Unequal Opportunities and Public Policy: The Impact of Parental Disability Benefits on Child Post-Secondary Attendance

Kelly Chen,[1] Lars Osberg[2] and Shelley Phipps[3]

Preliminary Draft: May 27, 2016

Abstract: Having a parent with a disability is an under-studied potential source of inequality of opportunity. This paper asks whether cash transfers (provincial disability benefits) available to parents with disabilities when their child is young increase the chances that the child will attend post-secondary education (PSE) as a young adult. We use Canada's National Longitudinal Survey of Children and Youth (NLSCY), to trace the eventual post-secondary educational attainment of children whose parent was activity limited when the child was aged 5 to 15. We then exploit differences across provinces and over time in the generosity of provincial disability benefits programmes in Canada to estimate the causal impact on PSE enrolment of cash transfers to poor households where a parent is disabled. We find that higher disability benefits when the child was aged 5-15 years old increase the probability that he or she will have attended or be attending PSE by age 19 to 25 and that the estimated effect size increases with the severity of the parental disability. Since we also find that lower disability benefits significantly worsen performance of public school aged children on standardized math tests and elevate their anxiety symptoms, we argue that one plausible pathway from disability benefit levels to PSE attendance may be through the cognitive and non-cognitive skills children acquire by the age of 15. If influences of benefit levels accumulate over time, the level of disability transfers available early in a child's life may be particularly important for the probability of PSE participation.

JEL Codes: J1 J6 I38

Keywords: Parental Disability, Disability Benefits, Post-Secondary Education, Intergenerational Linkage of Economic Status, Inequality of Opportunity

---

[1] Kelly Chen, Department of Economics, Boise State University, 1910 University Dr., Boise, Idaho 83725, USA, email: KellyChen@boisestate.edu; telephone: (208) 426-3346.
[2] Lars Osberg, Department of Economics, Dalhousie University, Halifax, Nova Scotia B3H 4R2, Canada, email: Lars.Osberg@dal.ca; telephone: (902) 494-6988.
[3] Shelley Phipps, Canadian Institute for Advanced Research, and Department of Economics, Dalhousie University, Halifax, Nova Scotia B3H 4R2, Canada, email: Shelley.Phipps@dal.ca; telephone: (902) 494-6987.
Acknowledgement: We gratefully acknowledge scholarship support from the Education Policy Research Institute. The NSLCY data were accessed through the Atlantic Research Data Centre; we thank Heather Hobson for vetting our output.

1. Introduction

Households headed by adults with disabilities tend to have lower money incomes, greater financial needs and less available free time than other households. Many adults with disabilities are also parents, so these factors have the potential to limit long-run opportunities and outcomes for their children. In this paper, we ask whether provincial disability benefits help to alleviate negative consequences of parental disability during public school years for their children's eventual educational post-secondary attainment.

In Canada, poverty risk for adults with disabilities is higher and increases with the severity of disability.[4] Because disabilities reduce employability and hourly wages if employed, they imply lower average labour earnings and they often also imply significant out-of-pocket expenses, as necessary equipment or services are often not publicly funded[5] (e.g. wheelchair ramps, hearing aids, travel to visit specialists, "deductibles" on drugs, etc.). Disabilities typically also increase the time required to perform normal household tasks and often impose additional time requirements (e.g. for doctor visits) which other households do not experience.

These income impacts, extra expenses burdens and additional time demands inevitably reduce the ability of disabled parents to invest in the goods, services and time helpful for the development of their children (Mayer 1997). Cross-spouse substitution of parental hours or tasks in child care may also be more challenging, and sometimes impossible, in households with a disabled parent. Low-income parents who can sometimes struggle even to meet basic needs such as nutritious food or sufficient heating clearly have less resources to spend on learning materials, socially enriching educational activities and other forms of child human capital investment.[6] As well, the stress caused by low income and/or traumatic events can in itself have adverse impacts (e.g., McLoyd 1990; Conger et al. 2000). Greater time and money stress can make parents irritable, frustrated, less patient, and lacking in the emotional resources needed for supportive and nurturing parenting behaviors – circumstances which are exacerbated when the disabling condition of the parent requires that they need intense or long-term care. As well, the stress induced in families driven by uncertainty of income may go well beyond direct linear effects of income (Rege, Telle and Votruba 2007; Stevens and Schaller 2010).[7]

---

[4] The Organisation for Economic Co-operation and Development (2012) notes that one-third of disabled Canadians have incomes below 60% of the household-size-adjusted median disposable income, only slightly lower than that in Ireland (37%), Australia and the U.S. (both 45%) but higher than Denmark, France, Ireland and the U.K. see also OECD (2010): Sickness, Disability and Work: Breaking the Barriers CANADA: Opportunities for Collaboration

[5] There is significant variation in what is available across provinces (Burton and Phipps 2009)

[6] Duncan and colleagues (2013), using data from the 2007 General Social Survey find that 35% of Canadian caregivers aged 45 years or older – the vast majority of them being family members – incurred out-of-pocket expenses in 2007. Depending on the specific needs of the condition, 22% of caregivers spent more than $24,000 per year, which can be considerable especially for those with low incomes.

[7] In addition, transfer incomes can create incentives for parents to modify their behavior. If benefit cuts push poor parents, especially the non-disabled spouse, to work longer hours, then the reduced parental involvement might have additional adverse consequences on children, though the overall effect of parental employment induced by transfers is not a priori clear.

It is therefore understandable that, despite the scarcity of data,[8] many studies find evidence of achievement gaps – that children who have spent part of their childhood growing up with a disabled parents do less well than their peers on a wide range of outcomes, including school enrolment (Mont and Cuong 2013; Bratti and Mendola 2014), high school graduation (Haveman et al. 1991), social, behavioral problems, and personality traits (Morefield 2010; Morefield, Mühlenweg and Westermaier, 2015).[9] Since children do not get to choose whether their parents will have disabilities or not, these achievement gaps are important examples of inequality of opportunity – and their frequency is quantitatively significant.

Using Canada's National Longitudinal Survey of Children and Youth (NLSCY) and defining disability as a physical or mental condition that impedes a person's usual activities for more than six months, we count that 1.8 million Canadian children under the age of 15, or about one in six, lived with one disabled parent (or more) between 1994 and 2008. Over 70% of them lived with parents reporting disabilities in more than one functional domain (e.g. at home, at work/school, transition to and from work, in leisure activities or in caring for children). The child poverty[10] rate was almost twice as high (9.95%) among the children aged under 15 of disabled parents than among their peers with able-bodied parents (5%). Poverty rates are even higher when parents are restricted in multiple domains (10.8%) or for those whose father is disabled (10.8%) (See Table 1.)

[Table 1 Inserted Here]

Since the NLSCY tracks a child for up to 20 years (e.g., from 5 to 25) we can follow a child in a family where one (or both) parents reported a disability during the child's public school years until he or she is a young adult in order to assess longer-term implications for that child's eventual PSE attendance. Figure 1 shows PSE participation rates for NLSCY youth aged 19-21 by parental functional status when the child was aged 5 to 15. 'PSE participation' in this case means that the youth reports that he or she is currently or has ever been enrolled in any form of post-secondary education.[11] For both boys and girls, the gap in PSE enrolment between the youth of disabled and able-bodied parents averages at around 4 percentage points Moreover, the

[8] Most national surveys provide information on the number of people with disabilities, or the number of parents, but not the combination of these two characteristics (Preston 2012).

