The Impact of Universal Child Benefits on Family Health and Behaviours

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1 June 2018

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In 2006, the Universal Child Care Benefit was introduced in Canada for all children aged less than 6 years. This program aims to help cover the cost of children and to provide financial assistance to families with young children in their choice of childcare. We exploit this policy change to estimate the effects of unconditional family cash transfers on the health and behaviours of two-parent families and their children. Using a difference-in-differences model, we find no evidence that the program improved child and parental outcomes in aggregate. A modest but fragile beneficial effect is found for low-education families and for girls.

Key words : universal child benefits, health, well-being, behaviour.

JEL Classification : J13, I10, J18

*We wish to thank professors Steven Ambler, Jean-Marie Dufour, Catherine Haeck, Pierre Lefebvre, Philip Merrigan and Victoria Zinde-Walsh. The analysis is based on Statistics Canada's restricted-access Micro Data Files, available at the Quebec Inter-University Centre for Social Statistics (QICSS). All computations on these microdata were prepared by the authors, who assume the responsibility for the use and interpretation of these data.

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1 Introduction

Governments in many developed countries have implemented income transfer policies for families with children. The goals of these policies are to help cover the cost of children, reduce child poverty and improve the long-term opportunities of children. There are two potential channels through which additional income may influence children's outcomes. On the one hand, an increase in income would allow families to buy more goods and services (food, education, health, books or educational toys) and directly promote the development of children (labelled the "resources" channel) (Becker, 1981). On the other hand, income transfers may have an indirect impact by reducing stress and improving family relationships and emotional well-being (labelled "family process") (Duncan and Brooks-Gun, 1997).

The major challenge faced by researchers is how to distinguish the effect of income from the effect of other factors that may be correlated with income. To address endogeneity, several studies use policy reforms to attain an exogenous increase in family income. These studies show that family benefit programs have significant positive effects on children's test scores and the mental and physical health of children and mothers (Milligan and Stabile, 2009, 2011; Dahl and Lochner, 2012; Evans and Garthwaite, 2014; Baughman and Duchovny, 2016). All of these programs are means-tested and/or conditional to employment (e.g., the Earned Income Tax Credit [EITC] in the USA and the Working Families Tax Credit [WFTC] in the UK).

Little is known, however, about universal child benefits and their effects on the well-being of children and parents. Universal family benefits are paid regardless of whether parents are employed and regardless of their income. The effects of universal benefits on the well-being of children and their parents might be expected to differ from those of other redistribution programs. Hener (2016) exploited a major reform of the German child benefit system in 1996. He reports that unconditional family cash transfers decrease mothers' labour supply but have no impact on mothers' life satisfaction. With regard to a substantial birth grant in Australia, Gaitz and Schurer (2017) and Deutscher and Breunig (2018) found no evidence that the program improved the well-being of children and parents.[1] González (2018) also shows that the introduction of a universal family benefit for all new mothers in Spain had no significant effect on children's health but increased health care utilisation.

In this study, we examine the effect of a universal child benefit on the well-being of children and parents in Canada. In July 2006, the federal government introduced the Universal Child Care Benefit (UCCB) for each child under the age of 6 years. The benefit is $100 per month,

1. For children, the outcomes studied are test scores, learning measures, socio-emotional development, behavioural measures and physical health. For parents, outcomes are parenting style, parental health, household environment and parental investment.

or $1,200 annually. The goals of this program were to help cover the cost of children and to provide financial assistance to families with young children in their choice of childcare. Schirle (2015) shows that the UCCB had a significant negative impact on the labour supply of married mothers.[2] Daley (2017) also reports that mental health and life satisfaction of mothers improved after the UCCB.[3] In this study, we focus on the health and behaviours of children and parents.

It is not clear, a priori, whether the additional income from UCCB will improve the well-being of children and parents. On one hand, many studies report that income boosts the development and health outcomes of children and improves parental health and behaviours (Duncan and Brooks-Gun, 1997; Yeung et al., 2002; Cooper and Stewart, 2017). On the other hand, income seems mainly to have a major impact on disadvantaged families, and universal benefits are not effective in improving family well-being (Gaitz and Schurer, 2017; Deutscher and Breuning, 2018).

Our study contributes to the literature and policy debate on child benefits in three important ways. First, to the best of our knowledge, this is the first study to provide an empirical analysis of the impact of the UCCB on children's health and behaviours, as well as on parents. Previous studies on this program focus on labour supply, family expenditures and maternal mental health (Schirle, 2015; Koebel and Schirle, 2016; Daley, 2017). However, no evidence exists on this reform's effects on children's well-being and parent-child relationships, which are of great interest to policymakers. Second, we evaluate whether the policy has achieved its objective to improve the well-being of families. Large amounts of money are allocated to the UCCB.[4] It is important to know whether the program can be justified as an intervention for the entire population. Finally, we contribute to a small but growing literature that seeks to investigate the effects of universal child benefits on family outcomes (Hener, 2016; Deutscher and Breuning, 2018; González, 2018). There are relatively few studies on universal programs, in particular in North America where these programs are not as common as in Europe (Baker, 2011; Schirle, 2015).

For our study, we use the National Longitudinal Survey of Children and Youth (NLSCY)

2. Koebel and Schirle (2016) distinguish effects on labour supply by the marital status of mothers and show that the UCCB negatively affected the labour supply of legally married mothers but not common-law married mothers or never-married mothers. In contrast, the reform had a significant positive effect on the labour supply of divorced mothers.

3. Daley (2017) uses Canadian Community Health Survey (CCHS) data to investigate the effect of UCCB on the mental health, stress and life satisfaction of mothers. The CCHS data only cover the Canadian population aged 12 and older. Daley (2017) investigates the effects of UCCB on lone and married mothers, separately.

4. The UCCB program represents 4.5% of federal transfers individuals in 2013-14 (almost $2.8 billion). It is one of the largest transfer programs administered by the Canadian government (Treasury Board of Canada, 2013).

and the Survey of Young Children (SYC), which constitute representative samples of the Canadian population of children and families. To identify the impact of the UCCB, we use a difference-in-differences (DD) model. The treatment group consists of children aged 5 or less and their parents. By contrast, the control group consists of children aged 6 or more (with no younger siblings) and their parents.

We find no evidence that the UCCB improved child health and behaviours in aggregate. This finding is strengthened by the observation that the UCCB did not affect parental health and behaviour, the potential channel via which the cash transfer could have affected children's outcomes. Finally, a modest but fragile beneficial effect is found for low-education families and for girls.

This paper is structured as follows. Section 2 describes the UCCB reform. Sections 3 and 4 present, respectively, the data set used and the methodology. Section 5 presents empirical results. Section 6 concludes the paper.

2 Universal Child Care Benefit

The UCCB was introduced in July 2006 to provide financial assistance to families with young children in their choice of childcare. The benefit is $100 per month, or $1,200 annually, for each child under the age of 6.[5] The UCCB is universal and taxable for lower-income parents in the case of couples and for the sole parent in the case of single-parent families. The UCCB is subject to both federal and provincial/territorial income taxes.

