Canadian Labour Market and Skills Researcher Network

Working Paper No. 122

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July 2013

CLSRN is funded by the Social Sciences and Humanities Research Council of Canada (SSHRC) under its Strategic Knowledge Clusters Program. Research activities of CLSRN are carried out with support of Human Resources and Skills Development Canada (HRSDC). All opinions are those of the authors and do not reflect the views of HRSDC or the SSHRC.

Intergenerational Effects of Disability Benefits

- Evidence from Canadian Social Assistance Programs*

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Abstract

Using Statistics Canada's National Longitudinal Survey of Children and Youth (NLSCY), this paper presents the first evidence on whether increased disability benefits reduce the negative consequences of parental disability on children's well-being. Using a continuous difference-in-differences (DD) approach, we analyze whether gaps in developmental outcomes between children of disabled and non-disabled parents vary with the benefit level. We find strong evidence that higher parental disability benefits lead to improvements in children's cognitive functioning and non-cognitive development, as measured by math scores in standardized tests, and hyperactive and emotional anxiety symptoms. The effect is larger on children with a disabled mother than on those with a disabled father - which is consistent with the "good mother hypothesis" that a mother's income is more likely than a father's to be spent in ways that benefit the children.

JEL Codes: J1 J6 I38
Keywords: Disability Benefits, Child Well-Being, Welfare, Intergenerational Transmission

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* We gratefully acknowledge scholarship support from Dalhousie University and the Canadian Labour Market and Skills Researcher Network. NSLCY data were accessed through the Atlantic Research Data Centre; we thank Heather Hobson for vetting our output.

Executive Summary

A growing body of literature suggests that the children of disabled parents have more developmental problems than children of non-disabled parents (Cuong and Mont 2011; Bratti and Mendola 2011; Morefield et al. 2011). This paper asks if higher provincial cash transfers to parents with disabilities partially alleviate the negative consequences of parental disability for children's cognitive and non-cognitive outcomes: specifically, standardized math test scores, hyperactive and emotional /anxiety symptoms.

In Canada, disability benefits are primarily provided by the ten provincial governments, each of which establishes its own rules and benefit levels, resulting in considerable heterogeneity across provinces, in both levels and timing of changes. For example, in 1994 Ontario (at $15,054) had the most generous benefits in the country while Quebec (at $10,301) and New Brunswick (at $10,531) lagged well behind. By 2006, however, Ontario had cut benefits substantially (a real reduction of 18%), New Brunswick benefits were down by 9.8 % but Quebec kept its rates roughly constant.

The Statistics Canada National Longitudinal Survey of Children and Youth (NLSCY), a nationally representative survey, provides intergenerational information on parents and children, including both father and mother's activity limitation and indicators of children's cognitive and non-cognitive skill development. Using the NLSCY, we estimate continuous difference-in-differences (DD) models of child outcomes, exploiting provincial variation in real disability benefits available to parents. This procedure assumes that children's province of residence, hence exposure to variation in parental disability benefits, is independent of unobservable determinants of the child's developmental outcomes.

Because unmeasured within-province shocks may influence all children's outcomes, this paper uses children of non-disabled parents who lived in the same province as comparison group and estimates whether changes in children's outcome gaps correspond to benefit changes.

The identifying assumption may, in principle, be violated if there is a potential inter-provincial migration response to disability benefits. The richness of the NLSCY allows us to address these sources of bias by constructing a longitudinal sample that tracks each child over time. Our panel continuous difference-in-differences estimator compares only children whose parents are "always disabled" with children whose parents are "always non-disabled" over the entire period and excludes those who ever moved inter-provincially. Finally, to check the robustness of the results and our identification strategy, placebo regressions with less likely eligible samples, e.g. children whose parents are disabled but have higher education are conducted.

In every province, there is an achievement gap between the children of disabled and non-disabled parents. But, we find that the gap is smaller when disability benefits are higher. Overall, we conclude that higher parental disability benefits lead to a substantial reduction in the gap in cognitive and non-cognitive skill development between children of disabled and non-disabled parents. We know of no plausible argument why greater benefits paid to disabled parents should diminish achievement among the children of non-disabled parents – hence our interpretation is that the gap narrows because the achievement of children of disabled parents is improved. The intent-to-treat estimates of this paper suggest that children with disabled parents living in a province that cut its real annual disability benefits by $3,000, as Ontario did during 1994-2006, would experience a decrease of 3 % of one standard deviation in standardized math test scores and 9-10 % of one standard deviation reduction in hyperactive and anxiety symptoms.

Although benefit reduction has a qualitatively similar impact on the labour supply of male and female disabled parents, there is an asymmetric gendered “added worker effect” on the spouse of the disabled parent. Specifically, lower benefits produce a larger increase in the non-disabled father’s full-time employment than on a non-disabled mother’s employment. Furthermore, benefit effect estimates for children’s math test scores and hyperactivity are substantially reduced when the disabled parent is a father rather than a mother.

To the best of our knowledge, this study is the first to investigate the effects of disability benefits on the gap in child well-being. This study is also distinguished from many related studies of the family income-child development relationship by including not only indicators of cognitive skills (i.e. math test scores), but also non-cognitive indicators (i.e. children's problem behaviour and emotional well-being). Both types of skills have been shown to have lasting impacts on individuals’ subsequent labour market outcomes (Cameron and Heckman 1998; Cunha and Heckman 2010). Finally, our family income and parental employment analysis contributes to a broader economics literature on the labour supply effects of disability benefits. Our estimates of disability benefit effects on weekly hours of work fall roughly within the range of previously published estimates using Canadian data, and are consistent with the “missing added worker” effects found by other studies in North America (e.g. Colie 2004; Gallipoli and Turner 2008).

1 Introduction

A growing body of literature suggests that the children of disabled parents have more developmental problems than children of non-disabled parents (Cuong and Mont 2011; Bratti and Mendola 2011; Morefield et al. 2011). For example, Cuong and Mont (2011) find in the 2006 Vietnam Household Living Standards Survey that children of parents with a disability have a lower enrollment rate in primary and secondary school. Morefield et al. (2011) find from the German Socio-Economic Panel (GSOEP) that work-limiting disabilities of either parent significantly increase children's problem behaviours and negatively affect their personality traits. It is not surprising that parental activity limitation is associated with a number of risk factors that adversely affect child well-being, but why does the achievement gap between children of non-disabled parents and children of disabled parents differ across provinces within Canada? Specifically, do cash transfers to parents with disabilities partially alleviate the negative consequences of parental disability for children's standardized math test scores, hyperactive and emotional / anxiety symptoms?

This paper attempts to answer these questions using data from the Statistics Canada National Longitudinal Survey of Children and Youth (NLSCY). The NLSCY is a nationally representative survey that provides intergenerational information on parents and children, including both father and mother's activity limitation and indicators of children's cognitive and non-cognitive skill development. It employs a continuous difference-in-differences (DD) strategy that exploits provincial variation in real benefits as a source of exogeneity. The continuous DD estimator allows investigation of average treatment effects over all possible values of the treatment levels, under the identifying assumption that children's province of residence, hence exposure to variation in parental disability benefits, is independent of unobservable determinants of the child's developmental outcomes. In every province, there is an achievement gap between the children of disabled and non-disabled parents – if that gap shrinks when disability benefits increase we take the positive association between changes in benefits and the outcomes of children of disabled parents to imply that higher benefits facilitate children's development.

In Canada, disability benefits are primarily provided by the ten provincial governments, each of which establishes its own rules and benefit levels, resulting in considerable heterogeneity across provinces, in both levels and timing of changes. For example, as Table 1 shows, in 1994 Ontario (at $15,054) had the most generous benefits in the country while Quebec (at $10,301) and New Brunswick (at $10,531) lagged well behind. By 2006, however, Ontario had cut benefits substantially (a real reduction of 18%), New Brunswick benefits were down by 9.8 % but Quebec kept its rates roughly constant. In this paper, we use this wide variation in disability benefits across provinces, over time, to construct a continuous difference-in-differences estimator.

Because unmeasured within-province shocks may influence all children's outcomes,[4] this paper uses children of non-disabled parents who lived in the same province as comparison group and estimates whether changes in children's outcome gaps correspond to benefit changes.

The identifying assumption may, in principle, be violated if there is a potential inter-provincial migration response to disability benefits. [5] The richness of the NLSCY allows us to address these sources of bias by constructing a longitudinal sample that tracks each child over time. Our panel continuous difference-in-differences estimator compares only children whose parents are "always disabled" with children whose parents are "always non-disabled" over the entire period and excludes those who ever moved inter-provincially. Finally, to check the robustness of the results and our identification strategy, placebo regressions with less likely eligible samples, e.g. children whose parents are disabled but have higher education are conducted.

Overall, this paper suggests higher parental disability benefits lead to substantial reduction in the gap in cognitive and non-cognitive skill development between children

[4] For example, Milligan and Stabile (2011) using data from the Canadian NLSCY conclude that the provincial child tax benefit policies initiated in 1998 have had significant positive effects on educational outcomes, physical health and mental health for the general population of children.