[9] For example, Mont and Cuong (2013) 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. Bratti and Mendola (2014) presents evidence from the Bosnia and Herzegovina (BiH) Living Standards Measurement Survey (LSMS) that children of mothers with severe limitations in activity of daily living are less likely to be in school at ages 15-24. Morefield, Mühlenweg and Westermaier (2015) 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. Importantly, the evidence is not only found in developing countries, but also within societies, such as Germany, with well-developed social safety nets and substantial intergenerational mobility.

[10] We use Statistics Canada's Low-Income-Cut-Off (LICO) as the unofficial poverty line, and the child poverty rate is calculated for all children aged under 15 (2008 constant $) in the NLSCY.

[11] Post-secondary education (PSE) in our study is defined to include any type of schooling higher than high school, for example, two-year colleges, Quebec's CEGEP, or four-year universities. In the main body of the paper, we also consider PSE participation for youth aged from 19 to 25 to allow for 'gap years' or return to school during young adulthood.

enrolment gap increases significantly with the number of functional domains in which parents are limited.

[Figure 1 Inserted Here]

This paper asks if the level of provincial disability benefits available to parents with disabilities makes a difference to the size of this achievement gap. Since provincial disability benefits are income-tested and hence more relevant for families with lower socioeconomic status, we focus on families in which neither parent has a university degree. This paper is therefore in the tradition of the literature suggesting large impacts of the marginal dollar of income in lower income households, and arguing that higher transfer incomes to households at the low end of the income distribution tend to produce developmental gains for children, including measures of health, social and behavioral development and cognitive and schooling outcomes (for a comprehensive review see Mayer 1997, and Lethbridge and Phipps 2006 for more evidence in the Canadian context).[12]

In order to separate out the impact of family income from those of other confounding factors such as innate ability, parental education, and parenting skills, we examine evidence from differences in benefit generosity caused by differing legislation across ten provincial disability benefit programs in Canada as well as changes in programs within provinces over time. Our continuous difference-in-differences (DD) approach allows us to compare educational attainments of children of parents with disabilities with those of otherwise similar children of non-disabled parents who live in the same province at the same time to net out any unobserved province-specific trends. We test whether the gap in the PSE participation rate – i.e. the difference between children of disabled and non-disabled parents in the probability of attending college as a young adult – is related to differences in provincial disability benefits available in the province and year when the child was between 5 and 15.

Needs-tested disability benefits in Canada are provided by provincial governments, which have complete control over rules and benefit levels, resulting in considerable variation in benefit generosity both across provinces and over time. For example (see Table 2), in 1994 Ontario (at $15,338) had much higher benefits than Quebec (at $10,468), but Ontario cut its benefits substantially (by 19 %) in subsequent years, while Quebec kept its rates roughly constant. In 2000, New Brunswick offered even less than Quebec ($8,337), when an individual with the same disabling condition in Ontario was entitled to $14,101.

[Table 2 Inserted Here]

This variety in benefit levels over time and across provinces creates identifying variation. We assume that a youth's 'exposure' to variation in provincial benefit levels when they were

[12] For example, studies on tuition levels, financial aid and family income find that policies addressing "income barriers" to PSE to have a larger impact on individuals at the lower end of income distribution (Coelli 2005 and 2006).

younger is independent of other unmeasured determinants of their college-going decision and that the children of disabled parents are more likely to be affected by disability benefit programs than the children of able-bodied parents. Our intention-to-treat estimating strategy uses changes in local benefit rates rather than actual receipt of benefits both because no variable in our data reports the individual household's disability payments and also because of the well documented (e.g., Meyer et al. 2009) reporting bias in welfare incomes in survey data. Our intention-to-treat design thus provides lower-bound estimates for a positive impact of parental disability benefits.[13]

Our analysis produces three main findings. First, lower parental disability benefits available in a province or year when the child was aged 5-15 have a strong adverse impact on the child's future PSE participation. Our preferred estimate using the number of domains in which the parents is limited as a proxy for eligibility suggests a decline of 2 % (19-25 years) to 3 % (19-21 years) of a standard deviation in PSE access rates in response to a $1,000 cut in disability benefits. If this effect of disability benefit can be scaled up, the average treatment effect on the treated (ATT) of disability benefits would be 3 times as large as the size of the intention-to-treat estimate, and a $3,000 benefit increase would close half of the gap[14] in PSE participation for the youth of disabled parents relative to their peers of able-bodied parents. Hence, an increase of this size in the benefit level would not completely eliminate the differences in PSE access between the children of disabled and able-bodied parents but would substantially reduce the achievement gap. We further find that while boys and girls are similarly affected, youth living in households where the father is disabled are worst affected.

Second, it matters when in a child's life the parental disability is assessed and the available disability benefit measured. We find the favorable disability benefit effect on post-secondary attendance is smaller if the initial observation of the child is earlier in the 5 to 15 age frame. Breaking child age down into four categories [young (5 to 7), preteen (8 to 10), early adolescent (10 to13), adolescent (14 to 15)] reveals that higher disability benefits in the relevant province/year when the child is younger has a larger effect on subsequent PSE attendance than if the observation is later in childhood. A larger effect in the younger age periods is consistent with the view that economic hardship early in a child's life may be particularly harmful to child development (Duncan et al. 1998; Clark-Kauffman et al. 2003; Duncan, Magnuson and Votruba-Drzal 2014).

Third, disability benefits affect PSE attendance partially through the formation of cognitive and non-cognitive skills before the age of 15. Consistent with recent studies on the dynamic

[13] We restrict our analysis to the set of likely participants, the children with parents without a university degree. Since not all eligible households actually receive the benefits ascribed to them by our imputation, estimates of benefit effects in our study can be considered as lower-bound estimates for a positive impact of disability benefits, but we avoid the danger that results will be biased upwards, if differences in reported income are associated with hidden household characteristics.

[14] Given the gap in PSE attendance between the youth of disabled and non-disabled parents in our sample is 6.5 percentage points (see Table 4), the calculation is carried out as follows: (0.004x3x3)/0.065 = 0.554 for 19-21 year olds for instance.

process of skill formation (e.g., Cameron and Heckman 1998; Keane and Wolpin 2001; Carneiro and Heckman 2002; Cunha et al. 2006), we find significantly worse performance in standardized math test and elevated anxiety symptoms for the same youth 1-2 years following a benefit cut, suggesting that the influences of low financial resources accumulate over time.

The paper is divided into eight parts. The next section discusses the institutional background. In Sections 2, 3 and 4 we introduce the data and empirical strategies used. The main results, pathways, and the heterogeneity in estimated treatment effects are examined in Sections 5-7. Section 8 discusses results and possible policy implications.

2. Disability Benefits in Canada

In Canada, needs tested disability benefits are delivered either through the disability component of provincial social assistance programs (Newfoundland and Labrador, Nova Scotia, New Brunswick, Quebec, Manitoba, Saskatchewan and British Columbia), or through provincial disability support programs that specifically target the disabled (Ontario, Alberta and PEI [15]). Combined, these benefits constitute the second largest income support program for the disabled next to the Canada/Quebec Pension Plan (C/QPP) disability benefits.[16] 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 medical evidence of a work limiting disability. Given that an applicant family's liquid and fixed assets from non-exempted sources [17] do not exceed the maximum allowable levels, 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.[18] During our observation period, only one province changed its basic earnings exemption level.[19]

[15] 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. We replicate our analysis later with children from these two provinces excluded. Our main results are not substantially affected.