It is rare for a family to be eligible for the UCCB and not receive it. According to the Treasury Board of Canada Secretariat (2009), 99% of eligible families received the UCCB. Parents who received the Canada Child Tax Benefit (a means-tested benefit for low- and middle-income families with children less than 18 years of age) were automatically enrolled in the UCCB ; otherwise, families applied to the Canada Revenue Agency. The application costs for the UCCB are very low, almost zero (see Schirle (2015) for more details). Families receive UCCB within 80 calendar days, and payments may be retroactive for up to 11 months. Benefits for a child are automatically interrupted the month following the child's sixth birthday.

In January 2015, the UCCB was established as $160 per month ($1,920 per year) for each child under the age of 6 and was extended to children aged 6 through 17 ($60 per month or $720 per year). In July 2016, the UCCB was replaced by a new child benefit program.

5. "The purpose of this Act is to assist families by supporting their child-care choices through direct financial support to a maximum of $1,200 per year in respect of each of their children who have not attained the age of six years"(Universal Child Care Benefit Act .S.C. 2006, c. 4, s. 168).

However, these last two programs do not affect our study because they are outside our range of data.

3 Data

To estimate the effects of the UCCB on family well-being, we use confidential micro-data from the National Longitudinal Survey of Children and Youth (NLSCY) and the Survey of Young Children (SYC). The NLSCY is a long-term, biennial survey designed to measure a wide range of characteristics related to Canadian children's development and well-being.[6] Administered by Statistics Canada, this survey started in 1994-95 (Cycle 1) and ended in 2008-09 (Cycle 8). A cohort of approximately 2,000 children aged 0-11 years was selected in the initial cycle and followed longitudinally through the entire survey. Then, in every cycle, new cohorts of 0-1-year-olds were added and followed until ages 4-5. The SYC is a cross-sectional survey of children aged 1-9 and was conducted in 2010-11. The SYC contains many of the questions on child and family well-being from the NLSCY and therefore allows us to have a longer view of the effects of the policy.[7] In all of the analysis, we use the weights provided by the NLSCY/SYC, which have been adjusted for nonresponse and post-stratified by province, age and sex to ensure that the survey is nationally representative.[8] All outcomes are reported by the person most knowledgeable of the child (almost always the mother).

The data allow us to have the age of the child (in months) at the time of the interview. As such, we are able to determine whether the child is eligible for UCCB, with families being eligible for UCCB benefits if they have at least one child under the age of 6 and are observed after July 2006. Table 1 shows the UCCB eligibility for children observed in the NLSCY/SYC. The treated are children under 6 years old, and the untreated are children aged 6 and over. For children aged 6 and over (and therefore no longer eligible for UCCB), we only keep families with no children aged 0-5 to avoid any confounding effects of the program. Cycles 1 (1994-95) to 6 (2004-05) are the pre-reform periods, and cycles 7 (2006-07) to 9 (2010-11) are post-reform periods.[9] Table 1 also shows that some child age groups are not

6. The target population was restricted to Canada's ten provinces and excluded children living on Aboriginal reserves and full-time members of the Canadian Armed Forces. These exclusions represent approximately 2% of the Canadian population.

7. See also the study by Baker, Gruber and Milligan (2017) that combines the NLSCY and SYC data to study the long-term effects of a universal childcare policy on Canadian children's outcomes.

8. To our knowledge, NLSCY and SYC are the only nationally representative data on Canadian children from birth to adulthood (McEwen and Stewart, 2014).

9. The NLSCY surveys are conducted over several months. In general, they start in September of the first year of the two-year period and end in June of the second year (Statistics Canada, 2008). For example, for cycle 6 (2004-05), data collection started on September 27, 2004, and ended on June 24, 2005. For cycle 7 (2006-07), data collection started on September 1, 2006, and ended on July 31, 2007.

observed in certain cycles. For example, children aged 8 and 9 years are not observed in cycle 8 (2008-09). As a result, given the structure of NLSCY/SYC, we use as a control group children aged 6-7 years. This control group allows the largest possible post-treatment period (2006 to 2011) and is available over all years. Nevertheless, we assess the robustness of our findings to this restriction in the empirical section. In our study, we excluded children under 12 months old because of the Canadian parental leave reform in 2001.[10] In addition, the SYC data only cover families with children aged 1-9 years.

In addition, we restrict our sample to two-parent families living outside the province of Quebec. The first restriction is due to the various provincial and federal reforms that have been implemented since 1998 and have affected the labour force participation of single mothers (Milligan and Stabile, 2007 ; Schirle, 2015). Indeed, Schirle (2015) reports that single parents face different constraints on financial and time resources compared with two-parent families and focuses on two-parent families.[11] Moreover, two-parent families remain a key focus of the universal benefits debate that aims to extend unconditional access to benefits to families to whom it was not previously made available (Bradshaw, 2012). The resulting sample captures the vast majority of parents of young children. According to NLSCY/SYC data, almost 85% of parents whose youngest child was aged less than 6 years were married or living in common-law relationships.

The second restriction comes from the fact that, in the late 1990s, Quebec implemented a universal childcare policy for all children aged 5 years or less at a cost at the time of only $5 per day. This policy had a significant impact on childcare use, maternal labour supply and child and parental well-being (Baker et al., 2008 ; Haeck et al., 2015 ; Haeck et al., 2018). During the same period, Quebec also implemented full-time kindergarten for all five-year-olds and before- and after-school care for all school-age children (at a cost at the time of $5 per day). Finally, in January 2006, Quebec established its own Quebec Parental Insurance Plan, which was more generous than the one offered by the federal government.

We use the same health and behavioural measures that are used in the evaluation of family policies in Canada and elsewhere (Baker et al., 2008 ; Kottelenberg et al., 2013 ; Haeck et al., 2018). For children, we use the following five parent-reported measures : (1) the child is in good/fair/poor health in general ; (2) hyperactivity/inattention score ; (3) emotional

10. In 2001, the federal government extended total available paid maternity leave from 25 to 50 weeks across Canada. The studies by Schirle (2015), Koebel et al. (2016) and Daley (2017) include children aged 0 years in their main analysis of the effects of the UCCB policy. As a robustness test, these authors exclude families with children under 12 months old, and their results are similar. Baker and Milligan (2010, 2015) also show that the Canadian parental leave reform had no impact on child behaviour, parenting practises or maternal depression score, measured at ages 7-24 months and ages 4-5 years.