[5] However, the level of interprovincial mobility in Canada and the size of transfer payment impact on migration are small enough that this is unlikely to be quantitatively important – see Osberg et al. (1994).

of disabled and non-disabled parents. We know of no plausible argument why greater benefits paid to disabled parents should diminish achievement among the children of non-disabled parents – hence our interpretation is that the gap narrows because the achievement of children of disabled parents is improved. The intent-to-treat estimates of this paper suggest that children with disabled parents living in a province that cut its real annual disability benefits by $3,000, as Ontario did during 1994-2006, would experience a decrease of 3 % of one standard deviation in standardized math test scores and 9-10 % of one standard deviation reduction in hyperactive and anxiety symptoms.

Although benefit reduction has a qualitatively similar impact on the labour supply of male and female disabled parents, there is an asymmetric gendered "added worker effect" on the spouse of the disabled parent. Specifically, lower benefits produce a larger increase in the non-disabled father's full-time employment than on a non-disabled mother's employment. Furthermore, benefit effect estimates for children's math test scores and hyperactivity are substantially reduced when the disabled parent is a father rather than a mother. This is consistent with the "good mother hypothesis" (e.g. Lundberg et al. 1997; Phipps and Burton 1998; Woolley 2004) that a mother's income is more likely than a father's income to be spent in ways that benefit the children.

To the best of our knowledge, this study is the first to investigate the effects of disability benefits on the gap in child well-being. This study is also distinguished from many related studies of the family income-child development relationship by including not only indicators of cognitive skills (i.e. math test scores), but also non-cognitive indicators (i.e. children's problem behaviour and emotional well-being). Both types of skills have been shown to have lasting impacts on individuals' subsequent labour market outcomes (Cameron and Heckman 1998; Cunha and Heckman 2010). Finally, our family income and parental employment analysis contributes to a broader economics literature on the labour supply effects of disability benefits. Our estimates of disability benefit effects on weekly hours of work fall roughly within the range of previously published estimates using Canadian data, and are consistent with the "missing added worker" effects found by other studies in North America (e.g. Colie 2004; Gallipoli and Turner 2008).

In this paper, Section 2 discusses past literature while Section 3 describes provincial disability benefit programs and proposes a conceptual framework. Section 4 describes the empirical strategy, data sources and measures, and Sections 5 and 6 present and discuss the results.

2 Parental Resources and Children's Well-being

A large body of literature has investigated the causal relationship between family income and children's well-being. Becker and Tomes (1986), for example, argue that parents decide how economic resources – i.e. money and time – will be allocated among adult consumption, asset accumulation or investments in children. Children from low-income families are therefore disadvantaged in terms of education and health (Brooks-Gunn and Duncan 1997), because a lower family budget restricts the material resources (i.e. goods such as food, clothing and education support) and non-material resources (e.g. social interactions with others) that parents can provide for their children.

Specifically, in the current context, lower benefits paid to families with disabled parents means that those parents have less income available to invest in their children's development. Additionally, and directly relevant to the development of children's non-cognitive skills (Morefield et al. 2010), lower family income may adversely affect children through a "socialization" process such as role models, family functioning and parental practice (e.g. Yeung 1997). As well, parental investment of time affects child outcomes and a tighter family budget can be expected to alter the desired market labour supply of both the disabled parent and his or her non-disabled spouse. If, in order to bring more income to the family, the non-disabled spouse works more hours and reduces the time spent with children, the reduction in time they spend with their children may be directly associated with children's lower academic standing and psychological problems. Families with disabilities often also face greater barriers to the cross-spouse substitution of parental hours in child care – if a disabled mother is herself less able to get involved in her children's learning activities at home or to adequately supervise her children's after-school behaviors due to barriers such as lack of accessible transportation to visit schools,

or lack of training in sign language which limits her communication skills (Cuong and Mont 2011), the non-disabled father's increased time away from home could impede child development by reduced time that parents spend with their children. Furthermore, parental disabilities imply stress and long work hours can be an additional stress – the cumulative stress involved may adversely influence children's development by depressing the quality of parent-child relationships (Baum 2003; Ruhm 2004; Cawley and Liu 2007; Chatterji et al. 2011). [6]

If both parental income and available family time are important inputs for child development, it is possible that negative impacts on child outcomes through reductions in time available for children resulting from increased paid hours offset gains in money income, particularly for low-income families. Indeed, Morris et al. (2000) found that increased maternal employment results in more problematic behaviour for adolescents, despite increases in family incomes.[7] Alessandri (1992) and Moore and Driscoll (1997) are among the U.S. studies on welfare reforms which find maternal employment is favourable for child development only when mothers voluntarily choose employment, or employed in stable jobs that provide supportive working environments, or the employment results in substantially increased family income.

3 Provincial Disability Benefit Programs

In Canada, provincial disability benefits are delivered either through the disability component of social assistance programs (Newfoundland and Labrador, Nova Scotia, New Brunswick, Quebec, Manitoba, Saskatchewan and British Columbia) or through disability support programs that specifically target the disabled (Ontario, Alberta and

[6] Greater stress on family life can plausibly be expected to increase the probability of divorce / separation – with associated subsequent impacts on family functioning and child outcomes. However, this paper restricts its attention to intact families.

[7] Based on data from the Canadian Self-Sufficiency Project (SSP), a program that offered welfare recipients the opportunity to receive an income supplement if they obtained full-time employment, they argue that as mothers take on off-hours and shift work, adolescents may have difficulties if left alone after school and into the evening hours. They also found adolescent children may be asked to take on greater household responsibilities and may be encouraged to engage in employment themselves when their single mothers move into employment. While there is limited research on the effects of household chores on children, a high level of employment during adolescence (particularly more than 20 hours of employment) has been linked with children's difficulties in school and increased drug and alcohol use.

PEI[8]). These benefits constitute the second largest income support program for the disabled next to the Canada / Quebec Pension Plan (C / QPP) disability benefits. In 2001, of the 3.42 million adults with disabilities in Canada, 10 % received income support from provincial disability benefit programs, about the same proportion as those receiving a Canadian / Quebec Pension Plan (Prince 2008).

Provincial disability benefits provide needs-tested income assistance for people with disabilities who are either ineligible for other benefits or for whom other benefits received are inadequate (e.g. C / QPP disability benefits, the Guaranteed Income Supplement, the Spouse's Allowance, Allowance for the Survivor, or War Veterans Allowance). Eligibility for provincial programs includes a needs-test and a work limiting disability. Given that an applicant family's liquid and fixed assets from non-exempted sources do not exceed the maximum allowable levels,[9] disability benefits are offset dollar-for-dollar with unearned income (e.g. interest income, pensions, or other needs-tested transfer income) and earned income that is not exempt.[10] During our study period, only one province changed its basic earnings exemption level,[11] and importantly, neither earnings exemption nor asset limits in any of the provincial programs is indexed for inflation.

It should be noted that besides the requirements on income and assets, each provincial program also made the benefits conditional on an assessment of disability, using its own defined terms (see Appendix B). It is also possible that provincial programs differ in terms of the strictness of the screening process. If larger caseload reductions occurred in

[8] The disability support program in PEI provides income support to persons with disabilities on a case-by-case base. In this study, we use data on PEI's social assistance program. Alberta also has a distinct program for persons with disabilities: the Assured Income for the Severely Handicapped (AISH) program. Different from other provincial disability benefit programs, the AISH clients are provided with a flat rate living allowance benefit which is not contingent on family size. Later, the analysis is replicated with children from these two provinces excluded. As are shown, our main results are not substantially affected.

[9] All provincial programs exempt most fixed assets, such as principal residence, vehicles (up to a certain limit), the value of prepaid funerals and property/equipment required for employment, while liquid assets are only partially exempt.

[10] All provincial programs exempt a portion of employment income although using slightly different formulae. For example, Nova Scotia allows its client families to keep the first $200 of earned total income and one-fourth of earnings exceeding $200 per month.

[11] PEI increased its basic earnings exemption level from $600 to $900 per month in 2001.

provinces with greater initial welfare caseloads, ignorance of the differential approval rates across programs would generate a downward bias in estimates (Mitra 2009). However, on the grounds that our empirical strategy utilizes variations in benefit levels across ten programs over five survey years, DD estimates are not likely to be affected by this selection bias, unless changes in approval rates happen to co-vary with changes in benefit level.[12]

Disability benefits under every provincial program consist of a basic allowance that is supposed to cover the cost of food, clothing, utilities, personal and household items, and a shelter allowance that covers rent or mortgage. Some provincial programs also provide extra benefits to meet special needs such as drug and dental coverage, vision care, medical transportation, diabetic supplies, assistive devices and mobility device repairs and batteries. Prior to 1996, all provincial programs were 50 % funded by the federal government under the Canada Assistance Plan (CAP), which offered a matching grant for provincial spending. Following 1996, a block grant (the Canada Health and Social Transfer – CHST) replaced CAP, resulting in substantial reduction in the federal government's contributions. In order to accommodate the cuts in federal support, provinces started to make a variety of changes such as reducing welfare benefit levels, tightening eligibility requirements, and imposing work requirements on welfare recipients. As explained in more detail in the next section, in this paper we utilize the dramatic change in benefits that took place over this period to estimate the effects of parental disability benefits on the gap in child well-being.[13]

Table 1 shows the maximum real annual disability benefits under ten provincial programs for the NLSCY survey years, and measures of both cross-section and time-series variations in benefit schedules. The data are compiled from various volumes of Welfare

[12] Benefit levels are shown in Appendix B. Disability designations by provincial programs all require applicants to submit a medical certificate completed by a licensed physician indicating the level of the impairment and the potential for rehabilitation. All provinces also require that the disability must have a substantial impact on the potential recipient's usual activities, and has to occur on a continuous or recurrent basis (e.g. last for at least 3-12 months).