[16] 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).

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

[18] 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.

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

Importantly, in all of the provincial programs earnings exemptions and asset limits are not indexed for inflation.

Besides income and assets requirements, each provincial program makes benefits conditional on an assessment of disability, using its own definition of disability.[20] As shown in Appendix Table 1, however, the designation of disability is similar across provinces in the sense that: (1) all provincial programs require applicants to submit a medical certificate completed by a licensed physician indicating the level of the impairment and the potential for rehabilitation; (2) 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).

Disability benefits under every provincial program consist of a basic allowance intended 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, the federal government funded 50 % of the benefits for all provincial programs through the Canada Assistance Plan (CAP), which offered a matching grant for provincial spending. After 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 enacted a variety of changes, reducing welfare benefit levels, tightening eligibility requirements, and imposing work requirements on welfare recipients. As explained in more detail in the next section, we utilize the dramatic changes in benefits over this period to estimate the effects of parental disability benefits on the gap in child well-being.[21]

Table 2 shows the maximum real annual disability benefits (2008 constant dollars) for a single individual 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 Incomes by the National Council of Welfare.[22] On average, Ontario, Alberta, British Columbia and Quebec offered the highest annual benefit level at $13,385, $12,803, $11,096 and $10,481 per person, respectively, whereas the benefits were lowest in New Brunswick, Manitoba and Nova Scotia, which paid $8,685, $9,540 and $9,971 per person

[20] Along with the medical certification requirement, an applicant must be of certain age (between 18 and 65) and be resident of particular province to be eligible for the benefits.

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

[22] The National Council of Welfare computed 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.

annually. In all provinces, the real value of disability benefits decreased (PEI, Nova Scotia, New Brunswick, Ontario, Manitoba and Saskatchewan), or remained roughly constant (Quebec, British Columbia and Newfoundland.)[23]

3. Data Description

This paper uses Canada's 1994-2008 National Longitudinal Survey of Children and Youth (NLSCY), combined with province-level data capturing variations in youth unemployment, school entering age, and disability benefit generosity in the province of residence.[24] The NLSCY is a probability survey designed to collect information about factors influencing a child's social, emotional and behavioral development over time. It began in 1994 by interviewing a nationally representative sample of children (22,831 children) between 0 and 11 years old. The same children were then re-interviewed at two-year intervals up to the age of 25. At each survey year, a new cohort of children aged 0-1 was added to the longitudinal population allowing for the construction of a sizable cross-sectional sample. The unit of analysis for the NSLCY is the child.

Our issue in this study is whether a youth participates in post-secondary education either right after high school[25] (i.e. ages 19-21) or after a subsequent "gap year (or years)" as a young adult (i.e. ages 19-25). We exclude18-year-olds since some may still be attending high school. We define a youth to be 'post-secondary attendee' if he/she reports being currently enrolled or having previously been enrolled and/or completed any type of schooling higher than high school, including two-year colleges, Quebec's CEGEP, or four-year universities. As a result, the probability of post-secondary enrolment we analyze is unconditional on high school graduation, and can be seen as the total effect of parental disability on the joint event of high school completion and post-secondary enrolment.[26]

---

[23] 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 (Moffitt 1990; 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 reflects changes in benefit levels for other family types.

[24] In the NLSCY, family information are provided by the "person most knowledgeable" (PMK) about the child (the mother is the PMK for over 90% of our sample) of the child when aged less than 18 years old. When a youth is 18 years old or older, he/she provides own information independently. An important advantage of the NSLCY is that information on various aspects of the youths' lives is collected regardless of whether they leave their parent homes to live in their own residences.

[25] All the provinces mandate students to enter grade one the year they turn 6. Ontario shifted from a 13 grade system to the 12 grade norm in 2003. See Chen, Fortin and Phipps (2015) for more details.

[26] Each youth in the NLSCY was asked about his/her educational status at the time of the survey, regardless of where he/she was living in the their parents' home or not. No youth was dropped because they moved out their parents' home.

A unique feature of the NLSCY relative to other population surveys in Canada is that it provides inter-generational information on the health of both the parents and their children. For example, in years 1994, 2000, 2002, 2004, 2006 and 2008, the "person most knowledgeable" (PMK) about the child was asked the following questions for her/himself or her/his spouse/partner: "*Because of a long-term (i.e. a condition or problem that lasts for more than six months) physical or mental condition or a health problem, are/is ..XXX…. limited in the kind or amount of activity you/he/she can do: 1) At home? 2) At school or at work? 3) In other activities such as transportation to or from work or leisure time activities? 4) In caring for children?*" We construct two measures of parental activity limitation, one capturing the *incidence,* and another capturing the *severity* of a disabling condition for the mother and father, respectively. The incidence measure is a dummy variable taking a value of one if the PMK of the child answered "yes" to any of the questions above, and zero otherwise. The severity measure is continuous counting the number of domains in which the parent reports being limited in activities. This measure ranges from a value of zero to four.[27] As will be seen, our results using these two measures are not at all sensitive to alternative model specifications and data samples, providing additional support to our claims.[28]

In the NLSCY, family information on a child under the age of 17 is provided by the PMK, as is both parents' health status.[29] Given that the mother is the PMK for over 90% of our sample, this implies a self-report for the mother's and a proxy report for the father's condition (Burton, Lethbridge and Phipps 2007). While proxy reports are less desirable than self-reports, if women know less about the true state of their spouses' health than about their own, they nonetheless constitute an accepted measure (e.g. Medical Research Council Cognitive Function and Ageing Study, 2000). Furthermore, given that the activity limitation measures we study are relatively severe, the questions are easier to answer than questions such as "how is your health in general?", so we believe the potential for reporting bias is likely to be small in our case. An additional advantage of having one person report on the functional status of both parents is to avoid potential gender differences in assessing the state of health.

We determine treatment (intent-to-treat) status using parents' self-reported activity limitation status. An advantage of the intent-to-treat approach relative to using actual disability benefit receipt is that it is less likely to be affected by economic incentives. We test for the possibility that respondents misreport disability status when the disability benefit level is high as

[27] For families in which both parents were disabled, we use the number of disabilities reported for whomever had the higher count. Our measure of "number of disabilities" thus is capped at the value of four for each household.
[28] In results not reported here, we also experimented breaking a restriction down by its functional domain (i.e. "work-limiting" if disability limits the respondent at work- or human capital-based activities, transition to or from work, leisure, or other activities, "home-limiting" if it limits other activities at home, and "childcare-limiting" if the respondent is limited in caring for children). Because these categories are not mutually exclusive, and over 70% of survey respondents reported restrictions in at least one functional domain, we decided to exclude it from the analysis to avoid potential ambiguity.
[29] In the NLSCY, children aged 10 to 15 also answer some questions directly.

a justification for other behaviors, such as less intensive work hours or benefit claims[30] by estimating a linear probability model of the probability of parental disability as a function of the benefit level, while controlling for the same set of controls as in our most comprehensive model (see Table x). Consistent with existing literature, these results indicate that self-reported disability is more prevalent for non-immigrant parents, as well as for parents with less than high school education. However, there is no relationship between benefit levels and the reported incidence of parental disability.