11. Koebel et al. (2016) and Daley (2017) also distinguish between one-parent families and two-parent families to evaluate the effects of UCCB.

disorder and anxiety score ; (4) physical aggression score ; and (5) indirect aggression score. The behavioural measures are available only for children aged 4-11. [12] For parents, several parent-reported measures are also available : (1) the mother is in good/fair/poor health in general ; (2) the mother's depression score (ranging from 0 to 36) ; (3) the family dysfunction index (score ranging from 0 to 36) ; (4) the hostile/ineffective parenting score (ranging from 0 to 25) ; and (5) the consistent parenting score (ranging from 0 to 20). These measures are available for all parents, except for the hostile and consistent parenting scores, which are available for parents with children aged 2 to 11 years. For each of the child and parental scores, a higher score indicates an increased level of health/behavioural disorder, except for the consistent parenting score, for which the opposite is true. [13] Appendix Table A.1 reports the sub-questions used for each measure. [14]

Several control variables are available using the NLSCY/SYC. We use the sex of the child, the mother's and father's highest level of education (less than a high school diploma, high school diploma, some post-secondary education, post-secondary diploma), the age group of the mother and father at the child's birth (14-24, 25-29, 30-34, 35 years or more), a dummy for whether the mother or father is an immigrant, the size of the area of residence (five groups, from rural population to 500,000 residents or more), the presence of older children (no older child, one older child, two or more older children), the presence of younger children (no younger child, one younger child, two or more younger children), the presence of children of the same age and dummies for the age of the child. Appendix Table A.2 compares mothers, fathers and family characteristics among children in the treated and control groups, before and after policy implementation. We computed the pre-post difference for each group and, finally, tested the null hypothesis of no difference between treated and control groups (p-values of the chi-square test of the difference). Taken together, we found that the parent and family characteristics are balanced between the different groups, except for maternal post-secondary degree, age of the father at birth (14-24 ; 30-34) and the presence of at least two older siblings. Later, in our analysis, we report findings with and without the control variables.

12. In NLSCY/SYC data, children's behavioural measures vary by age group. Behavioural measures exist for children aged 2-3 years but cannot be compared with those for children aged 4 and over.

13. Both the child and parental scales in NLSCY/SYC data are shown to have high levels of internal consistency (Jenkins et al., 2003 ; Statistics Canada, 2010).

14. In NLSCY/SYC, there is no common cognitive measure for children under 6 and children aged 6 and over. Therefore we focus on health and behaviour measures.

4 Empirical Strategy

To estimate the effects of UCCB, we use a DD model. The treatment group includes children under 6 and their parents, who are therefore eligible for UCCB. [15] The control group includes children aged 6-7 years (with no younger siblings) and their parents (Table 1). Our empirical strategy is comparable to that used by Schirle (2015), Koebel and Schirle (2016) and Daley (2017) in estimating the impact of the UCCB on labour supply and maternal mental health. [16] We estimate the following model :

$$Y_{it} = \alpha + \theta Under6_{it} + \sum_{t=1}^{9} \gamma_t D_t + \beta UCCB_{it} + \phi X_{it} + \epsilon_{it} \quad (1)$$

where Y_{it} is the outcome of child/parent i in cycle t. Outcomes studied here are child/parent health and behaviour. The term $Under6_{it}$ is a dummy variable taking the value of 1 if the child is under 6 years old and 0 otherwise. The cycle dummies D_t capture aggregate effects common to all children in Canada. The $UCCB$ variable is an interaction term indicating that the child is under 6 years old and is observed after the introduction of the UCCB. The term X_{it} represents the control variables listed in section 3 and province fixed effects. ϵ_{it} is the error term.

Following Haeck, Lebihan and Merrigan (2018), we compute cluster-robust standard errors based on birth-year cohort and province. Because we estimate impacts of the reform for multiple outcomes simultaneously, we also adjust our p-values following Simes (1986). This correction assumes that our outcomes are correlated with one another and avoids the possibility of over-rejecting the null hypothesis when using multiple correlated outcomes. The likelihood of making Type I errors is therefore reduced. Our adjusted p-values are determined by type of individual (child, parent), as suggested by Shaffer (1995). [17]

The DD model relies on three critical assumptions. First, the common trend assumption must hold before the policy is implemented; in other words, in the absence of the reform, mean outcomes of treated and control groups would have followed a similar trend. Figure 1 presents the evolution of a few outcome variables pre- and post-treatment. Clearly, the trends between the two groups are similar during the pre-reform years. Later, in the robustness

15. As existing evidence on UCCB benefits, we do not observe whether families actually received the UCCB. Rather, we identify the treatment group based on eligibility (i.e., the presence of a child aged less than 6 observed after July 2006). Schirle (2015) evaluates errors in defining the treatment group based on this criterion and reports that errors in assigning the UCCB occur in only 2.5% of two-parent families.

16. In their estimates, the treatment group included parents whose youngest child is aged 0-5. The control group included parents whose youngest child is aged 6-17 in the Schirle (2015) and Koebel et al. (2016) studies. In the Daley (2017) study, the control group consisted of mothers whose youngest child is aged between 6 and 11.

17. These categories are specified in the regression tables.

checks section, we will return to this point with a more formal test of the common trend hypothesis.

Second, our approach assumes that there have been no other significant changes in family policies that affected only children under the age of 6 (and their parents) over the period 1994-2011. As previously discussed, we excluded children aged 0 years and the province of Quebec. Other benefits have been introduced during this period, but they apply to all children aged 17 and less (i.e., the Canada Child Tax Benefit and the National Child Benefit Supplement in 1993 and 1998, respectively ; the Child Disability Benefit in 2006 ; and the Children's Fitness Tax Credit and Child Tax Credit in 2007). [18] Schirle (2015), Koebel et al. (2016) and Daley (2017) argue that such benefits did not affect families differently in terms of labour supply and mental health. Similarly, except in Quebec, there were no widespread changes in the availability and cost of childcare (Haeck, Lebihan and Merrigan, 2018). In the province of Ontario, [19] the implementation of full-time kindergarten for four-and five-year-olds began in 2010 and was completed in 2014. The Ministry of Education of the Government of Ontario (2013) reports that only approximately 15% of Ontario's four- and five-year-olds participated in the program in September 2010 ; thus, a small proportion of children in Ontario is affected. However, robustness checks, discussed in the next section, will demonstrate that this reform does not drive any of the results in this paper.

Third, the DD model requires that UCCB reform be exogenous. This assumption is likely to hold because the UCCB was an exogenous cash transfer paid to all families with children aged 0-5. This program is also unlikely to have had an impact on fertility (Milan, 2013 ; Daley, 2017). Similarly, Schirle (2015), Koebel et al. (2016) and Daley (2017) argue that UCCB is exogenous.

5 Econometric results

In this section we present the estimation results of the effect of the UCCB on the well-being of children and parents. We report the coefficients and standard errors. Following Haeck et al. (2018), estimated coefficients that are statistically significant according to adjusted p-values are presented in boldface. [20] We also report a plus or minus sign for each outcome, showing the direction the effect must take for the UCCB to be beneficial for families. [21] We standardise all non-binary outcomes to have a mean of 0 and a standard deviation (SD) of

18. See Schirle (2015) and Jones et al. (2015) for a discussion of family benefits in Canada.
19. Ontario is Canada's most populous province, accounting for nearly 40% of the Canadian population.
20. The adjusted p-values are available on request.
21. See Haeck et al. (2018) and Lebihan et al. (2018) for using plus and minus signs to clarify the direction of the effect.