[13] We use the maximum benefit in the empirical analysis, because I do not know the disability payments that are actually received by individuals, and because these would be endogenous with child outcomes.

Incomes by the National Council of Welfare.[14] On average, Ontario, Alberta and Quebec offered the highest annual benefit level at $13,341, $12,194 and $10,316 per person, respectively, whereas the benefits were lowest in New Brunswick, Manitoba and Saskatchewan, which paid $8,913, $9,437 and $9,850 per person annually. In all provinces, the real value of disability benefits decreased (PEI, Nova Scotia, Ontario, Manitoba and Saskatchewan) during the 12 year window or remained roughly constant (Quebec, British Columbia and Newfoundland). The huge cross-province variation in levels and timing changes suggests that estimators that rely on within-province variation in benefits - while having some important advantages – may not be able to estimate the effect of disability benefits accurately.[15]

A small number of studies on disability benefits in Canada have investigated their effect on labour supply (Campolieti 2004) and volunteering work (Campolieti et al. 2009). However, no study has investigated whether the effect can help children of disabled parents. This paper will help fill this gap.

4 Empirical Strategy

We use a continuous difference-in-differences estimator to control for potential unobserved heterogeneity associated with parental disability and benefit status. Assuming that the level of disability benefits is determined by provincial legislation and the level can only influence children's outcomes indirectly through individual families'

[14] The National Council of Welfare computes the disability benefits as the sum of the basic assistance rate (i.e. amounts for food, clothing, shelter and utilities, personal and household needs), additional benefits (i.e. supplementary allowances that were automatically provided to persons with a disability), and the provincial tax credit and GST credit that are intended for the disabled. These estimates assume a single disabled person who: (1) qualifies for long-term rates of assistance; (2) lives in the largest urban area in the province or territory; (3) goes on disability benefits on January 1 of each year and remains on benefits for the entire calendar year; and (4) is a tenant in the private rental market rather than a homeowner or social housing tenant, and who also does not share accommodation.

[15] In some provinces, actual entitlement to disability benefits may vary according to the circumstances of each individual family, including household size, composition and the children's age. We do not differentiate these family types because of data limitation, i.e. the National Council of Welfare did not produce benefit schedules for couple-families with a disability. Doing so also avoids potential endogeneity in fertility decisions and living arrangements to the generosity of needs-tested benefits (Milligan and Lemieux 2004; Milligan 2005). We are unaware of any systematic legislation change that affected benefit schedules for single persons differently than for couple-families with a disability during the study period. This paper exploits within-province variations in benefit levels for the single disabled over time, which will reflect changes in benefit levels for other family types, unless there was such a change.

circumstances, correlations between changes in benefit generosity and child outcome measures will imply that increasing parental disability income improves child development. Compared to the standard DD estimator that exploits a binary treatment variable, the continuous DD approach uses information on treatment level to treatment / potentially eligible group to estimate the *average* of the average treatment effects over all possible values of the treatment levels with respect to the whole control group (Blundell Dias 2009).

Because these assumptions will be violated if there are unmeasured province-specific transitory shocks that are correlated with both benefit generosity and children's outcomes (for example, an improvement in school quality) we use the children of non-disabled parents who live in the same province as comparison group and test whether the gap in outcomes between the children of disabled and non-disabled parents are related to the benefits changes over time. Specifically, we estimate the following model for a cross-sectional sample, pooling data from 1994-2006 of the NLSCY:

$$Y_{ipt} = \beta_0 + \beta_1 BEN_{pt} + \beta_2 DIS_{ipt} + \delta BEN_{pt} \times DIS_{ipt} + X_{ipt}\theta + \varphi_t + \pi_p + \varepsilon_{ipt} \qquad (1)$$

where i is individual child, p is province and t is survey year. Y represents a child's outcome, DIS is a dummy variable indicating the disability status of a parent, and BEN is a continuous variable capturing the real maximum disability benefit level that prevailed in the previous year. In this regression, π_p includes dummy variables for each of the ten Canadian provinces (i.e. province fixed effects), while φ_t includes dummy variables for years (i.e. year fixed effects). The province fixed effects hold constant unmeasured permanent differences across provinces, such as stable province differences in policies, such as regulations in earnings exemptions and asset limits, cost of living, the degree of discrimination against disabled people, and other disability-related services. The year fixed effects hold constant any time trends that affect all provinces similarly: changes in the federal disability tax credit in year 2004, for example. We also control for all higher

order interactions between province and year dummies to allow for differential trends within the provinces.

After centering,[16] β_1 picks up the average difference in outcomes across benefit levels that are common to both the children of disabled and non-disabled parents. β_2 indicates the average gap in outcome level between the children of disabled and non-disabled parents for those who are exposed to the average level of benefits. δ is the coefficient of interest. It captures the extent to which the gap in Y between children with disabled and non-disabled parents differs in provinces with greater disability benefits, relative to provinces with smaller benefits. If higher disability benefits are associated with child outcomes, we should expect to see a statistically significant δ, indicating that the gap in outcomes between the children of disabled and non-disabled parents of the same province change when the benefit level varies. This model controls for any permanent unobserved differences across provinces by inclusion of province fixed effects. Also, the benefit variable BEN is measured at the province-year level, which allows us to control for unrestricted province-year effects. This absorbs all unobserved linear trends that vary across provinces over time.

The control variables are: child age in month; gender; both parents' age and age squared, parents' immigration status (a dummy that equals one if either parent is an immigrant and zero otherwise), and both parents' education in three categories: less than high school; high school graduate; and post-secondary diploma or some post-secondary education but not a degree. A set of interaction terms between both parents' education and disability status is also added to the model, in order to allow differential impacts of parental education across the two types of families. Importantly, family income and both parents' labour market variables are left out of the equation to avoid the introduction of a mechanical endogeneity.

The use of a continuous treatment variable reduces the impacts of other province-specific factors. Unless the implementation / generosity of other public spending programs varies

[16] We subtract the sample mean from each respective benefit level.

by province-year coincidentally with the disability benefit level, the resulting estimates will not be affected. However, changes in developmental outcomes of children with disabled parents may be correlated with observed and unobserved parental permanent characteristics, such as attitude and preference that could lead to a downward bias to the estimates. As well, if parents with disabilities tend to move to provinces that offer relatively more generous benefits, the resulting benefit effects will be mis-specified. Finally, it is possible that benefit claim, benefit duration and the incidence of self-reported disability are positively influenced by the generosity of disability benefits (see Fortin et al. 2008). If so, it may well be that higher disability benefits change the composition of the disabled population rather actually affecting child development.

To confront these concerns we first take advantage of the longitudinal structure of the NLSCY and create a two-period panel by tracking two cohorts of children, from ages 6-9 to 12-15. These two cohorts of children were first observed in 1994 and 2000, and then again in 2000 and 2006. Included in the sample are children whose parents reported a disability in both periods (i.e. "always disabled"), and children whose parents never reported a disability (i.e. "always non-disabled"). We also exclude children who ever moved inter-provincially during the observation period. Since for children over the age of 11, the NLSCY switch from parental to child report of hyperactivity and anxiety scales, we focus on child's math test score, which is available for all students in grade two through ten, for this exercise. Based on this longitudinal sample, our panel DD estimator estimates:

$$\Delta Y_{ipt} = \beta_0 + \beta_1 \Delta BEN_{pt} + \delta \Delta BEN_{pt} \times DIS_{ip} + \Delta X_{ipt}\theta + \Delta\varphi_t + \Delta\varepsilon_{ipt} \quad (2)$$

Here Δ represents the first difference of any variable between two adjacent time periods. Compared to the level specification for the cross-sectional sample (equation 1), this model relies on more rigorous identifying assumptions (see Lee 2004). Any permanent unobserved parental / child characteristics that may potentially influence child developmental outcomes, and consequently the achievement gaps between children of

disabled and non-disabled parents across provinces are removed in this first-difference setting.

We also replicate the cross-sectional analysis with a sample that includes a more advantaged group: children of parents with a university degree.[17] We compare benefit effects on outcome gaps between children of parents with and without disabilities and neither of the parents have a university degree, relative to the benefit effects on outcome gaps for children who have at least one parent with a university degree. Parents with a university degree may be more likely to hold skilled, stable jobs and less likely to file for welfare or be influenced by changes in benefits. Finding smaller or non-existent effects among children of parents with a university degree would indicate that provincial shocks have been effectively removed through the research design.

We emphasize that this study uses an intention-to-treat design – we do not actually know whether a particular disabled parent filed for or received disability benefits. Rather we examine whether a change in benefit generosity has an impact on the population most likely to be affected. The analytic sample may include ineligible disabled parents as part of the treated group (i.e. the "intended to be treated" group) and also eligible parents who do not actually receive disability benefits (i.e. the average treatment effect). The average treatment effect on the treated (ATT) thus depends on the proportion of eligible parents included in the sample, and the proportion of eligible parents who actually take up the benefits. All reported analyses use sampling weights. The standard errors are clustered at the province level to correct for non-independence of residuals across children of the same province.