Sample Selection

Using the fact that NLSCY is longitudinal, our data consists of each observation of a child/youth for whom we have: 1) an assessment of parental disability status at some point during the child's public school years (5 to 15); and, 2) for the same child, self-reported attendance in PSE at some point during young adulthood (age 19-21 for sample one; age 19-25 for sample 2).[31] In our largest pooled sample, the same child can appear more than once. For Cohort A (see Table 3), parental disability status is observed 3 times during the 5 to 15 window. Thus, for a child from Cohort A we can construct 3 observations: 1) combining parental disability and provincial disability data from age 5 to 7 with PSE attendance at age 19; combining data at age 11 to 13 and age 19 to 21; combining data from 13 to 15 and data from 19 to 21. Potential combinations for children from cohorts B and C are also illustrated in Table 1 below. [Our results are unaffected when we exclude repeat observations of the same child, as we show below.]

[Table 3 Inserted Here]

If we broaden the window of observation to examine enrolment in post-secondary education when aged 19 to 25, our data can be summarized as in Table 3.[32] Clearly, this broader window introduces more possible combinations and hence increase our pooled sample size. Note, however, that the same children are used to construct the two samples.

[Table 4 Inserted Here]

These pooled samples maximize sample size and enable us to increase identifying variation over time in provincial disability benefit levels. However, since the pooled samples can use repeated observations on the same youth depending on his or her birth cohort, we test that our

[30] Haveman and Wolfe (2000) suggest that the self-reported presence of a work limitation may increase for workers in redundant industries or for older workers during periods of high unemployment.

[31] A peculiarity of the NSLCY is the fact that the set of questions about parental disability was only asked of the parents of children under the age of 15, and only in 1994, 2000, 2002, 2004, 2006 and 2008 during our observation period of 1994-2008.

[32] Clearly, this broader window of observation for PSE attendance sometimes creates missing data issues for the observation of parental disability. For example, for Cohort D we observe in 2008 the PSE attendance of 19 year olds, but in 2002 we only observe disability for the cohort D members who were then 13. The parental disability status of the full 19 to 25 cohort from 2008, 2006 and 2004 is observed in 1994, but at differing ages – 5 to 11, 7 to 13 and 9 to 15, respectively.

results are robust to sample composition by replicating our analysis randomly keeping just one observation for each youth. Results are not substantively affected.

Our estimates may also mingle the shorter and longer-term and cumulative impacts of disability benefits on PSE attendance given the fact that youth with shorter and longer exposure to benefit changes are treated the same in a cross-sectional analysis. Due to insufficient observations in each province-year cell, we do not attempt to separately identify these effects in this study.

Throughout this paper, we exclude youth who reported disabilities for themselves, to avoid confounding the effect of parental disability with a youth's own health problems. This leads to a less than 10% reduction of the sample sizes. Divorce or re-marriage can involve non-income-related stress for both children and their parents, which would be difficult to separate from the effect of parental disability at the same time. To obtain the cleanest estimates possible, we focus on the youth of two-parent families (over 85% of all non-disabled youth in the NLSCY).[33] Furthermore, because the purpose of this study is to examine the potential impact of social assistance programs, we examine only a subset of families most likely to be eligible for the disability benefits. Specifically, we select youth in families where neither parent has a university degree, and both parents are between 18 and 65 years in the first observation.

Finally, to ensure comparability of coefficients across models, we exclude those for whom information on any variable is missing. Due to non-response to the PSE status question (in the youth questionnaire), around 10% of youth with demographic or parental disability information available are excluded. This could introduce a sample selection bias if the youth with missing data are systematically different from those for whom complete information is available. To rule out this possibility, we estimate linear probability models of the probability that youth have a missing value on PSE attendance for all youth with basic and/or parental disability demographic information (results are available upon request). Overall, older youths or those whose mother was older at the time of the survey are less likely to respond. The non-response rate also tends to be higher for those who lived in step families, and for those whose father had lower education. Conditional on these covariates, however, we find no systematic difference between the children of disabled and non-disabled parents across benefit levels.

In the end, we obtain 5,224 and 7,444 observations for the two age range samples, 19-21 and 19-25, respectively, constructed using data for xx individual children. Throughout the analyses, we employ longitudinal sampling weights to take account of the non-response bias and the sample design. Therefore, our results are representative of the longitudinal cohorts of 5-11 year

[33] To the extent that disability induced stress may increase the probability of divorce/separation and parental divorce or separation following a disability may have an additional negative impact on the educational attainment of children, our analysis will under-estimate the total impact of parental disability.

olds in 1994. All standard errors are clustered at the province level to account for potential serial correlations on observations of youth in the same province over time.[34]

Descriptive Statistics

Depending on the window of observation, at least one parent reports a disability for 14-16% of our pooled samples (see Table 5). In over 70% of cases, parents indicated activity restrictions in more than one functional domains (e.g. home; work/school; transition to and from work; caring for child).[35] Mothers on average were more likely to report a disability than fathers (7.4 vs 6.9 in the narrow age range; 6.3 vs 6.2 in the wider age range), but not in terms of the severe cases. For example, 4.9% of the mothers of the youth in the narrow age range reported multiple disabilities whereas 5.3% of the fathers did so. A similar pattern (4.2 vs 4.7) can be found for the youth in the wide age range as well.

[Table 5 Inserted Here]

A closer examination of the child and family characteristics (Tables 6 and 7) suggests that youth living with a disabled parent tend to be slightly older, whose father (but not the mother) is less likely to attended postsecondary education himself. The patterns found for the youth aged between 19 and 25 are much the same, and thus are omitted from the paper for the sake of brevity (available upon request).

[Tables 6-7 Inserted Here]

Figures 2-3 illustrate the basic idea of our empirical strategy. By classifying the ten provinces into low- (PEI; Saskatchewan; Nova Scotia; Manitoba; New Brunswick) and high-benefit (Ontario; Alberta; British Columbia; Quebec; Newfoundland) categories, the gaps in PSE attendance (Figure 2) and math test scores (Figure 3) between the youth of disabled and non-disabled parents appear to be inversely related.

[Figures 2-3 Inserted Here]

In addition, the achievement gaps between the youth of disabled and able-bodied parents appears to start widening before the entry of junior high (i.e. age 11 for hyperactive / inattentive and anxiety symptoms; see Figures 5-6) or senior high school (i.e. age 15 for math test score; see Figure 4).

[Figures 4-6 Inserted Here]

[34] Given our main coefficient of interest is the benefit effect on youth, we choose to cluster standard errors at the highest level with the smallest number of clusters, which is a relatively conservative strategy.

[35] Note that a parental disability can be life-long (deaf), last several periods (prior to hip replacement surgery) and/or can exist in just one period. A limitation of our analysis is that we cannot distinguish these cases.