1. Coefficients can thus be interpreted in terms of changes in SDs.

5.1 Main Estimates

Table 2 presents the results for child and parents outcomes from the DD specification. For each dependent variable, we report the age of treated children, the range for the dependent variable, the pre-programme mean (with standard deviation) for the treated group and the number of observations. The last two columns present the estimates of our coefficient of interest, β, without and with controls. Interestingly, we observe that the coefficients vary little between the two specifications (without or with control variables). Subsequently, we focus on the model with a full set of controls.

The estimation results presented in Panel A suggest that the UCCB had no significant impact on children's general health. For hyperactivity and emotional disorder scores, we find that the reform had a negative but statistically insignificant effect; we estimate an insignificant treatment effect of 9.0% of an SD and 4.3% of an SD for hyperactivity and emotional disorder scores, respectively. There is also no evidence of a change in physical aggression score following the implementation of UCCB. However, the estimates suggest that the indirect aggression score deteriorated for children less than 6 after the reform. Indeed, we found a significant increase of 12.7% of an SD for this measure. The results are robust if we adjust the p-values for the multiple outcomes to reduce the likelihood of making Type I errors (presented in boldface).

So far, our results indicate no beneficial effects of the UCCB on child health and behaviours. This conclusion would be strengthened further if the UCCB had no impact on the channels through which transfers of income affect children's outcomes. Previous empirical evidence identified various causal channels, such as monetary investments in the child, parental health and parenting practises. In Panel B, we test whether the UCCB affected parental health and behaviours using a DD estimation model. We find no evidence that the reform affected the mother's general health (insignificant effect on the odds of being in good/fair/poor health of 1.1 percentage points). We also show that the UCCB decreased maternal depression score by 2.5% of an SD, but this effect is not statistically different from zero.[22] The sign of the coefficients indicates that the reform has beneficially affected family dysfunction score and parenting. However, none of those effects are significant. Again, our estimates are robust to adjusted p-values.

22. These results could seem surprising and contradictory compared with the study by Daley (2017). Nevertheless, excluding Quebec, the author's results show that the positive effect on mental health becomes insignificant. Outcomes in CCHS data for mothers differ from those studied here. Indeed, our paper focuses on maternal general health, depression score and the mother-child relationship (in addition to studying children's outcomes).

To summarise, it appears that the UCCB had no significant positive effect on the well-being of children and parents.

5.2 Robustness checks

Our identification strategy relies on several assumptions.[23] In this section, we first test whether the common time trend assumption holds before the UCCB is implemented. Then we use alternative control groups (children 6-9 years old and their parents [no younger siblings]). Finally, we keep only NSLCY data and show that our results are similar whether including or not including the SYC data (2010-11).

For DD methodology, the common trend assumption before the policy is implemented is necessary. In section 4, we showed graphically that the trends between the two groups were similar during the pre-reform years (Figure 1). We also formally tested this assumption by replicating our analysis in periods before the reform was implemented (column 1 of Table A3). None of the coefficients are significant, giving support to the assumption that the trends for the outcome variables between treated and control groups were parallel before the reform.

In column 2 of Table A3, we use children aged 6-9 years (with no younger siblings) as an alternative control group. The post-reform cycles are cycles 7, 8 and 9 (Table 1). The results for the estimated effect of the UCCB are similar to the baseline estimates. We continue to find that the policy had no significant impact on children under 6, except for the indirect aggression score. In this specification, given the structure of NLSCY/SYC, we had in cycle 8 only children 6-7 years old. To keep the same age categories throughout the analysis, as a robustness test, we also excluded cycle 8 (cycles 7 and 9 are post-reform cycles) (Table 1). Column 3 of Table A3 shows, in general, no significant effect of the reform on the well-being of children and parents, except for indirect aggression score. We also report a significant decrease of 9.8% of an SD for the hyperactivity score, but this is not robust to adjusted p-values.

To have a longer view of the policy, we added the SYC data to the NLSCY data. As a reminder, the SYC contains exactly the same questions used by the NLSCY. However, whether the results obtained are driven by the addition of SYC to the NLSCY data may be questioned. This also accounts for parameters of Ontario's kindergarten reform beginning in 2010. In column 4 of Table A3, we excluded SYC data ; our findings remain similar to the baseline estimates.

23. It is not possible to estimate triple-difference models using the NLSCY/SYC data due to missing data for the age groups necessary for the estimation and because outcomes differ by children's age group (Table 1). Moreover, the NLSCY/SYC data only contain families with children.

5.3 Heterogeneous effects

It may not be surprising that the unconditional boost to family income provided by the UCCB had no discernible effect across the population as a whole. Improvement outcomes are more plausible for some sub-populations, such as disadvantaged households (Deutscher et al., 2018 ; Milligan and Stabile, 2011). Similarly, the effects of child benefits might differ depending on the child's sex. Milligan and Stabile (2011) show that Canadian child benefits have stronger effects on mental health outcomes for girls (measured by children's behavioural and maternal depression scores). To test these assumptions, we report, in Table 3, results for different population subgroups. We divide our sample into two groups : (1) households with mothers with a high school diploma or less (low education) and (2) households with mothers with some post-secondary education or more (high education). We also divide our main sample by the child's sex : boys versus girls.

In general, our results show no improvement in child and parent outcomes, no matter the level of the mother's education (Table 3). For lower-education families, we found a significant increase of 25.7% of an SD for the consistent parenting score, but the effects are insignificant for other outcomes. For higher-education families, the effects are also mostly insignificant, but we report a significant increase of 11.3% of an SD for the indirect aggression score. The significant results in Table 2 for the indirect aggression score for the full sample thus seem to come from families with high education.

For results by child's sex, it is difficult to draw a clear conclusion, though it seems that girls benefit most from the reform. Indeed, our estimates suggest that the hyperactivity score decreases by 15.5% of an SD for girls (significant at the 5% level and robust to adjusted p-values). Some other point estimates are statistically significant and beneficial for girls, but they are significant at the 10% level and not robust to adjusted p-values. For boys, we report a decrease in the emotional disorder score by 14.1% of an SD but an increase in the indirect aggression score by 14.2% of an SD. The effects for boys are not robust to adjusted p-values.

In sum, our results suggest that the UCCB was not effective in improving the health and behaviours of children and parents in aggregate. A modest but fragile beneficial effect is found for low-education families and for girls. We discuss the possible reasons for these results in the next section.

5.4 Discussion

Several factors may explain the statistically insignificant effect of the UCCB on family health and behaviours.