5 Data, Sample, and Measures

Empirical analysis is based on the 1994-2006 National Longitudinal Survey of Children and Youth (NLSCY), combined with province-level data capturing variations in disability benefit generosity. The NSLCY is an ongoing survey of Canadian children,

[17] The sample size is too small for panel DD estimation.

designed to help analyze child development and well-being. Starting in 1994, it has followed up a nationally representative sample of children aged between 0 and 11 years every two years until they reach the age of 25. At each survey round, a new cohort of children aged 0-1 was added to the longitudinal files. An important feature of the NLSCY is that it provides inter-generational information on parents' activity limitation, and a variety of children's developmental outcomes along with detailed socio-economic characteristics of both parents.

Data from 1996 and 1998 and for children aged 16 years or above are excluded since the set of questions on parental disabilities was not available. We use data from 1994, 2000, 2002, 2004 and 2006, and restrict the analysis to non-disabled children aged between 4 and 15 years old who lived in two-parent families. These are the years when most children should be attending Kindergarten through Grade Ten. Younger children are excluded from the sample to avoid the complex task of differentiating the effects of family income from the effects of schooling. Divorce / re-marriage can involve non-income-related stress for children and their parents, which would be difficult to separate from the benefit changes at the same time. Hence, we exclude children of single parents. Children with disabilities are excluded from the sample because certain disability conditions can be genetically transmitted and we want to focus on the effect of disability benefits, and avoid its effect being confounded with that of the child's own health problems,. Furthermore, since provincial welfare beneficiaries must be 18-65 years of age, we focus on children whose both parents were between 18-65 years during 1994-2006. Finally, since the needs-tested disability benefits target low-income families and tend to have the largest impact on people with lower education, our primary sample is limited to families where neither parent has a university degree.

This paper considers three domains of children's developmental outcomes: cognitive, behavioural and emotional well-being. Cognitive outcomes are measured by children's standardized math test score. The math test (CAT/2 test) in the NLSCY is designed to measure a child's basic competencies in math (e.g. addition, subtraction, multiplication and division of integers) and is administered to children in grade 2 to 10 every year. and

Itis a shorter version of the Mathematics Computation Test taken from the Canadian Achievement Test, 2nd edition.. Scores range from 0 to 750. The hyperactivity score is derived from six statements by the Person Most Knowledgeable (PMK) about the child having trouble sitting still or being restless, being easily distracted, being inattentive, having trouble sticking to any activity, concentrating, paying attention for long, being impulsive, acting without thinking, having difficulty waiting for his turn in games or groups. The emotional anxiety score is derived from six statements about the child being unhappy or sad, not as happy as other children, fearful or nervous, worried, crying a lot, being high strung or tense, having trouble enjoying himself or herself. Parents respond to these two scores on a scale ranging from 0 to 14, with 14 indicating the highest level of hyperactivity or emotional anxiety.[18]

The NLSCY asks "Because of a long-term physical or mental condition or a health problem, are/is ... ... limited in the kind or amount of activity you/he/she can do: 1) At home? 2) At school? 3) At work? 4) In other activities such as transportation to or from work or leisure time activities? 5) In caring for children?" .If the parent answered "yes" to any of the above items for herself or her spouse, parent's disability is coded one indicating disabled, otherwise zero for non-disabled.

Based on this disability definition, 8.3 % of non-disabled children in the full sample lived with a disabled mother, 8.2 % lived with a disabled father and 1 % lived with two disabled parents.[19] Cross-tabulation for children's outcomes by parental disability status is shown in Table 2. There is a significant gap across three developmental outcomes. Having a parent with activity limitation is associated with 5.7 % of one standard deviation (S.D.) drop in math scores, 59 % and 86 % of one S.D. increase in the hyperactive and anxiety symptoms. As Table 3 shows, relative to families of non-disabled parents, the equivalent family income for families with a disabled parent was approximately 7 % lower. Taking Statistics Canada's Low-Income-Cut-Off (LICO) as an

[18] Earlier cycles contained an additional question for each scale. We re-constructed these scales by dropping this question so they can be compared consistently across cycles.
[19] Note that the "disability rates" reflected in these tables are the percentages of non-disabled children with disabled parents among all children rather than the percentages of disabled people among the population – and therefore are not comparable to the disability rate normally reported by Statistics Canada

unofficial poverty line shows that having a disabled parent in the household more than doubled the incidence of poverty among these children: 10.69 % of children with disabled parents lived below the LICO while the corresponding number for children with non-disabled parents was only 5.80 %. Results based on the sample that only includes children of parents without any university degrees reveal more or less the same story (lower panel of Table 2). Compared to children of fathers with a disability, children of mothers with a disability fare worse (columns 3 and 4 of Table 2).

The mean ages for mothers and fathers are 38 and 40, respectively. Noticeably, disabled parents are only slightly older than their non-disabled counterparts, as are their non-disabled spouses. Parents' educational attainments, however, show great disparity. Only 15 % and 20 % of non-disabled mothers and fathers dropped out of high school, while these figures are 17 % and 23 % in the corresponding disabled population. Perhaps not surprisingly, their non-disabled spouses do not tend to have less education. Around 27 % of fathers in mother-disabled families and 32 % of mothers in father-disabled families had some post-secondary education (but not a degree), compared to 27 % and 28 % of their non-disabled counterparts. On average, disabled parents are much less likely to participate in paid work compared to non-disabled parents, while their non-disabled spouses seem to be slightly more likely to work long paid hours.

Aside from the NLSCY, information on provincial regulations, such as disability benefit levels, is compiled from various issues of Welfare Incomes (2000-2006), Social Assistance Statistics Report (2004-2006), and each provincial program's website. Since most family income and parents' labour market activities in the NLSCY are reported retrospectively over a 12-month period, we use the disability benefit schedule that prevailed in January of the previous calendar year. The program data is then merged to the NLSCY data based on the province of residence reported by individual households. All benefits, income and earnings data are converted into 2006 dollars using the corresponding provincial seasonally adjusted Consumer Price Index. As a result, all data in the paper, aside from those which are presented in Table 1 describing the provincial regulations on disability benefits, are in 2006 constant dollars.

6 Empirical Results

6.1 Effects of Parental Disability Benefits on Children's Well-being

6.1.1 Cross-Sectional DD Results

Table 4 presents difference-in-differences estimates of Equation (1) above for the pooled cross-sectional sample. As earlier noted, the key variable of interest in the regressions on children's outcomes is the interacted variable [Benefits*Disability]. For each outcome, Table 4 reports results from three model specifications. Column (1) adjusts only for year fixed effects, child's age in month, and gender. Estimates from this most basic model reveal a positive association between the generosity of disability benefits and children's math test scores, and a negative association between the benefits and two behavioural scales, where a higher value indicates more behavioural problems. In column (2), indicators that control for province fixed effects and second-order interaction between province and year fixed effects are added to the regressions. If provinces that provide higher benefits tend to be generous in other public spending programs, and if these programs have especially favourable impacts on children with disabled parents, adding in these controls would reduce the estimated benefit effects – but column (2) lends little support to this hypothesis. There is a moderate drop in the estimated benefit effect on math scores, and the magnitude of the estimates for hyperactive and anxiety symptoms increases slightly, which suggests that the unmeasured heterogeneity across provinces is unlikely to explain the observed link between the child's outcome gap and parental disability benefits. [20] In column (3) – our preferred specification – the inclusion of socio-economic characteristics of both parents again does not change the results substantially.[21] The size of the benefit effect decreases slightly in all three cases, implying families with a disabled parent on average have lower social attainments than families without disabilities. As one would expect, the fit of the regressions (adjusted R^2) increases significantly as the province fixed effects and parental background are controlled for.

[20] A set of identical regressions without province-year interactions were also estimated, and the substantive conclusions are unaffected (results are not reported but available upon request).

[21] In addition to the model specifications reported in Table 4, a fully interacted model that includes interaction between parental disability dummy and every single covariate in the regression produces highly similar results.

The results from column (3) imply that a $1,000 reduction in real disability benefits results in a 0.01 S.D. (1.16 point) decrease in math scores, 0.033 (0.11 point) and 0.036 S.D. (0.07 point) increase in hyperactive and anxiety symptoms. Hence, a cut in real benefits by $3,000, the equivalent of cuts enacted in Ontario between 1994-2000 (i.e. around 10 % of the equivalent family income for families with a disabled parent in the sample) will reduce standardized math test scores for children with disabled parents by 0.11 S.D., and increase hyperactive and anxiety symptoms by 0.30 and 0.28 S.D., respectively. To put these estimates in context, in the same specification mothers having a high school degree (compared to dropping out) is respectively associated with 12 %, 13 % and 11 % of one S.D. improvement in math test score, hyperactive and anxiety symptoms. In other words, the effect of a $3,000 benefit reduction is nearly the same as the magnitude of the association between maternal high school education and math score, and two times as large as the association between maternal high school education and child hyperactivity and anxiety. Relative to gains in cognitive functioning, the effects of disability benefits on the child's behavioural and emotional well-being seem more substantial. [22]

Control variables have the expected results. Children with disabled parents on average score lower in standardized math tests and exhibit more hyperactive and anxiety problems than their peers with non-disabled parents.[23] The coefficients on disability benefits, which capture the average differences in outcomes of interest across benefit levels, suggest that children in general tend to do worse in provinces that offer less generous disability benefits. Compared to children of high school dropouts, children of parents with a high school degree or post-secondary education fare significantly better in all three cases. Girls score slightly lower than boys on math tests but are less likely to suffer from hyperactive or anxiety symptoms.