4. Empirical Strategy

In this study, we consider changes in real benefits under the ten disability benefit programs to be a source of exogenous variation, and use a continuous difference-in-differences (DD) method to estimate the causal impact of parental disability benefits on children. Because there could be unmeasured province-specific transitory shocks that are correlated with benefit generosity and children's educational outcomes, we use the children of non-disabled parents who live in the same province at the same time as controls. Hence, we test whether the outcome gap – i.e. the *difference* in outcomes between children of disabled and non-disabled parents – is related to benefits changes across provinces and over time. Since the level of disability benefits is determined by provincial legislation, and can only affect child achievement indirectly through changes in individual families' financial circumstances, positive associations between changes in benefit generosity and the later observed PSE enrolment will imply that increasing parental disability income assistance improves the probability of attending PSE.

Specifically, using the age 19-25 PSE enrolment window, our Model 1 estimates the following model for a large cross-sectional sample, pooling data from 1994-2008 of the NLSCY:

$$PSE_{ijpt,18/21} = \alpha_0 + \alpha_1 DIS_{jpt,4/15} + \alpha_2 BEN_{pt,4/15} + \delta_1 DIS_{jpt,4/15} \times BEN_{pt,4/15} + Y'_{ijpt,19/25}\phi_1 + X'_{ijpt,4/15}\gamma_1 + \eta_1 UR_{pt,19/25} + \rho_1 YOUNG_{ijp} + \kappa_t + \lambda_p + \varepsilon_{ijpt} \quad (1)$$

where i indexes the youth, j the family, t the survey year, and p the province. $PSE_{ijpt,19/25}$ is the youth's PSE attendance observed at ages 19/25. $DIS_{jpt,6/15}$ represents the incidence or severity of parental disability, as reported by the PMK when the youth was aged 4 and 15 years. $X_{ijpt,4/15}$ is a vector of child- and family- characteristics at the time of parent's disability (e.g. child age, gender, number of siblings, family structure, both parents' education, ages, and immigrant status), while $Y_{ijpt,18/21}$ is a vector of control variables capturing the changing family circumstances of the youth at 19/25 (e.g. change in the number of siblings).

In this regression, λ_p includes dummy variables for each of the ten Canadian provinces (i.e. province fixed effects), while κ_t includes dummy variables for years (i.e. year fixed effects). The province fixed effects hold constant unmeasured permanent differences across provinces – for example, stable province differences in regulations about earnings exemptions and asset limits, cost of living, the degree of discrimination against disabled people, or other disability-related services. The year fixed effects hold constant any time trends that affect all provinces similarly – such as the 2004 changes in the federal disability tax credit.

Given that our disability benefit variable varies by province-year, we include as further controls the provincial unemployment rate for youth under 25 ($UR_{pt,19/25}$), and a child's relative age for grade ($YOUNG_{ijp}$) required by provincial school entry age cut-off legislation (this varies

substantially across province and also over time during our observation period). We view the former as a proxy for the opportunity cost of schooling at the time of college entry and business cycles. The latter captures the potential relative age effect for children in the NLSCY demonstrated in Chen, Fortin and Phipps (2015). Specifically, $YOUNG_{ijp}$ is defined to be a dummy variable indicating that the child's birth date puts him/her in the younger half of his/her class given the school-entry legislation in that year and province.

Finally, to relax the linearity assumption implied by the use of a continuous variable measuring disability benefit levels, our Model 2 replaces it with a set of higher order interactions between province and year dummies (i.e. province-year fixed effects) to allow for unrestricted time trends within each province. For example, the child tax benefit policies initiated in some Canadian provinces in 1998 may affect child development at the province level.[36] We treat model (2) as our preferred one, though results obtained from both specifications are qualitatively similar to each other.

$$PSE_{ijpt,18/21} = \beta_0 + \beta_1 DIS_{jpt,4/15} + \delta_2 DIS_{jpt,4/15} \times BEN_{pt,4/15} + Y'_{ijpt,19/25}\phi_2 + X'_{ijpt,4/15}\gamma_2 + \eta_2 UR_{pt,19/25} + \rho_2 YOUNG_{ijp} + \kappa_t + \lambda_p + \pi_{tp} + \varepsilon_{ijpt} \quad (2)$$

After centering,[37] β_1 picks up the differences in post-secondary attendance between the youth of disabled and non-disabled parents for those who are exposed to the average level of benefits. δ_2 is the coefficient of interest. If higher disability benefits are beneficial for PSE enrolment, we should expect to see a positive and statistically significant δ_2, indicating that the gap in the post-secondary enrolment between the youth of disabled and non-disabled parents of the same province change in the same direction as the benefit level does.

Together with key variables, we also include two sets of covariates as determinants of PSE attendance. The first was measured for the child at the time of parental disability assessment ($X'_{ijpt,4/15}$), including child gender, number of siblings, family structure (step vs "intact" family), both parents' ages and age squared, immigration status, levels of education (less than high school; high school graduate; and post-secondary diploma or some post-secondary education but not a degree), and interaction terms between both parents' education and disability statuses. The second set was measured at the later college entry period when the child has become a young adult ($Y'_{ijpt,19/25}$), including change in the number of siblings between the reports of parental disability and PSE attendance, and family structure. Importantly, since family income can be influenced by the size of the benefit, and determines eligibility for social assistance benefits, we leave it out of the equation to avoid the introduction of a mechanical endogeneity.

[36] Indeed, Milligan and Stabile (2015) using data from the Canadian NLSCY conclude that the provincial child tax benefit policies initiated in 1998 have a significant positive effect on educational outcomes, physical health and mental health for the general population of children.

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

Since this study uses an intention-to-treat design, we are thus examining whether a change in benefit generosity during their earlier childhood has an impact on the population *most likely to be affected* (i.e., college age children of disabled parents with low education). The analytic sample may include ineligible disabled parents as part of the treated group and also eligible parents who do not actually receive disability benefits. 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.[38] Assuming the vast majority of disability benefit recipients do not have a university degree, and that not all eligible households will in fact have received the benefits ascribed to them, estimates of benefit effects in our study can be considered as *lower-bound* estimates for a positive impact of disability benefits. The advantage of using likely eligibility for benefit payments, rather than the actual receipt, is that it avoids the danger that results will be biased upwards, since differences in reported income may be associated with hidden household characteristics. All reported analyses use sampling weights, and the standard errors are clustered at the province level to account for a potential serial correlation on observations of children in the same province over time.[39]

5. Overall Effects of Parental Disability Benefits on PSE Attendance

Table 8 shows estimated effects of parental disability benefits on PSE attendance. Results labelled M1 correspond to Model 1 (Equation 1 above) while M2 reports estimates of Model 2 (Equation 2 above). Results reported include two disability measures, incidence (columns 1-2 and 5-6), and the number of disabilities being reported (columns 3-4 and 7-8), as well as two windows of observation: 19-21 years (left panel; 5,224 observations) and 19-25 years (right panel; 7,444 observations). Across model specifications, disability measures, and data samples, there is strong evidence that a lower parental disability benefit discourages PSE participation – the benefit variable is in all specifications statistically significant at high levels of confidence, of appropriate sign and with an empirically meaningful magnitude. Focusing on the incidence of disability, the preferred model specification (columns 2 and 6) suggests that a $1,000 reduction

[38] Data on the take-up rate of means-tested disability benefits in Canada are unfortunately difficult to obtain. We collect the number of cases (i.e., the number of family units receiving benefits) for each provincial disability benefit program from Social Assistance Statistics Report (2004-2008), and Social Assistance Combined Summaries (2015) to get a sense of the total caseload over time. Due to the lack of information, however, we are only able to obtain near-complete data on nine disability benefit programs from 2004 to 2008. The exception is New Brunswick. We then divide the estimated total number of caseloads in 2006, 510,020 by the number of working-age Canadians (15 and 64) with activity limitations as reported in the Participation and Activity Limitation Survey 2006, who uses a similar definition of disability as in current study (Statistics Canada 2008), 2,457,350. The resulting take-up rate is 20.8 %. Considering welfare recipiency is much higher among disabled individuals with less education, the actual benefit take-up rate can be around 30-35 % among the population under analysis. If true, the ATT effect of disability benefits should be 2-3 times as large as the size of the ITT effect estimated in current paper. However, since the unit of analysis in the NLSCY is the child instead of the adult, above extrapolation is rather crude and cautions should be taken in interpretation.