The first explanation can be related to the fact that the UCCB is universal i.e., UCCB

is non-means tested and not targeted toward the sub-populations that may see the highest returns from additional income. Existing evidence indicates positive significant effects of the EITC on child development and health as well as maternal health ; however, the EITC differs from the UCCB because it is targeted toward disadvantaged households (Dahl and Lochner, 2012 ; Evans and Garthwaite, 2014 ; Baughman and Duchovny, 2016). Similarly, Milligan and Stabile (2011) find that Canadian child benefits mostly affect lower-education families, and some of their results become insignificant when Quebec is excluded.[24] The UCCB benefits are sizeable and represent approximately 12-18% of the annual cost of raising a child (Schirle, 2015). The benefits are comparable in size to cash transfers in other countries that found significant effects (Gaitz et al., 2017). However, it is not surprising that an unconditional program leads to a null effect on the well-being of families. This is confirmed by evidence on universal family benefits that found no impact on child and parent well-being (Hener, 2016 ; Gaitz and Schurer, 2017 ; Deutscher and Breunig, 2018 ; González, 2018).

Another possible explanation is that the UCCB has no impact on children's outcomes and on the mechanisms (direct or indirect) through which additional income could influence children's outcomes ("family process" and "resources" channels). Indeed, Schirle (2015) shows that the UCCB had no significant effect on total household consumption and expenditures, health, education, childcare or reading expenditures. Here, we also show that the reform had no impact on parents' health or their relationship with their child. It is then not surprising to observe a lack of effects on children's well-being. Our results are consistent with existing evidence on the causal link between universal child benefits, expenditures and family well-being (González, 2013 ; Hener, 2016).

Although our results are consistent with existing evidence, there are some limitations in our study design that deserve more attention in future research. For example, in NSLCY/SYC data, we do not have common behavioural measures for children aged 3 and under and children aged 6 years and older. It would also be interesting to know whether the UCCB had a significant effect on children's cognitive scores.[25] However, we do not have data on common cognitive scores for the two groups.[26]

24. Quebec's family policy is in stark contrast to that of other Canadian provinces, particularly with regard to child benefits. For example, in 2009-10, the maximum child benefits for a two-parent family with two children amounted to $CA 3,249 in Quebec compared to $CA 0-2,200 in the other provinces.

25. Gaitz et al. (2017) and Deutscher et al. (2018) found no evidence that unconditional cash transfers in Australia are effective in boosting learning and cognitive scores.

26. In NLSCY/SYC data, we only have a Motor and Social Development score for children aged 0-3. For children aged 4-5, three measures of cognitive development are available : Peabody Picture Vocabulary Test-Revised (PPVT-R) ; Number Knowledge Test and the "Who am I?" test. See Baker and Milligan (2010, 2015) for more details.

6 Conclusion

We find no evidence that the UCCB improved family health and behaviours in aggregate. A modest but fragile beneficial effect is found for low-education families and for girls. Our results are robust to several specifications. Moreover, they call into question whether universal child benefits are an advisable policy tool. Some policy implications can be suggested. Unconditional cash transfers given to the entire population seem ineffective in improving child and parental well-being, at least for the outcomes studied here. Future policies need to be revisited either by focusing directly on families for which the marginal return of income on children outcomes is highest, or by investing financial resources in another way that could have a direct impact on family well-being, such as childcare (Currie, 2001).

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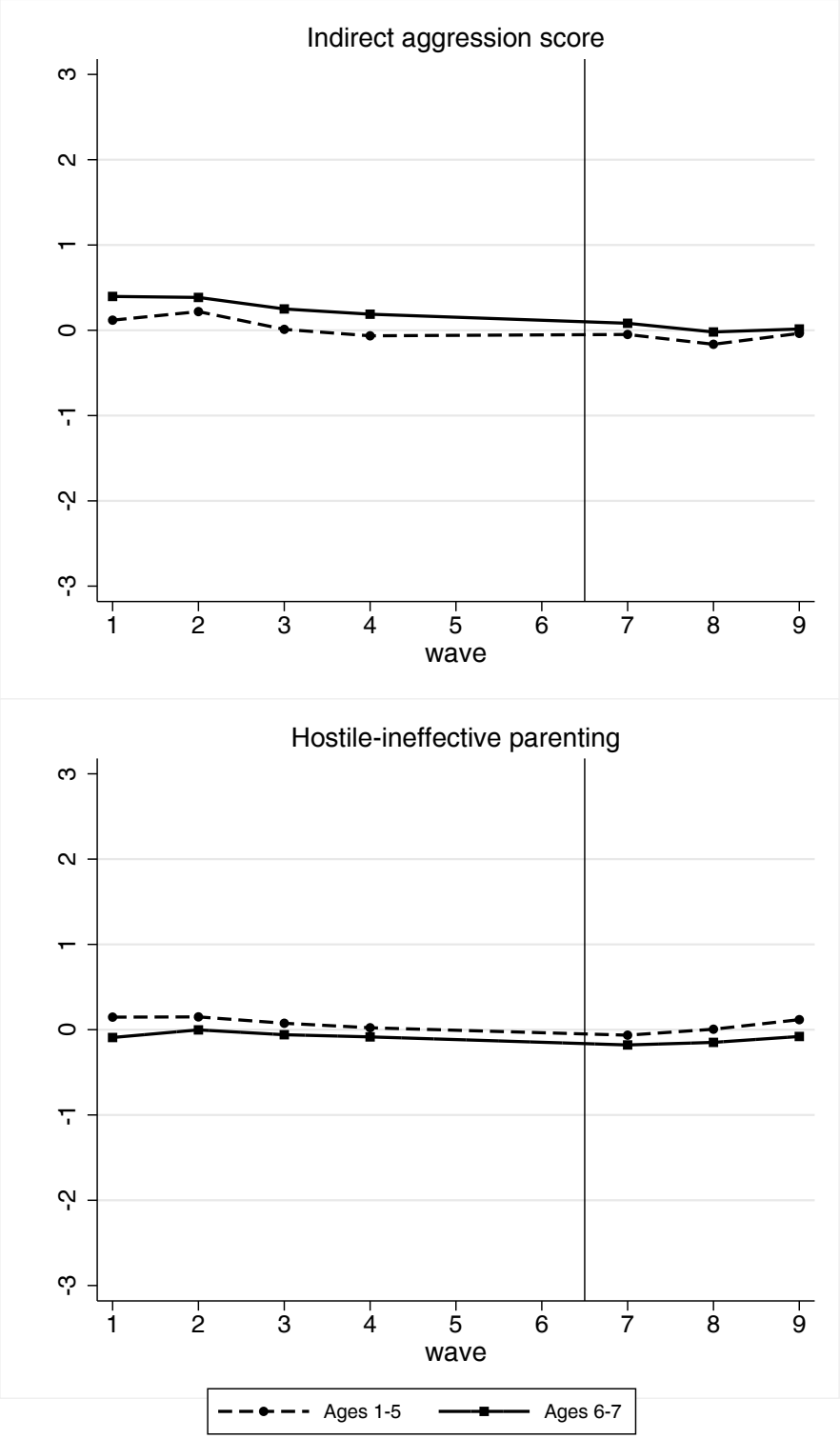
Figure 1 – Mean values of measures for child and parental outcomes by child age: cycles 1-8 of the NLSCY and SYC



Notes: Shows the trajectories for the mean of two outcomes (standardized) for children aged 1-5 years and children aged 6-7 years. Source is the NLSCY (wave 1-8) and the SYC (here labeled as wave 9).