[22] Cognitive achievement is more likely to be linked to the cumulative process of human capital acquisition (Cunha and Heckman 2007; Todd and Wolpin 2007; Currie et al. 2010) as opposed to external shocks, such as variations in family income, or parental stress associated with employment.

[23] We do not attach any fundamental meaning to these estimates since in the presence of interaction terms, their magnitude and significance merely reflect the group difference at the average benefit level and whether or not this difference is statistically different from zero at this point.

6.1.2 Panel DD Results

Table 5 presents panel difference-in-differences estimates of Equation (2) above for the longitudinal sample that includes children with "always" disabled and non-disabled parents. The use of child fixed effects in the regressions eliminates the bias in the cross-sectional estimates attributable to potential sample composition change and unobserved permanent omitted factors that vary across families and children. This analysis examines only math test scores, because this is the only outcome measure for which there is sufficient sample in each year to enable comparisons over time.[24]

Column (1) shows the results from child-fixed effects for the full sample. The benefit effect estimate in this case is substantially larger in magnitude and highly significant. A $1,000 decrease in disability benefit leads to 9.3 % of one standard deviation (9.77 point) reduction in math test scores. This may reflect a combination of two potential effects: (1) children of parents with a longer-term disability are the least well-off and most likely to be affected by the needs-tested disability benefits; and (2) lower statistical power arises from a relatively small sample size (n=3224) where the number of children with disabled parents is around 250. For this reason, results in this section should be taken with care and we am inclined to treat results from repeated cross-sectional samples as our preferred estimates. Results in columns (2)-(4) are based on samples that exclude children who ever moved from one province to another, children who resided in Alberta and PEI during the observation period (details are discussed in Section4.3). The benefit effects estimates are highly similar to the ones reported in column (1), suggesting that the potential migration response is not extensive in this analysis and does not in fact drive the main findings.

6.1.3 Children of Parents with Higher Education

Table 6 shows results from cross-sectional DD of association between disability benefits and child outcomes for children neither of whose parents has a university degree (column

[24] As part of Early Child Development (ECD) initiative, the NLSCY dropped many young children aged between 6 and 10 from its cross-sectional sample in later cycles. Also, since the NLSCY switches from parental to child report of hyperactivity and anxiety symptoms, we are unable to extend our analysis to include older children for these two cases.

(1)) and children either of whose parents has a university degree (column (2)) (more details are discussed in Section 4.4). The model specification is identical to the one used in column (3) of Table 3. As discussed before, for children neither of whose parents has a university degree, there is a favourable and statistical significant association between changes in children's outcome gaps and changes in disability benefits. The results presented in column (2) for children either of whose parents has a university degree, however, are strikingly different. Despite the qualitatively similar estimates for the main effects of parental disability and disability benefit levels, the coefficients on their interaction terms are small in magnitude and insignificant at any conventional level across outcomes. In some cases, the signs of the estimated effects are even reversed. This sharp contrast suggests that most of the associations between disability benefits and children's developmental outcomes are driven by children whose parents have lower education. Since this triple difference comparison non-parametrically absorbs heterogeneity associated with parental disability, it provides additional comfort to the main findings.

6.2 Maternal vs Paternal Disability Benefit Effects

Does it matter whether it is the mother or father who is disabled? Traditional gender roles assign home production and care for children primarily to mothers, so their disability especially impedes the delivery of time inputs. However, because male wages tend to be higher, disability will likely have a larger impact on household living standards when the father is disabled – so the father's disability may especially affect material inputs in home production. Table 7 investigates this issue by separately estimating model (3) in Table 4 for children in families with only mother or only the father being disabled.[25] Again, the key variable of interest is [Benefits*Disability]. For children of mothers with a disability, the benefit effect estimates are significant across outcomes and, even though the treated cases are reduced by half, their magnitudes are even larger than the ones reported in column (3) of Table 3, suggesting that the favourable impact of benefit changes discovered before is mainly concentrated on children in families where the mother is

[25] For ease of interpretation, children both of whose parents are disabled are omitted. As a result, 453, 447 and 452 observations are excluded from the math test score, hyperactivity and anxiety samples, respectively.

disabled. Ceteris paribus, a $1,000 benefit reduction results in a 0.02 S.D. reduction in math test scores, and a 0.06 and 0.04 S.D. increase in parent-report hyperactive and anxiety symptoms. In direct contrast, the benefit effect estimates for children of fathers with a disability are all insignificant with considerably smaller magnitudes. These estimates reveal a distinct benefit effect depending on the gender of the disabled parent. To get a full picture of this finding, the next subsection explores pathways through which generosity of disability benefits may affect child well-being.

6.3 Exploring Mechanisms

Table 8 presents DD estimates for models of parental employment (columns (1)-(4)), and family income (columns (5) and (11). As mentioned before, a reduction in disability benefits will both directly decrease poor families' disposable incomes and induce poor parents to participate more in paid work, which could lead to an increase in earnings and family income. Although a negative association between benefit level and parental paid work for both the disabled parent and his or her non-disabled spouse is to be expected, the benefit effect on family income is ambiguous.[26] For the sake of brevity, only the coefficients of benefit effect and parental disability are shown, but all controls included are identical to column (3) of Table 3. The upper and lower panel show results for the "math score sample" (i.e. parents of children in Grade 2-10 with math scores) and the "hyperactivity and anxiety sample" (i.e. parents of children aged 4-11 with reports on hyperactivity and emotional anxiety scores), respectively.

Columns (1)-(2) show a large and negative parental employment impact of disability benefits for the disabled parents. For every $1,000 decrease in annual benefits, disabled mothers and disabled fathers increase their time spent in the labour market by 0.68 and 0.88 hours per week, respectively. The change in paid hours in both cases is mainly driven by an increase in the extent of full-time employment (defined as exceeding 30

[26] The NLSCY contains retrospective information on labour market activities for both parents such as paid work participation, usual weekly hours, and family income received from all sources (before taxes), 12 months prior to the survey. Parents reported their hours of work in six categories: less than 10 hours, 10-19 hours, 20-29 hours, 30-39 hours, 40-49 hours and 50 hours or more. We create a pseudo continuous variable coded at the mid-point of each category to capture the non-linear nature of parental hours, and another indicator variable that identifies a parent's full-time work status (i.e. equal to one if a parent works 30 hours or more), to test the effect of hours of work.

hours per week). Living in a province with a benefit reduction of $1,000 increases the probability of engaging in a full-time job for both disabled mothers and fathers by around 0.02 percentage points. Considering that in our sample mothers' average weekly hours is lower than fathers', the size of benefit effect for own-labour supply is slightly larger for disabled mothers than disabled fathers.

Also apparent is an asymmetric "added worker effect" across disabled fathers and disabled mothers. As suggested by some studies (e.g. Berger and Fleisher 1984; Berger 1982), mothers of disabled spouse may be less likely to increase their labour supply relative to fathers of non-disabled spouse because of a "nursing effect". Results shown in columns (4)-(5) is consistent with this hypothesis. A $1,000 decline in the disability benefits leads the non-disabled father to increase his time spent in the labour market by 0.44 hours per week (1 % of the average hours of work) and increases his chances of participating in full-time employment by one percentage point. In contrast, the effects on non-disabled mothers are much smaller and statistically insignificant. Corresponding to the missing added worker effect for families with disabled mothers, there is a significant and negative association between the "combined" family income and benefit generosity, with every $1,000 benefit reduction resulting in 2.7 % increase in real equivalent family income,[27] whereas the same relationship is insignificant for families where the father is disabled.

Taken together, the analysis on parental employment and family income provides evidence that deductions in disability benefits during the 1994-2006 period increased disabled parents' own labour supply by a similar magnitude for disabled mothers and disabled fathers, but also generated a significant spill-over incentive effect for the husband of a disabled wife, in which families poorer child outcomes are observed. To test the importance of parental employment, we re-estimate our original models for children of disabled mothers, additionally controlling for covariates for both mother and father's employment status. If the benefit effect on child development operates through this

[27] Log of family income measure is used in column (6).

channel, we would expect the estimated benefit effects to decline under this specification. We are also interested in the explanatory power of interaction between the above covariates and a parental disability dummy, since a significant interaction term would indicate that parental employment plays a role in widening/narrowing the outcome gaps between children of disabled parents and children of non-disabled parents discussed earlier.