[39] Given our main coefficient of interest is the benefit effect on children, we cluster standard errors at the highest level with the smallest number of clusters, which is a relatively conservative strategy. Clustering at the household level produces qualitatively similar results.

in real disability benefits[40] causes a decline in PSE enrolment by 6.1% and 3.5% of a standard deviation by the ages of 21 and 25, respectively. The effect size is smaller for the broader window of observation, suggesting that while youth tend to return to post-secondary education over time,[41] it is a bit more likely for the children of disabled parents.

[Table 8 Inserted Here]

Focusing on the severity of disabilities (columns 4 and 8), the adverse effect of a benefit cut on PSE attendance is greater for those of parents with more severe disabilities. Holding benefit level constant, each additional disability experienced by the parent increases the benefit impact by 2.4 % and 0.9 % of a standard deviation by 21 and 25 years, respectively.[42] In other words, a $1,000 increase in benefit level would boost the probability of participating in PSE by 9.6 % (by 21) and 3.6 % (by 25) of a standard deviation for a youth of parent suffering from the most severe (i.e. all four) disabilities.

Relative to other key covariates, the estimated effect size of greater disability benefit is 11-20 % as large as the effect of being the youngest student in class, though in the opposite direction. It is also roughly equal to 10-20 % in size of the association between growing up in a step family (as opposed to intact families). If we treat the estimates obtained using disability severity measure as the "cleanest" ones, and assuming the average treatment effect of disability benefits to be 2-3 times as large as the size of the intention-to-treat effect, a $3,000 benefit increase would close half of the average gap in PSE attendance between the youth of disabled parents and their peers of able-bodied parents, although the conversion from the intention-to-treat to average treatment effect is rather crude for reasons stated before.

We next conduct a series of tests to check the robustness of our results.

A falsification test

A first test is to run a set of placebo regressions for a more advantaged group – i.e. youth with one or both parents university educated. Parents with a university degree are more likely to hold skilled, stable jobs, and less likely to file for welfare or to be affected by means-tested benefits (but may benefit from other types of transfer programs.) Finding smaller or non-existent effects among the youth of parents with a university degree would thus indicate that the impact of transitory provincial shocks is removed through our research design. Table 9 presents results from a set of models identical as those in Table 8 for the likely participants. As shown in Table 9, all coefficients on the interaction terms are insignificant at any conventional level. This sharp contrast suggests that most of the association between disability benefits and post-secondary

[40] In our regression analysis, the disability benefit variable is measured in 1,000 dollars.
[41] For example, Lefebvre and Merrigan (2008) using the NLSCY data find that youth are more likely to attend college over time.
[42] Since we do not sum the number of restrictions across mother and father within the family, that is, this variable is top-coded at 4, our estimate may have under-estimated the impact of benefit cuts on the youth whose both mother and father reported disabilities, and the total number of restrictions exceeds 4.

enrolment is driven by the youth whose parents have lower education, who are the target population of the means-tested disability benefits.

[Table 9 Inserted Here]

Omitted variables and sample composition

In the upper panel of Table 10, we present regression results from an augmented model specification that additionally controls for a set of "long-term" or cultural factors suggested in the literature to be significant determinants of PSE participation in Canada (Finnie and Mueller 2008). These factors may be correlated with financial factors, potentially causing omitted variable bias. These variables include the child's ethnicity (a dummy for being non-white), family wealth (a dummy for home ownership),[43] and French minority (a dummy for French as first language). As shown in Table 10, though the inclusion of the covariates reduces sample sizes, it does not affect the estimated benefit effects substantively. The lower panel of Table 10 also reports results from that subsamples that randomly keep only one observation for each youth. Again, the estimated benefit effects are qualitatively similar as before, suggesting that the sample composition does not drive our main findings.

[Table 10 Inserted Here]

6. Pathways

Previous research on determinants of PSE enrolment and the dynamic process of skill formation (Carneiro and Heckman 2002; Keane and Wolpin 2001; Todd and Wolpin 2006) find that factors involved in post-secondary education enrolment are often entangled, and may be largely determined long before the actual point of entry into higher education. For example, in both the U.S. (Carneiro and Heckman 2002; Cunha et al 2006; Heckman 2007) and Canadian contexts (Finnie and Mueller 2008) the data suggest the dominance of long-term or "cultural" factors, such as family background, over short-term factors, such as credit constraints. Keane (2002), commenting on the income divide in college attendance in the U.S. notes that this inequality "appears to be driven by unequal human capital accumulation prior to the college-going age." Frenette (2007) using detailed date from the Youth in Transition Survey (YITS) (Cohort A) on academic abilities, prenatal influences, financial constraints, and other socio-economic background characteristics of Canadian youth, finds that 97% of the total gap in university attendance between youth from the top and bottom income quartiles can be accounted for by differences in observable characteristics.

Consistent with these views, we hypothesize that a lower disability benefit level may hurt PSE participation through the impact on a child's cognitive and non-cognitive development of the experience of economic stress in early childhood. We thus select three development outcomes (standardized math scores, parent-report hyperactive / inattentive and emotional

[43] Since the NLSCY does not provide any direct information about family assets, we use home ownership as a proxy for family wealth.

anxiety symptoms – all measured 1-2 years after a benefit change). We ask whether these key elements of children's human capital – cognitive ability, behavioral problems and social / emotional well-being – as suggested by existing literature (Cameron and Heckman 1998; Cunha, Heckman and Schennach 2010) respond to the generosity of benefits for the *same* youth.[44]

The math 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 grades 2 to 10 every survey year. It is a shorter version of the Mathematics Computation Test taken from the Canadian Achievement Test, 2nd edition with scores ranging from 0 to 750. The hyperactivity score is derived from six statements by the 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. For each behavior, the parent can choose: "never or not true" (=0); "sometimes or somewhat true" (=1); or, "often or very true" (=2). Responses are summed to construct a scale ranging in value from 0 to 14, with a high score indicating the highest level of inattentive /hyperactive or anxiety behavior. Because the hyperactivity and anxiety questions were only asked to parents of children aged under 11 in the NLSCY, the youth with hyperactivity and anxiety scales measured at more than one time point are those aged 5 years in 1994, and again 11 years in 2000 for both the 19-21 and 19-25 age range samples. The substantially fewer benefit variations in the samples may pose a challenge in accurately identifying the benefit effects. We thus are inclined to base our interpretation on the results from math test scores for robustness reasons.