Table 1 – Eligibility for UCCB by age of the child and NLSCY/SYC cycle

		Pre-reform						Post-reform		
	Age	cycle 1 (1994-95)	cycle 2 (1996-97)	cycle 3 (1998-99)	cycle 4 (2000-01)	cycle 5 (2002-03)	cycle 6 (2004-05)	cycle 7 (2006-07)	cycle 8 (2008-09)	cycle 9 (2010-11)
Treated	0	No	No	No	No	No	No	Yes	Yes	Yes (n.a)
	1	No	No	No	No	No	No	Yes	Yes	Yes
	2	No	No	No	No	No	No	Yes	Yes	Yes
	3	No	No	No	No	No	No	Yes	Yes	Yes
	4	No	No	No	No	No	No	Yes	Yes	Yes
	5	No	No	No	No	No	No	Yes	Yes	Yes
Untreated	6	No	No	No	No	No (n.a)	No (n.a)	No	No	No
	7	No	No	No	No	No (n.a)	No (n.a)	No	No	No
	8	No	No	No	No	No	No (n.a)	No	No (n.a)	No
	9	No	No	No	No	No	No (n.a)	No	No (n.a)	No
	10	No	No	No	No	No	No	No (n.a)	No (n.a)	No (n.a)
	11	No	No	No	No	No	No	No (n.a)	No (n.a)	No (n.a)

Notes: This table shows the children eligible for the Universal Child Care Benefits ("Yes") and non-eligible children ("No") according to the child's age and cycle. The term n.a (not available) means that the data for this age group in this cycle are not available in the NLSCY/SYC. Sources: NLSCY (cycle 1-8) and the SYC (here labelled as cycle 9).

Table 2 – Estimated effects of the policy for child and parent outcomes

Dependent Variable	Age (treated)	Range	Mean (s.d)	N	UCCB (1)	UCCB (2)
	A. Child Behaviour and Health					
Child in good/fair/poor health (-)	1-5	0/1	0.108	53,658	-0.017	-0.021
			(0.311)		(0.015)	(0.017)
Hyperactivity/inattention (-)	4-5	0-14	3.902	22,783	-0.066	-0.090
			(2.785)		(0.049)	(0.058)
Emotional disorder and anxiety (-)	4-5	0-14	1.796	22,854	-0.063	-0.043
			(1.911)		(0.063)	(0.068)
Physical aggression (-)	4-5	0-12	1.550	22,833	0.057	0.016
			(1.829)		(0.038)	(0.044)
Indirect aggression (-)	4-5	0-10	0.669	22,123	**0.118****	**0.127****
			(1.216)		**(0.050)**	**(0.050)**
	B. Parent Behaviour and Health					
Mother in good/fair/poor health (-)	1-5	0/1	0.227	53,342	0.020	0.011
			(0.419)		(0.016)	(0.017)
Mother's depression score (-)	1-5	0-36	4.254	52,416	0.004	-0.025
			(4.742)		(0.047)	(0.042)
Family dysfunction index (-)	1-5	0-36	8.121	52,704	0.012	-0.027
			(5.088)		(0.040)	(0.041)
Hostile parenting (-)	2-5	0-25	9.106	39,234	0.005	-0.026
			(3.549)		(0.053)	(0.044)
Consistent parenting (+)	2-5	0-20	15.027	38,907	-0.001	0.041
			(3.280)		(0.052)	(0.056)
Controls					No	Yes

Notes: For each dependent variable, we report the age of treated children, the range for the dependent variable, the pre-program mean for the treated group (with standard deviation in parentheses), the number of observations and the estimated policy effects without and with controls. All scores are standardised, except for child/mother health (binary outcome). We report a plus or minus sign for each outcome, showing the direction the effect must take for the policy to be beneficial. Standard errors (in parentheses) are clustered by province and by birth-year cohort. Statistically significant estimates according to the adjusted p-values are presented in bold.
***: significant at 1% ; **: significant at 5% ;*: significant at 10%

Table 3 – Heterogeneous effects of the policy

	Low-educ. mothers		High-educ. mothers		Boys		Girls	
Dependent Variable	UCCB	N	UCCB	N	UCCB	N	UCCB	N
	A. Child Behaviour and Health							
Child in good/fair/poor health (-)	-0.026	14,451	-0.017	39,207	-0.021	27,344	-0.021	26,314
	(0.038)		(0.020)		(0.019)		(0.024)	
Hyperactivity/inattention (-)	-0.057	6,043	-0.087	16,740	-0.011	11,648	**-0.155****	11,135
	(0.097)		(0.065)		(0.075)		**(0.064)**	
Emotional disorder and anxiety (-)	0.047	6,073	-0.064	16,781	-0.141*	11,677	0.050	11,177
	(0.095)		(0.074)		(0.083)		(0.085)	
Physical aggression (-)	0.099	6,069	-0.002	16,764	0.043	11,664	-0.011	11,169
	(0.111)		(0.043)		(0.070)		(0.052)	
Indirect aggression (-)	0.175	5,887	0.113**	16,236	0.142**	11,317	0.105	10,806
	(0.114)		(0.052)		(0.065)		(0.077)	
	B. Parent Behaviour and Health							
Mother in good/fair/poor health (-)	0.057	14,356	0.001	38,986	-0.018	27,200	0.037	26,142
	(0.050)		(0.022)		(0.023)		(0.024)	
Mother's depression score (-)	-0.077	14,040	-0.002	38,376	0.047	26,727	-0.107*	25,689
	(0.088)		(0.047)		(0.058)		(0.065)	
Family dysfunction index (-)	0.077	14,149	-0.049	38,555	-0.001	26,876	-0.053	25,828
	(0.113)		(0.058)		(0.054)		(0.051)	
Hostile parenting (-)	-0.071	10,430	-0.005	28,804	0.053	20,066	-0.096*	19,168
	(0.077)		(0.052)		(0.078)		(0.057)	
Consistent parenting (+)	**0.257****	10,359	-0.036	28,548	0.004	19,900	0.085	19,007
	(0.101)		(0.066)		(0.076)		(0.068)	

Notes: For each dependent variable, we report the estimated policy effects for children whose mothers have a high school diploma or less (low-education mothers) and for children whose mothers have some post-secondary education or more (high-education mothers). We also show the results by the child's sex (boys versus girls). All scores are standardised, except for child/mother health (binary outcome). We report a plus or minus sign for each outcome, showing the direction the effect must take for the policy to be beneficial. Standard errors (in parentheses) are clustered by province and by birth-year cohort. Statistically significant estimates according to the adjusted p-values are presented in bold. Covariates are included in all regressions.
***: significant at 1% ; **: significant at 5% ;*: significant at 10%

