggesting that children coming from disrupted households should be considered a priority when it comes to public policy and their access to government aid.

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Appendix

Appendix Tables 1.a & 1.b

Type of household by quintile 2010						
		Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Both parents	Married	32.69	33.04	33.04	40.03	52.92
	Cohabiting	30.53	36.44	34.04	32.59	28.93
Separated o Divorced		32.04	26.73	29.94	24.68	15.77
Widowed		0.66	0.28	0.33	0.21	0.18
Immigrated		4.08	3.52	2.64	2.49	2.20
TOTAL		100	100	100	100	100

Type of household by quintile 2012						
		Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
Both parents	Married	31.71	32.38	34.34	38.96	51.23
	Cohabiting	29.03	35.63	33.93	33.36	30.68
Separated o Divorced		35.64	29.78	29.88	25.91	17.16
Widowed		1.03	0.57	0.75	0.53	0.26
Immigrated		2.59	1.64	1.09	1.23	0.67
TOTAL		100	100	100	100	100

Source: Author's own elaboration based on ELPI 2010 & 2012

TABLE A.2: Results According to Having a Teen Mom using the Fixed Effects Model, cohorts 2010 and 2012.

Tests	(1)		(2)		(3)		(4)	
	PPVT	CBCL	PPVT	CBCL	PPVT	CBCL	PPVT	CBCL
Single Parent Household (Single=1)	-1.204 (0.796)	1.510*** (0.480)	-1.109 (0.801)	1.592*** (0.481)	-1.095 (0.800)	1.408*** (0.475)	-1.069 (0.798)	1.076** (0.455)
Interaction (Single parent=1; Teen mom=1)	0.436 (2.105)	0.611 (1.166)	0.313 (2.107)	0.585 (1.164)	0.326 (2.105)	0.524 (1.148)	0.720 (2.101)	-0.519 (1.100)
Income (log)					0.183 (0.123)	-0.291*** (0.0785)	0.103 (0.124)	-0.0608 (0.0758)
Mother's Occupational Status (1 if she works)			0.344 (0.565)	-1.447*** (0.343)	0.277 (0.567)	-1.290*** (0.339)	0.106 (0.566)	-0.556* (0.326)
Mother's education+			-0.00936 (0.0270)	0.0367** (0.0154)	-0.00718 (0.0270)	0.0330** (0.0152)	-0.00204 (0.0269)	0.0203 (0.0145)
Area (1 if countryside)					2.113** (1.012)	0.807 (0.613)	2.172** (1.010)	0.711 (0.587)
Cognitive Stimulation Proxy (1 if >10 books)					1.142** (0.481)	-3.374*** (0.292)	0.711 (0.488)	-2.164*** (0.285)
Emotional Proxy					0.00668 (0.212)	-0.0388 (0.133)	0.185 (0.215)	-0.590*** (0.130)
Assistance to Preschool=1							2.086*** (0.430)	-5.047*** (0.228)
Observations	13,279	14,303	13,274	14,297	13,274	14,297	13,274	14,297
R-squared	0.001	0.003	0.001	0.007	0.004	0.035	0.009	0.116

Notes: robust standard errors in parenthesis, variables significant at 1% ***; variables significant at 5% **; variables significant at 10%*.

(hishschool), 3 if she has more than 12 years in a professional institute, 4 if she has a bachelor's degree and 5 if she has a post graduate

Source: Author's own elaboration based on ELPI 2010 & 2012

TABLE A.3: Results According to Belonging to and Indigenous Group using the Fixed Effects Model, cohorts 2010 and 2012.

Tests	(1)		(2)		(3)		(4)	
	PPVT	CBCL	PPVT	CBCL	PPVT	CBCL	PPVT	CBCL
Single Parent Household (Single=1)	-1.317 (0.813)	1.539*** (0.484)	-1.231 (0.820)	1.615*** (0.481)	-1.207 (0.821)	1.430*** (0.478)	-1.134 (0.822)	0.895* (0.461)
Interaction (Single parent=1; Indigenous=1)	1.617 (1.994)	0.694 (1.579)	1.520 (1.996)	0.714 (1.584)	1.458 (1.977)	0.626 (1.570)	1.534 (1.923)	0.874 (1.530)
Income (log)					0.183 (0.151)	-0.291*** (0.0731)	0.102 (0.151)	-0.0610 (0.0696)
Mother's Occupational Status (1 if she works)			0.348 (0.570)	-1.448*** (0.363)	0.282 (0.572)	-1.290*** (0.359)	0.111 (0.569)	-0.556 (0.347)
Mother's education+			-0.00942 (0.0300)	0.0368** (0.0184)	-0.00724 (0.0301)	0.0331* (0.0189)	-0.00211 (0.0301)	0.0202 (0.0174)
Area (1 if countryside)					2.114** (0.984)	0.803 (0.626)	2.173** (0.988)	0.711 (0.604)
Cognitive Stimulation Proxy (1 if >10 books)					1.139** (0.520)	-3.374*** (0.293)	0.709 (0.529)	-2.163*** (0.289)
Emotional Proxy					0.00713 (0.223)	-0.0380 (0.137)	0.186 (0.227)	-0.593*** (0.136)
Assistance to Preschool=1							2.082*** (0.449)	-5.044*** (0.220)
Observations	13,279	14,303	13,274	14,297	13,274	14,297	13,274	14,297
R-squared	0.001	0.003	0.001	0.007	0.004	0.035	0.009	0.116

Notes: robust standard errors in parenthesis, variables significant at 1% ***; variables significant at 5% **; variables significant at 10%*.
 (+) This indicator takes the value of 0 if the mother has no education, 1 if she has 8 or less years (elementary), 2 if she had 12 years or less (hishschool), 3 if she has more than 12 years in a professional institute, 4 if she has a bachelor's degree and 5 if she has a post graduate

Source: Author's own elaboration based on ELPI 2010 & 2012