After additionally controlling for parental employment (column 2 of Table 7), the significance of the benefit effect for children's math test score completely disappears. The interaction between the father's full-time employment and maternal disability is significant on its own in the cases of math test scores and hyperactivity, suggesting that having the father working full-time reduces a child's math test scores by 17 % of one standard deviation, and increases his or her hyperactive symptoms by 10 % of one standard deviation. However, the inclusion of parental employment variables does not alter the benefit effect for children's anxiety symptoms substantially. One potential explanation is that children's emotional anxiety is affected more through the "socialization" rather than "family resource" channel, by parents', especially the primary caregiver's subjective well-being, as compared to cognitive skills. A father's long work hours could impose stress on a family from which parents cannot successfully shield the child (Burton and Phipps 2011). It is unfortunately not feasible to estimate a model of parental stress or depression in this scenario, as Milligan and Stabile (2011) did, because depression could well be a cause or result of the mother's disability, or, could even be the mother's disability.

Besides the asymmetric employment effect, the "good mother hypothesis" might help explain why the developmental returns of parental disability benefits may be larger for children with disabled mothers than children with disabled fathers. If a mother's income is more likely than a father's income to be spent in ways that benefit the child, then given the same disability, benefits received by the mother may increase her independent access to family financial resources; enhance her bargaining power in household expenditure decision-making process and thus have a larger positive effect on child well-being. For

example, Lundberg et al. (1997) studied the effect of a change in family allowance benefits which decreases father's net income in the United Kingdom in the late 1970s. They find that expenditures on children's clothing increased significantly relative to expenditures on men's clothing as a result of this policy change. Woolley (2004) uses data from Canada and finds that the monthly child tax benefits paid to mothers relieves women's financial dependence and are more likely to be spent on children.

Overall, these results indicate that lower benefits may hurt children's development, in part, through the time constraints and stress associated with the non-disabled father's longer employment. There also seems to be an asymmetric incentive effects on spousal labour supply – as the benefit level declines, fathers of disabled spouse increase their full-time employment and hours of work. By contrast, wives of disabled spouse do not behave differently. The pattern is consistent with previous research on the effect of spousal ill-health on labour supply in particular, husband's health on wife's labour supply in North America (Haurin 1986; Berger and Fleisher 1984; Berger 1982; Gallipoli and Turner 2008), and studies related to spill-over effects of public transfer payments in the U.S. (e.g. Colie 2004). However, cautions should be taken in interpretation since the unit of analysis in the NLSCY is the child instead of the adult. Even though the results can be replicated when one parent per child is randomly selected,[28] further analysis using alternative data sources is needed.

8 Conclusions

This paper has asked: 1) Do higher disability benefits reduce the gap in child outcomes between the children of disabled and non-disabled parent 2) If so, are the benefit effects different depending on the gender of the disabled parent? 3) Finally, what are the mechanisms that drive these differences? Using changes in real benefits under ten disability benefit programs in Canada as an identification strategy, we find higher parental disability benefits indirectly protect child development and cognitive skill formation. Specifically, the gaps in developmental outcomes between children of

[28] Results are not reported in the paper but available upon request.

disabled parents and children of non-disabled parents grow wider in provinces that decrease their benefits compared to provinces that do not. In addition, the benefits have stronger effects on children's behaviour problems and emotional anxiety, than on children's cognitive ability as measured by standardized math test scores. We interpret these estimates as causal effects of parental disability benefits, because a family's exposure to benefits affects the parents' income and employment, while it is independent of unmeasured characteristics.

Although parental disability is self-identified by parents through a checklist of questions, there is little evidence suggesting that the results are driven by sample composition change, unobserved family-level heterogeneity associated with parental disability, or potential inter-provincial migration response to the generosity of disability benefits. A "placebo" type of DD estimator for the less likely eligible (i.e. university educated) sample lends additional support to the main finding.

We also find a difference in the effects of benefits by the gender of the disabled parents: lower benefits have strong detrimental effects for children with a disabled mother, while the effects are small and insignificant for children with disabled father. For families with a disabled mother, benefit reductions significantly increase a non-disabled father's full-time employment. The increase in the father's time away from home leads to a substantial decline in children's math test scores and an increase in behavioural problems. Thus, it appears that higher benefits may facilitate child development mainly through parents' potentially available family time and the reduced stress associated with employment. This finding is in line with related Canadian studies which indicate both parental time and money are important inputs to the well-being of children (Curtis and Phipps 2000; Burton et al. 2006). While a tight family budget directly limits the material resources that parents can afford for children (i.e. Mayer and Jencks 1993; Mayer 1997 and 2007), parents' long hours of work reduce the amount of time parents can spend with children, erode parental health, and increase stress levels, all of which negatively affect the well-being of children.

Since the mid-1990s, Canadian policy makers have made significant changes to welfare programs, in the general direction of connecting cash transfers to labour market participation. This paper's findings suggest that reduced income support to parents with disabilities may have had unintended adverse consequences for the well-being of their children. Living with a disabled parent is not a rare event. The NLSCY data indicate that, in 2006, 1.8 million Canadian children aged under 15, or about one in six, lived with at least one disabled parent. Out of this total, around 1 million were adolescents aged 10-15. As governments in Canada continue to pay disability benefits that are now distinctly lower, in real terms, than twenty years ago, it is important not to lose sight of the fact that the children who live in these poor households already face a gap in equality of opportunity due to their parent's disability – and that gap widens when disability benefits are cut.

Table 1 Real Maximum Annual Disability Benefits (2006 Constant $)

	NL	PEI	NS	NB	QB	ON	MB	SK	AB	BC	Canada
1994	10783	11975	11291	10531	10301	15054	10749	11148	13443	11479	11675
2000	10175	10330	10566	8182	10410	… … 13846	9548	9948	12871	10999	10688
2002	9983	10050	9456	8357	10334	… … 13062	9213	9713	11848	10826	10284
2004	9498	9616	9420	8356	10305	… … 12471	8914	9420	10971	10391	9936
2006	9905	9400	9082	9143	10234	… … 12273	8765	9075	11841	10843	10056
Real % change, 1994-2006	-8.14	-21.50	-19.56	-13.18	-0.65	-18.47	-18.46	-18.60	-11.91	-5.54	-13.87
% difference from national average, 1994	-7.64	2.57	-3.29	-9.80	-11.77	28.93	-7.93	-4.52	15.14	-1.69	--
% difference from national average, 2000	-4.79	-3.34	-1.14	-23.45	-2.60	29.55	-10.66	-6.92	20.43	2.92	--
% difference from national average, 2002	-2.93	-2.28	-8.06	-18.74	0.49	27.01	-10.41	-5.55	15.20	5.27	--
% difference from national average, 2004	-4.41	-3.22	-5.19	-15.90	3.71	25.51	-10.29	-5.20	10.41	4.57	--
% difference from national average, 2006	-1.50	-6.52	-9.68	-9.08	1.77	22.04	-12.84	-9.76	17.75	7.82	--
Provincial Average	10068	10274	9963	8913	10316	13341	9437	9860	12194	10907	10527

Note: Disability benefit information is collected from Welfare Incomes (1993-2005) and the AISH website. Consumer Price Index (CPI), 2001 basket content, is from Statistics Canada E-Stats Table 326-0002.

Table 2 Children's Developmental Outcomes by Parental Disability
(Standard Error) [Number of Observation]

	No Parent Disabled	One Parent Disabled	Only Mother Disabled	Only Father Disabled
	(1)	(2)	(3)	(4)
Non-Disabled Children (Neither of Parents has a University Degree)				
Standardized Math Score (Grade 2-10)	377 (170) [10,932]	365*** (153) [2,493]	366** (171) [1,040]	373 (153) [1,000]
Hyperactive Symptoms (Age 4-11)	3.62 (0.93) [11,897]	4.06*** (0.88) [2,279]	4.17*** (0.86) [920]	4.00*** (0.87) [912]
Emotional Anxiety (Age 4-11)	2.24 (0.35) [11,917]	2.59*** (0.31) [2,261]	2.61*** (0.35) [912]	2.58*** (0.32) [907]
Non-Disabled Children (Full Sample)				
Standardized Math Score (Grade 2-10)	379 (179) [13,757]	369*** (162) [3,137]	367*** (162) [1,309]	373 (162) [1,258]
Hyperactive Symptoms (Age 4-11)	3.47 (0.85) [14,887]	3.91*** (0.81) [2,852]	3.94*** (0.80) [1,151]	3.85*** (0.79) [1,134]
Emotional Anxiety (Age 4-11)	2.22 (0.39) [14,931]	2.55*** (0.35) [2,833]	2.59*** (0.37) [1,148]	2.52*** (0.35) [1,118]

Note: The sample includes non-disabled children in two-parent families during 1994-2006 in the NSLCY. Children both of whose parents were disabled (around 15 % of all children with a disabled parent), are excluded from the mother-disabled and father-disabled samples. Number of observations and robust standard errors are in square bracket and parentheses, respectively. The number of stars denotes the p-value of a t-test for group difference. *p<0.1; **p<0.05; ***p<0.01.