Table A.1 – Child and Family Outcomes Index Component (NLSCY; SYC) (Appendix)

Outcome Index	**Questions**	
Hyperactivity-Inattention (Range: 0-16)	How often would you say that the child: a) Can't sit still, is restless or hyperactive?; b) Is distractible, has trouble sticking to any activity? c) Fidgets?; d) Can't concentrate, can't pay attention for long?; e) Is impulsive, acts without thinking?; f) Has difficulty awaiting turn in games or groups?; g) Cannot settle to anything for more than a few moments?; h) Is inattentive?	Almost all the time (1) to Almost never (5)
Emotional Disorder-Anxiety (Range: 0-16)	How often would you say that the child: a) Seems to be unhappy, sad or depressed?; b) Is not as happy as other children?; c) Is too fearful or anxious?; d) Is worried?; e) Cries a lot?; f) Appears miserable, unhappy, tearful or distressed?; g) Is nervous, high-strung or tense?; h) Has trouble enjoying him/herself?	Almost all the time (1) to Almost never (5)
Physical Aggression (Range: 0-12)	How often would you say that the child: a) Gets into many fights? b) When another child accidentally hurts him/her, assumes that the other child meant to do it, and then reacts with anger and fighting; c) Physically attacks people?; d) Threatens people?; e) Is cruel, bullies or is mean to others?; f) Kicks, bites, hits other children?	Almost all the time (1) to Almost never (5)
Indirect Aggression 4-11 years (Range: 0-10)	How often would you say that the child: a) When mad at someone, tries to get others to dislike that person; b) When mad at someone, becomes friends with another as revenge?; c) When mad at someone, says bad things behind the other's back?; d) When mad at someone, says to others, "Let's not be with him/her"?; e) When mad at someone, tells that person's secrets to a third person?	Almost all the time (1) to Almost never (5)
Depression score (Range: 0-36)	How often have you felt or behaved this way during last week: a) I do not feel like eating; b) I felt that I could not shake off the blues even with help from family or friends; c) I had trouble keeping my mind on what I was doing; d) I felt depressed; e) I felt that everything I did was an effort; f) I felt hopeful about the future; g) My sleep was restless; h) I was happy; i) I felt lonely; j) I enjoyed life (reversed); k) I had crying spells; l) I felt that people dislike me.	Rare or none of the time, less than 1 day (1) to Most or all of the time, 5-7 days (4)
Family Dysfunction Index (Range: 0-36)	Planning family activities is difficult because we misunderstand each other. In times of crisis we can turn to each other for support; We cannot talk to each other about sadness we feel. Individuals in the family are accepted for who they are; We avoid discussing our fears or concerns; We express feelings to each other; There are lots of bad feelings in our family; We feel accepted for who we are; Making decisions is a problem for our family; We are able to make decisions about how to solve problems; We don't get along well together; We confide in each other.	Strongly agree (1) to Strongly disagree (4)
Hostile/ineffective parenting (Range: 0-25)	How often do you get annoyed with the child for saying or doing something he/she is not supposed to? Of all the times that you talk to this child about his/her behaviour, what proportion is praise?; Of all the times that you talk to this child about his/her behaviour, what proportion is disapproval? How often do you get angry when you punish this child? How often do you think that the kind of punishment you give this child depends on your mood? How often do you feel you are having problems managing this child in general? How often do you have to discipline this child repeatedly for the same thing?	Never (1) to many times each day (5)
Consistency parenting (Range: 0-20)	When you give this child a command, what proportion of the time do you make sure that he/she does it? If you tell this child he/she will get punished if he/she doesn't stop doing something, and the child keeps doing it, how often will you punish him/her? How often does this child get away with things that you feel should have been punished? How often is this child able to get out of a punishment when he/she really sets his/her mind to it? How often when you discipline this child, does he/she ignore the punishment?	Never (1) to all the time (5)

Table A.2 – Parents and family characteristics (Appendix)