When running the regressions, we adopt the preferred model specification (e.g. M2 in Table 11) and use a slightly different set of covariates so they reflect factors relevant to these "mediators". They include child age in month, child age in month squared, gender, relative age for grade (i.e., whether the youth was born in six months prior to the school entry cut-off date), number of siblings living in the household, family structure (step vs "intact" family), both parents' ages and age squared, immigration status, education, and interaction terms between both parents' education and disability statuses. As noted in Lefebvre, Merrigan and Verstraete (2008), the difficulty of the NLSCY math test varies with the school grade of the child. Hence the standardized scores increases as a child grows older. We thus additionally control for the child's school grade (K through ten) in our math test score regressions.

[44] In previous work, we found a higher parental disability benefit leads to better outcomes of the above three measures for children aged between 4 and 15 in the NLSCY (Chen, Osberg and Phipps, 2015). However, the current paper requires observing ages when PSE enrolment is feasible, which means the youth under analysis here are a fraction of the original sample (around 3000 vs. 14,000 observations). With so many fewer observations exposed to (measurable) benefit changes for more than one time point, it is possible for results from the two data sets to diverge in implications, but the basic results are unchanged.

[Table 11 Inserted Here]

The upper panel of Table 11 reports the results on standardized math test scores (columns (1) and (2)), inattentive/hyperactive (columns (3) and (4)), and emotional anxiety symptoms (columns (5) and (6)) for youth aged 19-21. For 19-21 year olds (upper panel of Table 11), there is a significant and positive association of benefit changes with math test score, and a significantly negative relationship between the benefit generosity and emotional anxiety symptoms (where a higher value indicates worse outcome). Using our preferred parental disability measure, the number of disability reports, a $1,000 benefit cut reduces the math test score by 1.6 % of a standard deviation, and increases anxiety symptoms by 1.1 % of a standard deviation, though the benefit impact on inattentive / hyperactive symptoms is not precisely estimated, possibly due to the lack of time-series variations in benefit level in the sample. As before, the estimated benefit effects are qualitatively similar for 19-25-year-olds (lower panel of Table 11).[45]

7. Who benefits most?

Does it matter whether the father or the mother is disabled?

Since traditional gender roles assign home production and care for children primarily to mothers, their disability might be expected to especially impede the delivery of time inputs. If additional income allows the disabled mother and/or her spouse to work less hours, transition from welfare to employment, or move from unstable, low-skilled jobs to relatively "better" (or more "kids friendly") ones, a higher benefit may be more important to children in households where the mother is disabled. On the other hand, because male wages tend to be higher, disability will likely have a larger impact on a household's material living standards when the father is disabled – so the father's disability may especially affect material inputs in home production. Given that a $1,000 represent a larger fraction of the household income for those are poorest, it is conceivable that the marginal effect of disability benefits has a greater impact on the youth of disabled fathers (i.e. households at the bottom of income distribution) than on those of disabled mothers.[46]

[45] Given math test scores are the most frequently measured intermediate for youth under analysis, we present the effects of parental disability benefits on this outcome, breaking down by the gender of the student and by the gender of the disabled parent (in Appendix Table 2). Results, using our preferred disability measure show that that math test performance of boys are affected more by the changes in benefits than that of girls. For the sample of 19-25 year olds (right panel of Appendix Table 2), a $1,000 benefit cut reduces the standardized math test score for boys by 2.6 % of a standard deviation (column (8) of Appendix Table 2), more than doubling the effect size estimated for girls (0.9 % of a standard deviation). Separating paternal and maternal disability (columns 5-6 and 11-12) reveals a significant benefit effect on the math test scores for children of both a disabled father (1.6 % of a standard deviation) and a disabled mother (2.9 % of a standard deviation). Different from the results on PSE participation, maternal disability (and disability benefits) seems to matter more for children' cognitive ability, which is also consistent with the evidence found in our previous study (Chen, Osberg and Phipps 2015).

[46] Furthermore, welfare transfers can create incentives for parents to modify their behaviors. As Moffit (1992) argues, these behavioral responses might have additional adverse or positive consequences on children, and they might strengthen or dampen the effects of the transfers themselves.

In Table 12, we test for the asymmetric effect of disability benefits with a higher importance of time over material inputs in home production. To obtain the cleanest estimates possible, we exclude the 102 and 134 youths who lived with two disabled parents from our 19-21 and 19-25 age range groups, respectively. Paternal and maternal disabilities are each identified by the incidence (columns (1) and (3)) and severity (columns (2) and (4)). Results in column (2) of Table 12 for 19-21 year old sample find a significant benefit effect for both paternal and maternal disability, though paternal disability is greater in size (5.1 % of a standard deviation) than of maternal disability (2 % of a standard deviation).

[Table 12 Inserted Here]

Are boys and girls similarly affected?

Table 13 reports the results of the estimates split by child gender. Using our preferred disability measure, columns (2) and (4) show that that male (2.8 % of a standard deviation) and female students (2.1 % of a standard deviation) are similarly affected. [Judging from the coefficient on the youth unemployment rate, determinants to college attendance may be very different for male than for female students]

[Table 13 Inserted Here]

Does it Matter at which life stage benefits are higher?

Is there a critical developmental stage during which the additional parental disability benefits produce larger gains in PSE participation? The longitudinal nature of the NLSCY enables us to ask whether it matters *when* in a youth's life additional income appears.

To assess this, we limit ourselves to the sub-samples of 19-21 and 19-25 years olds that randomly keep one observation per youth, since a youth can be observed different number of times depending on his or her birth cohort (see Section 3). We augment our preferred model specification (M2) in Table 8 with the interaction of child age and the estimated disability benefit effect (DIS x BEN), where a child's age is measured in years (5-15) at the time when the parent's disability status/benefit receipt was reported.

$$PSE_{ijpt,18/21} = \beta_0 + \beta_1 DIS_{jpt,4/15} + \beta_2 DIS_{jpt,4/15} \times BEN_{pt,4/15} + \delta_1 DIS_{jpt,4/15} \times BEN_{pt,4/15} \times AGE_{ijpt,4/15} + \delta_2 DIS_{jpt,4/15} \times AGE_{ijpt,4/15} + \delta_3 BEN_{pt,4/15} \times AGE_{ijpt,4/15} + \delta_4 AGE_{ijpt,4/15} + PROV_p + YEAR_t + PROV_p \times YEAR_t + \varepsilon_{ijpt} \quad (3)$$

To allow for differential trends specific to childhood stages, we include in the regression all lower order interactions among parental disability, disability benefit level, and child age. If some stages of childhood are particularly crucial for child development, and therefore low income or related risks at these times have deeper consequences for PSE attendance, δ_1 will be statistically significant.

Table 14 reports the estimated coefficients from two alternative model specifications in which child age is modelled as a continuous variable (M1) and a set of categories (M2), childhood (5-7 years), preteen (8-10 years), early adolescence (10-13 years) and late adolescence (14-15 years) for our narrow (columns 1-2) and wide (columns 3-4) window of observations, respectively.[47] We also experimented including a quadratic term of child age in the regressions. In no case the quadratic term is statistically significant.