Table 3 Sample Characteristics

	Parents Not Disabled	One Parent Disabled	Only Mother Disabled	Only Father Disabled
	(1)	(2)	(3)	(4)
		Child Characteristics		
Child Age (in Month)	127	133	135	131
	(0.502)	(0.946)	(1.400)	(1.338)
Child Female	0.49	0.50	0.50	0.50
	(0.006)	(0.012)	(0.019)	(0.017)
		Family Characteristics		
Equivalent Family Income	37076	34266	36949	36718
	(373)	(589)	(350)	(709)
Either Parent Immigrant	0.181	0.190	0.182	0.200
	(0.005)	(0.120)	(0.020)	(0.016)
		Mother Characteristics		
Mother Age	38.24	39.13	39.00	39.13
	(0.071)	(0.161)	(0.216)	(0.217)
Mother Post-Secondary Diploma	0.28	0.19	0.28	0.32
	(0.005)	(0.012)	(0.015)	(0.016)
Mother High School Degree	0.56	0.52	0.54	0.49
	(0.006)	(0.012)	(0.018)	(0.017)
Mother High School Dropout	0.15	0.18	0.17	0.18
	(0.004)	(0.009)	(0.014)	(0.013)
Mother Employment Status	0.80	0.72	0.68	0.79
	(0.004)	(0.011)	(0.017)	(0.014)
Mother Weekly Hours	27.53	24.60	22.81	27.60
	(0.205)	(0.458)	(0.699)	(0.622)
Mother Weekly (Hours 30 +)	0.56	0.50	0.46	0.57
	(0.006)	(0.012)	(0.019)	(0.017)
		Father Characteristics		
Father Age	40.33	41.88	41.26	42.16
	(0.077)	(0.188)	(0.264)	(0.243)
Father Post-Secondary Diploma	0.27	0.27	0.27	0.29
	(0.005)	(0.010)	(0.016)	(0.016)
Father High School Degree	0.52	0.49	0.52	0.46
	(0.006)	(0.012)	(0.018)	(0.017)
Father High School Dropout	0.20	0.22	0.20	0.23
	(0.004)	(0.009)	(0.014)	(0.014)
Father Employment Status	0.95	0.85	0.95	0.79
	(0.002)	(0.008)	(0.007)	(0.013)
Father Weekly Hours	42.84	37.84	43.12	34.68
	(0.128)	(0.408)	(0.362)	(0.635)
Father Weekly (Hours 30 +)	0.93	0.82	0.94	0.75
	(0.002)	(0.009)	(0.002)	(0.014)
Number of Observations	17,603	4,054	1,804	1,797

Note: The sample includes non-disabled children aged between 4 and 15 years in two-parent families whose parents did not have any university degree. 453 children with two disabled parents are excluded from the mother-disabled and father-disabled samples

Table 4 Cross-Sectional DD Estimates of the Association between Parental Disability Benefits and Children's Developmental Outcomes

	Math Score			Hyperactivity			Anxiety		
	M1	M2	M3	M1	M2	M3	M1	M2	M3
Benefit x Disability	2.393***	1.860***	1.159***	-0.108***	-0.115***	-0.107***	-0.064*	-0.077**	-0.072*
	(0.559)	(0.339)	(0.290)	(0.022)	(0.019)	(0.016)	(0.032)	(0.029)	(0.033)
Parental Disability	-7.867***	-6.550***	-8.937	0.553***	0.586***	0.058	0.432***	0.460***	0.020
	(1.456)	(1.181)	(6.103)	(0.061)	(0.057)	(0.211)	(0.107)	(0.102)	(0.222)
Benefit	-4.063*	5.865***	5.381***	-0.034	-0.122***	-0.121***	-0.012	-0.281***	-0.289***
	(2.064)	(0.137)	(0.272)	(0.031)	(0.002)	(0.009)	(0.036)	(0.004)	(0.006)
Child Age in Month	1.659***	1.475**	1.563**	-0.013***	-0.013***	-0.011***	0.005***	0.005***	0.008***
	(0.471)	(0.572)	(0.539)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Child Female	-1.655	-1.687	-2.143	-1.058***	-1.046***	-1.056***	0.056	0.063	0.071
	(3.505)	(3.527)	(2.991)	(0.061)	(0.057)	(0.048)	(0.051)	(0.053)	(0.065)
Either Parent Immigrant			3.130**			0.182			0.030
			(1.221)			(0.122)			(0.064)
Mother Diploma			18.32***			-0.369***			-0.063
			(2.377)			(0.088)			(0.085)
Father Diploma			9.856***			-0.071			0.052
			(3.017)			(0.079)			(0.117)
Mother High School			12.17***			-0.397***			-0.228**
			(1.243)			(0.087)			(0.075)
Father High School			5.865*			-0.141			0.0001
			(2.928)			(0.094)			(0.091)
Mother Age			2.937			-0.055			-0.114**
			(2.426)			(0.120)			(0.042)
Mother Age Squared			-0.026			0.0004			0.001
			(0.030)			(0.0014)			(0.0005)
Father Age			0.299			-0.067*			0.012
			(1.708)			(0.034)			(0.015)
Father Age Squared			-0.0003			0.0007**			-0.0003
			(0.019)			(0.0002)			(0.0002)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province Fixed Effects		Yes	Yes		Yes	Yes		Yes	Yes
Year x Province		Yes	Yes		Yes	Yes		Yes	Yes
Sample Mean		449			3.822			2.192	
Sample S.D.		104			2.989			2.151	
Adjusted R^2	0.633	0.641	0.651	0.050	0.057	0.066	0.012	0.021	0.039
N		13,425			14,176			14,178	

Notes: DD estimates for cross-sectional samples, pooling data from the 1994-2006 NLSCY. Robust standard errors (in parentheses) are clustered at the province level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 5 Panel DD Estimates of the Association between Parental Disability Benefits and Children's Developmental Outcomes

	Full Sample	No Inter-Provincial Movers	No Children in Alberta	No Children in PEI
Benefit x Disability	9.765**	9.538**	9.131**	9.538**
	(3.864)	(3.817)	(3.634)	(3.817)
Parental Disability	2.458	2.473	3.406**	2.473
	(1.393)	(1.391)	(1.095)	(1.391)
Year Fixed Effects	Yes	Yes	Yes	Yes
Year x Province	Yes	Yes	Yes	Yes
Adjusted R^2	0.641	0.651	0.057	0.066
Number of Children	1612	1564	1470	1564
N	3224	3128	2940	3128

Note: Child fixed-effects estimates for the effect of parental disability benefits on children's math test scores. When running the regression, we use a slightly different set of covariates to control for the initial condition, since all time-invariant variables will be dropped out of the regression, including a dummy indicating cohort, and higher order interactions between province and year fixed effects. Robust standard errors (in parentheses) are clustered at the province level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 6 Robustness -- Children of Parents with Higher Education

	Math Score		Hyperactivity		Anxiety	
	Low Education	High Education	Low Education	High Education	Low Education	High Education
Benefit x Disability	1.159***		-0.107***		-0.072*	
	(0.290)		(0.016)		(0.033)	
Benefit x Disability		-0.546		-0.074		0.037
		(1.906)		(0.058)		(0.036)
Disability	-8.937**	-49.444**	0.058	0.155	0.020	1.117*
	(2.064)	(15.485)	(0.211)	(1.499)	(0.222)	(0.563)
Benefit	5.381***	1.686	-0.121***	0.499***	-0.289***	0.145***
	(0.272)	(2.540)	(0.009)	(0.018)	(0.006)	(0.010)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year x Province	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.641	0.651	0.057	0.080	0.025	0.062
N	13,425	6,037	14,176	5,848	14,178	5,851

Note: Robust standard errors (in parentheses) are clustered at the province level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7 Children in Mother-Disabled versus Father-Disabled Families

	Math Score		Hyperactivity		Emotional Anxiety	
	Mother Disabled	Father Disabled	Mother Disabled	Father Disabled	Mother Disabled	Father Disabled
Benefit x Disability	2.433**		-0.178***		-0.102**	
	(1.032)		(0.032)		(0.042)	
Benefit x Disability		0.476		0.021		-0.024
		(0.919)		(0.034)		(0.057)
Parental Disability	-0.789	-19.309**	0.080	-0.006	-0.092	-0.010
	(11.77)	(6.519)	(0.627)	(0.208)	(0.350)	(0.197)
Benefit	3.632***	4.979***	-0.021	-0.139***	-0.106***	-0.322***
	(0.321)	(0.306)	(0.017)	(0.008)	(0.009)	(0.005)
Child Age in Month	1.586**	1.580**	-0.011***	-0.011***	0.009***	0.008***
	(0.582)	(0.574)	(0.001)	(0.002)	(0.001)	(0.001)
Child Female	-1.756	-1.867	-1.051***	-1.029***	0.087	0.068
	(3.324)	(3.464)	(0.042)	(0.046)	(0.077)	(0.053)
Either Parent Immigrant	3.340	5.470***	-0.155	-0.123	0.041	0.060
	(1.406)	(1.270)	(0.117)	(0.100)	(0.057)	(0.043)
Mother Diploma	19.710***	19.631***	-0.353***	-0.355***	-0.054	-0.058
	(3.419)	(3.172)	(0.094)	(0.094)	(0.086)	(0.093)
Father Diploma	11.098***	10.769**	-0.073	-0.073	0.053	0.059
	(2.167)	(2.377)	(0.079)	(0.077)	(0.118)	(0.114)
Mother High School	13.608***	13.572***	-0.402***	-0.394***	-0.226**	-0.224**
	(2.718)	(2.551)	(0.090)	(0.087)	(0.073)	(0.080)
Father High School	7.041*	6.615*	-0.144***	-0.136***	-0.0004	0.005
	(3.216)	(3.149)	(0.087)	(0.089)	(0.090)	(0.088)
Mother Age	7.022**	8.329**	-0.084	-0.057	-0.075	-0.117**
	(2.934)	(2.783)	(0.116)	(0.107)	(0.044)	(0.037)
Mother Age Squared	-0.073*	-0.091**	-0.0008	0.0004	0.0006	0.001*
	(0.035)	(0.034)	(0.001)	(0.001)	(0.0005)	(0.0005)
Father Age	-1.335	-1.312	-0.080**	-0.101**	-0.009***	-0.006
	(2.373)	(2.087)	(0.032)	(0.035)	(0.0027)	(0.025)
Father Age Squared	0.020	0.019	0.0009*	0.001***	-0.00005	-0.0001
	(0.026)	(0.024)	(0.0004)	(0.0003)	(0.003)	(0.0002)
Sample Mean	449	449	3.789	3.775	2.155	2.147
Sample S.D.	104	104	2.971	2.962	2.138	2.125
Adjusted R^2	0.652	0.653	0.068	0.066	0.041	0.040
N	11,972	11,932	12,803	12,817	12,809	12,824