	Children 1-5		(1) Difference	Children 6-7		(2) Difference	(1) - (2)	N
Variable	Pre-policy	Post-policy	Post-Pre	Pre-policy	Post-policy	Post-Pre	Prob>Chi2	
Child is a boy	0.511 (0.500)	0.510 (0.500)	-0.001 (0.007)	0.486 (0.500)	0.507 (0.500)	0.022 (0.023)	0.350	59,167
Mother								
Less than high school	0.095 (0.293)	0.061 (0.239)	-0.034 (0.004)***	0.094 (0.292)	0.049 (0.216)	-0.045 (0.012)***	0.385	58,007
High school diploma	0.182 (0.385)	0.178 (0.383)	-0.003 (0.006)	0.219 (0.413)	0.200 (0.400)	-0.019 (0.020)	0.448	58,007
Some post-secondary	0.254 (0.435)	0.182 (0.386)	-0.072 (0.006)***	0.289 (0.454)	0.188 (0.391)	-0.102 (0.021)***	0.177	58,007
Post-secondary degree	0.470 (0.499)	0.579 (0.494)	0.109 (0.007)***	0.398 (0.490)	0.564 (0.496)	0.166 (0.024)***	0.024	58,007
Age 14-24 at birth	0.148 (0.355)	0.139 (0.346)	-0.009 (0.005)*	0.107 (0.309)	0.074 (0.262)	-0.033 (0.013)**	0.075	59,269
Age 25-29 at birth	0.353 (0.478)	0.299 (0.458)	-0.054 (0.007)***	0.295 (0.456)	0.258 (0.438)	-0.038 (0.020)*	0.433	59,269
Age 30-34 at birth	0.344 (0.475)	0.360 (0.480)	0.016 (0.007)**	0.383 (0.486)	0.402 (0.490)	0.019 (0.023)	0.908	59,269
Age 35 or more at birth	0.155 (0.362)	0.202 (0.401)	0.047 (0.006)***	0.215 (0.411)	0.266 (0.442)	0.051 (0.021)**	0.830	59,269
Immigrant	0.182 (0.386)	0.240 (0.427)	0.057 (0.007)***	0.163 (0.370)	0.227 (0.419)	0.063 (0.022)***	0.804	57,228
Father								
Less than high school	0.130 (0.337)	0.081 (0.274)	-0.049 (0.004)***	0.120 (0.326)	0.061 (0.239)	-0.059 (0.012)***	0.404	56,984
High school diploma	0.182 (0.386)	0.208 (0.406)	0.026 (0.006)***	0.225 (0.417)	0.234 (0.423)	0.009 (0.021)	0.441	56,984
Some post-secondary	0.214 (0.410)	0.189 (0.392)	-0.025 (0.006)***	0.225 (0.418)	0.201 (0.401)	-0.023 (0.021)	0.940	56,984
Post-secondary degree	0.473 (0.499)	0.521 (0.500)	0.048 (0.008)***	0.430 (0.495)	0.504 (0.500)	0.074 (0.024)***	0.300	56,984
Age 14-24 at birth	0.068 (0.252)	0.067 (0.250)	-0.001 (0.003)	0.048 (0.213)	0.024 (0.152)	-0.024 (0.008)***	0.006	57,799
Age 25-29 at birth	0.254 (0.436)	0.225 (0.418)	-0.029 (0.006)***	0.197 (0.398)	0.140 (0.347)	-0.056 (0.017)***	0.136	57,799
Age 30-34 at birth	0.382 (0.486)	0.347 (0.476)	-0.034 (0.007)***	0.384 (0.486)	0.406 (0.491)	0.023 (0.024)	0.021	57,799
Age 35 or more at birth	0.296 (0.456)	0.361 (0.480)	0.065 (0.007)***	0.372 (0.483)	0.430 (0.495)	0.058 (0.024)**	0.777	57,799
Immigrant	0.172 (0.377)	0.227 (0.419)	0.056 (0.007)***	0.172 (0.377)	0.222 (0.416)	0.050 (0.023)**	0.812	55,992
Family								
Rural region	0.139 (0.345)	0.162 (0.369)	0.024 (0.004)***	0.145 (0.352)	0.198 (0.398)	0.053 (0.017)***	0.095	59,086
Region <30,000	0.137 (0.344)	0.087 (0.282)	-0.050 (0.004)***	0.150 (0.357)	0.090 (0.286)	-0.060 (0.012)***	0.377	59,086
Region 30,000-99,999	0.077 (0.266)	0.083 (0.276)	0.007 (0.003)**	0.080 (0.271)	0.077 (0.267)	-0.002 (0.010)	0.409	59,086
Region 100,000-499,000	0.214 (0.410)	0.190 (0.392)	-0.024 (0.005)***	0.234 (0.423)	0.182 (0.386)	-0.052 (0.017)***	0.114	59,086
Region >499,000	0.434 (0.496)	0.477 (0.499)	0.043 (0.008)***	0.391 (0.488)	0.453 (0.498)	0.062 (0.025)**	0.478	59,086
No older sibling	0.416 (0.493)	0.433 (0.495)	0.017 (0.007)**	0.178 (0.382)	0.224 (0.417)	0.047 (0.019)**	0.142	59,270
One older sibling	0.382 (0.486)	0.383 (0.486)	0.001 (0.007)	0.491 (0.500)	0.517 (0.500)	0.026 (0.023)	0.320	59,270
Two or more older siblings	0.203 (0.402)	0.184 (0.388)	-0.018 (0.006)***	0.331 (0.471)	0.259 (0.438)	-0.072 (0.022)***	0.017	59,270
No younger sibling	0.686 (0.464)	0.707 (0.455)	0.021 (0.007)***	1.000 (0.000)	1.000 (0.000)	0.000 (0.000)	0.002	59,270
One younger sibling	0.280 (0.449)	0.261 (0.439)	-0.019 (0.007)***	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.004	59,270
Two or more younger siblings	0.035 (0.183)	0.033 (0.177)	-0.002 (0.003)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.420	59,270
Same-age children	0.022 (0.148)	0.034 (0.181)	0.011 (0.003)***	0.030 (0.170)	0.054 (0.227)	0.000 (0.000)	0.000	59,270

Notes: This table displays the weighted (sample weights from Statistics Canada) summary statistics for independent variables. The statistics are presented by child's age for pre- and post-reform. Numbers shown are means of the variables in the "pre-policy" and "post-policy" columns, mean Post-Pre differences in columns (1) and (2), and p-values of the differences in the last column. Standard deviations are in parentheses (standard errors for the Differences columns).
***: significant at 1% ; **: significant at 5% ;*: significant at 10%

Table A.3 – Robustness Checks (Appendix)

	(1)		(2)		(3)		(4)	
	Falsification test		Ages 6-9		Ages 6-9 bis		Ages 6-7, SYC excluded	
Dependent Variable	Pre-reform	N	UCCB	N	UCCB	N	UCCB	N
	A. Child Behaviour and Health							
Child in good/fair/poor health (-)	-0.004	32,415	-0.008	64,775	-0.013	49,480	-0.004	47,731
	(0.024)		(0.014)		(0.015)		(0.013)	
Hyperactivity/inattention (-)	-0.058	14,080	-0.047	30,834	-0.098**	23,155	-0.043	20,536
	(0.098)		(0.044)		(0.048)		(0.048)	
Emotional disorder and anxiety (-)	0.071	14,106	-0.044	30,913	-0.066	23,226	-0.024	20,586
	(0.098)		(0.058)		(0.063)		(0.091)	
Physical aggression (-)	-0.079	14,099	0.026	30,889	0.003	23,203	0.021	20,562
	(0.072)		(0.035)		(0.043)		(0.040)	
Indirect aggression (-)	0.039	13,647	**0.175*** **	29,867	**0.202*** **	22,376	0.105**	19,921
	(0.089)		**(0.045)**		**(0.046)**		(0.053)	
	B. Parent Behaviour and Health							
Mother in good/fair/poor health (-)	0.022	32,235	0.002	64,354	-0.006	49,211	0.018	47,417
	(0.029)		(0.014)		(0.017)		(0.020)	
Mother's depression score (-)	0.076	31,709	0.017	63,069	0.009	48,411	-0.021	46,575
	(0.062)		(0.039)		(0.043)		(0.036)	
Family dysfunction index (-)	-0.033	31,951	-0.015	63,478	0.009	48,706	0.007	46,886
	(0.087)		(0.034)		(0.041)		(0.043)	
Hostile parenting (-)	-0.079	24,064	0.019	48,921	0.014	36,954	-0.025	35,287
	(0.056)		(0.045)		(0.053)		(0.043)	
Consistent parenting (+)	0.084	23,942	0.010	48,459	0.023	36,676	0.034	34,967
	(0.141)		(0.041)		(0.049)		(0.051)	

Notes: In column (1), for each outcome, we only use the pre-treatment periods to test the common trend assumption. In column (2), we use children aged 6-9 years (and no youngest child) as an alternative control group. The post-reform cycles are cycles 7, 8 and 9. In column (3), children aged 6-9 years (and no youngest child) are the alternative control group, but we only keep the post-reform cycles with the same age categories (cycles 7 and 9). In column (4), SYC data are excluded. All scores are standardised, except for child's/mother's health (binary outcome). We report a plus or minus sign for each outcome, showing the direction the effect must take for the policy to be beneficial. Standard errors (in parentheses) are clustered by province and by birth-year cohort. Statistically significant estimates according to the adjusted p-values are presented in bold. Covariates are included in all regressions.
***: significant at 1% ; **: significant at 5% ;*: significant at 10%