Notes: DD estimates for cross-sectional samples, pooling data from the 1994-2006 NLSCY. Robust standard errors (in parentheses) are clustered at the province level. * $p < 0.1$, $p < 0.05$, *** $p < 0.01$

Table 8 Disability Benefit Effects on Parental Paid Work and Family Income

	Mother-Disabled Families					Father-Disabled Families				
	Own Hours		Spousal Hours		Family Income	Own Hours		Spousal Hours		Family Income
	Hours (OLS)	Hours 30+ (LPM)	Hours (OLS)	Hours 30+ (LPM)	(LPM)	Hours (OLS)	Hours 30+ (LPM)	Hours (OLS)	Hours 30+ (LPM)	(LPM)
"Math Score" Sample (Parents of Children in Grade 2-10)										
BEN x DIS	-0.684***	-0.019***			-0.027***	-0.885***	-0.019***			-0.014
	(0.194)	(0.005)			(0.006)	(0.244)	(0.005)			(0.008)
BEN x DIS			-0.449***	-0.009***				-0.138	-0.003	
			(0.125)	(0.002)				(0.289)	(0.007)	
DIS	-5.727**	-0.100*	-1.922	-0.054	-0.114	-13.955***	-0.294***	-5.768	-0.068	-0.271***
	(2.307)	(0.051)	(1.492)	(0.030)	(0.089)	(2.809)	(0.063)	(3.252)	(0.051)	(0.006)
Adjusted R^2	0.088	0.067	0.081	0.068	0.166	0.109	0.099	0.086	0.065	0.171
N			11,438					11,434		
"Hyperactivity and Anxiety" Sample (Parents of Children in Aged 4-11)										
BEN x DIS	-1.009***	-0.026***			-0.024***	-0.628**	-0.012***			-0.008
	(0.225)	(0.004)			(0.005)	(0.202)	(0.004)			(0.007)
BEM x DIS			-0.415***	-0.009***				-0.523	-0.009	
			(0.116)	(0.004)				(0.289)	(0.006)	
DIS	-3.831	-0.057	-0.778	-0.031	-0.121*	-14.271***	-0.311***	-5.313	-0.052	-0.266**
	(2.634)	(0.060)	(1.142)	(0.024)	(0.056)	(3.698)	(0.081)	(4.283)	(0.088)	(1.196)
Adjusted R^2	0.094	0.073	0.096	0.084	0.175	0.123	0.112	0.094	0.072	0.178
N			11,006					11,959		

Note: DD estimates for cross-sectional samples, pooling data from the 1994-2006 of NLSCY. Robust standard errors (in parentheses) are clustered at the province level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 9 Non-Disabled Father's Full-Time Employment as a Mechanism for Benefit Effects

	Math Score		Hyperactivity		Anxiety	
	M1	M2	M1	M2	M1	M2
Benefits x Parental Disability	2.433**	2.185	-0.179***	-0.170***	-0.101**	-0.103**
	(1.032)	(1.261)	(0.033)	(0.026)	(0.043)	(0.044)
Father Hours (30 +) x Disability		-18.072**		0.299**		-0.010
		(5.763)		(0.121)		(0.172)
Mother Hours (30 +) x Disability		-7.821		-0.246		-0.066
		(13.02)		(0.272)		(0.117)
Father Hours (30 +)		-1.198		-0.300		-0.199
		(6.432)		(0.442)		(0.348)
Mother Hours (30 +)		0.356		0.293***		0.061
		(1.841)		(0.078)		(0.072)
Mother Disability	-0.789	19.447*	0.080	-0.053	-0.098	-0.081
	(11.77)	(10.53)	(0.627)	(0.613)	(0.341)	(0.253)
Benefit	3.632***	4.577***	-0.021	0.031*	-0.110***	-0.132***
	(0.321)	(0.444)	(0.017)	(0.015)	(0.009)	(0.013)
Adjusted R^2	0.652	0.653	0.065	0.068	0.038	0.040
N	11,972	11,925	12,803	12,714	12,809	12,720

Note: Robust standard errors (in parentheses) are clustered at the province level. * p < 0.1, ** p < 0.05, *** p < 0.01

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APPENDIX: DISABILITY DESIGNATIONS IN TEN DISABILITY BENEFIT PROGRAMS

Province/Disability Benefit Programs	*Disability Designation*
NL[29] (Income Support Program)	A person who, because of a persistent and permanent physical, sensory, speech, communication, psychological, psychiatric, developmental or other disability, demonstrates significant challenges in accessing education, training, or employment.
PEI[30] (Social Assistance Program)	A person in need "who has an ongoing intellectual, mental or physical impairment".
NS[31] (Employment Support and Income Assistance)	Refers to severe and persistent restriction or impairment that results in an inability to perform an activity in the range or within the range considered normal for someone of the same age, gender, and culture. It describes a functional limitation (versus a diagnosis) and is ongoing in nature.
NB [32](Social Assistance Program)	The Medical Advisory Board considers an individual for certification (of disability) who suffers from a major physiological, anatomical, or psychological impairment, which severely limits the individual in normal living activities, and which is likely to continue indefinitely without substantial improvement (i.e. totally and permanently disabled).
Quebec[33] (Social Solidarity Program)	A person who, because of a persistent and permanent physical, sensory, speech, communication, psychological, psychiatric, developmental or other disability, demonstrates significant challenges in accessing education, training, or employment.
ON[34] (Ontario Disability Support Program)	A person with a disability is defined as a person who has a substantial physical or mental impairment that is continuous or recurrent and is expected to last one year or more. The impairment must result in a substantial restriction in one or more activities of daily living (ability to attend to personal care, function in the community or function in a workplace), taking into account the person's age, level of education and employment experience/work history.
MB[35] (Employment and Income Assistance)	(A person who suffers from) physical or mental ill health, or physical or mental incapacity or disorder that is likely to continue more than 90 days is unable to earn income to meet basic necessities or unable to care for themselves.
SK[36] (Saskatchewan Assistance Program)	Clients with a disability are those whose employment or training capabilities are limited and no change is expected within one year.
AB[37] (Assured Income for the Severely Handicapped)	Applicants and clients must have a severe handicap that substantially limits their ability to earn a living; and is likely to remain permanent. There is no training, medical treatment or therapy that would improve the person's ability to earn a living.
BC[38] (BC Employment and Assistance Program)	Refers to cases which include a person 18 years of age or over with a severe mental or physical impairment, which restricts the person`s ability to perform daily living activities. The person must require an assistive device, the help or supervision of another person, or the services of an assistance animal to perform daily living activities.

[29] NL: Income and Employment Support Regulations. www.hrle.gov.nl.ca/hrle
[30] PEI: Social Assistance Policy Manual http://www.gov.pe.ca/sss/index.php3?number=1028464&lang=E
[31] NS: http://www.gov.ns.ca/coms/disabilities/documents/GlossaryofTerms.html
[32] NB: Social Assistance Policy Manual. http://www.gnb.ca/0017/Policy%20Manual/POL-E/policy1.htm#blind
[33] Quebec: Individual and Family Assistance Act. http://www.mess.gouv.qc.ca/solidarite-sociale/programmes-mesures/assistance-emploi/index_en.asp
[34] Ontario: Income Support Directives. http://www.mcss.gov.on.ca/en/mcss/programs/social/directives/ODSP_incomesupport.aspx
[35] MB: Income Assistance for Persons with Disabilities. http://www.gov.mb.ca/fs/pwd/iapd.html#content
[36] SK: SAP Policy Manual. http://www.socialservices.gov.sk.ca/SAP-policy-manual.pdf. In addition, a separate disability support program, Saskatchewan Assured Income for Disability (SAID) was initiated since 2009
[37] AB: AISH Policy Manual. http://www.seniors.alberta.ca/aish/PolicyManual/Policy/Eligibility/Eligibility_Criteria.htm
[38] BC: Persons with disabilities. http://www.hsd.gov.bc.ca/factsheets/2004/pwd.htm