[Table 14 Inserted Here]

Column (1) of Table 14 reveals that the favorable disability benefit effect on achievement diminishes with age, with each additional year associated with 1-2.5% of a standard deviation of PSE attendance, depending on the measurement of parental disability. Breaking the child age variable down into four categories of developmental stage (column (2) of Table 14) reveals that receiving additional benefits when the child is young (5 to 7) or a preteen (8 to 10) has a larger effect on PSE attendance than if it is during one's late adolescence (14 to 15). For 19-25 year olds, the age pattern of disability benefit effect is similar though less obvious, with benefits received in early adolescence (10 to13) (closer to college entrance?) generating the largest impact.

8. Policy Implications and Discussions

We do not want to over-inflate our results – only a minority of Canadian children grow up with disabled parents and a majority of them do attend post-secondary education. But this is a smaller majority than for the children of non-disabled parents. Although our results indicate that the disability benefit level is not a determinant of PSE enrolment if the parents are themselves university educated, we find consistent evidence that when the parents are not university educated the level of disability benefit does causally affect the probability of their children's PSE attendance.

One could choose to see our results as documentation of the fact that many children of disabled parents are able to surmount the disadvantages of their childhoods. However, since children do not get to choose the disability status of their parents, one can also see the continuing achievement gap between the children of disabled and non-disabled parents as a clear example of inequality of opportunity.

Although some inequalities of opportunity may be intractably difficult for public policy to address, this paper provides evidence that in this particular instance money matters – the level of social assistance benefits clearly reduces the achievement gap for poor families with disabled parents. Even if deficits in parental time and energy are likely to still have adverse consequences for PSE enrolment, our results indicate that the level of cash transfers via provincial disability benefits can help to lessen the achievement gap. Social assistance benefit levels do make a

[47] Alternative breakdowns (e.g. preschool age, elementary school age and junior high school age) generate qualitatively similar results.

significant difference to the PSE attendance of the children of disabled parents without a university education of their own, and thereby can make a significant difference to their life chances. In particular, we suggest that an increase of $3,000 per year in provincial social assistance benefits to children in families with disabled parents could have the potential to close about half the achievement gap in PSE enrolment.

In future versions of this paper we hope to provide estimates of the cost of such a benefit increase and the extent to which that initial financial cost will be offset by increased tax revenue later from the higher earnings of university graduates. Our preliminary calculations imply that the initial financial cost would be roughly 0.05% of GDP[48] - which does seem like an amount that a country with Canada's wealth could afford. In general, it does not take all that much to make a big difference in the lives of people who have very little – and it seems to us to be desirable to pay more than lip service to the idea of greater equality of opportunity.

[48] In 2008, the total disability assistance provincial caseload from nine disability benefit programs (New Brunswick not available) was 536,909. Rounding up 550,000, and assuming half of households receiving disability benefits have children, $3,000 disability benefit increase for families with children would then imply an additional total expenditure of roughly 800 million dollars for ten provinces combined. GDP in 2008 was estimated to be 1,551 billion dollars (Statistics Canada. Table 379-0029 - accessed: May 24, 2016), so $ 800 million would then be equivalent to 0.05% of GDP in that year.

References

Adda, J., Bjorklund, A., & Holmlund, H. (2011). The role of mothers and fathers in providing skills: evidence from parental deaths. Discussion Paper no 5455, IZA.

Akee, R. K., Copeland, W. E., Keeler, G., Angold, A., & Costello, E. J. (2010). Parents' incomes and children's outcomes: A quasi-experiment. American economic journal. Applied economics, 2(1), 86.

Akee, R., Simeonova, E., Copeland, W., Angold, A., & Costello, E. J. (2013). Young adult obesity and household income: Effects of unconditional cash transfers. American economic journal. Applied economics, 5(2), 1.

Akee, R., Simeonova, E., Costello, E. J., & Copeland, W. (2015). How Does Household Income Affect Child Personality Traits and Behaviors? (No. w21562). National Bureau of Economic Research.

Burton, P., Chen, K., Lethbridge, L., & Phipps, S. (2014). Child health and parental paid work. Review of Economics of the Household, 1-24.

Burton, P., & Phipps, S. (2009). Economic costs of caring for children with disabilities in Canada. Canadian Public Policy, 35(3), 269-290.

Caledon Institute of Social Policy. (2015) Social assistance combined summaries, 2014. http://www.caledoninst.org/Publications/PDF/1062ENG.pdf. Accessed on May 26, 2016.

Cameron, S. V., & Heckman, J. J. (1998). Life Cycle Schooling and Dynamic Selection Bias: Models and Evidence for Five Cohorts of American Males. Journal of Political Economy, 106(2): 262-333.

Clark-Kauffman, E., Duncan, G. J., & Morris, P. (2003). How welfare policies affect child and adolescent achievement. The American Economic Review, 93(2), 299-303.
Bratti, M., & Mariapia M., 2011. Parental Health and Child Schooling. Working Papers 212, University of Milano-Bicocca, Department of Economics.

Chen, K., Fortin, N., & Phipps, S. (2015). Young in class: implications for inattentive/hyperactive behavior of Canadian boys and girls. Canadian Journal of Economics (Forthcoming).

Chen, K., Osberg, L., & Phipps, S. (2015). Inter-generational effects of disability benefits: evidence from Canadian social assistance programs. Journal of Population Economics, 28(4), 873-910.

Choi, H. (2010). Parents' health and adult children's subsequent working status: A perspective of intergenerational transfer and time allocation. Journal of Family and Economic Issues. 32(3): 493-507.

Conger, K. J., Reuter, M. A. and Conger, R. D. (2000) The Role of Economic Pressure in the Lives of Parents and their Adolescents: The Family Stress Model, in Crockett, L. J. and Silbereisen, R. K. (eds) Negotiating Adolescence in Times of Change. Cambridge: Cambridge University Press, pp. 201–23.

Costello, E. J., Compton, S. N., Keeler, G., & Angold, A. (2003). Relationships between poverty and psychopathology: A natural experiment. Jama, 290(15), 2023-2029.

Cunha, F., Heckman, J., & Schennach, S. (2010). Estimating the Technology of Cognitive and Noncognitive Skill Formation. IZA Discussion Papers 4702.

Dahl, G. B., & Lochner, L. (2012). The impact of family income on child achievement: Evidence from the earned income tax credit. The American Economic Review, 102(5), 1927-1956.

Duncan, G. J., Brooks-Gunn, J. & Klebanov, P. K. (1994) Economic deprivation and early childhood development, Child Development, 65, pp. 296–318

Duncan, G. J., Magnuson, K., & Votruba-Drzal, E. (2014). Boosting family income to promote child development. *The Future of Children*, *24*(1), 99-120.

Finnie, R., Frenette, M., Mueller, R., & Sweetman, A. (2010). Pursuing Higher Education in Canada: Economic, Social and Policy Dimensions. Montreal-Kingston, McGill-Queen's University Press.

Finnie, R., Childs, S., & Qiu, T. (2012). Patterns of Persistence in Postsecondary Education: New Evidence for Ontario. Higher Education Quality Council of Ontario.

Haveman, R., Wolfe, B., & Spaulding, J. (1991). Childhood events and circumstances influencing high school completion. Demography, 28(1), 133-157.

Haveman, R., & Wolfe, B. (2000). The economics of disability and disability policy. Handbook of Health Economics, 1(18): 995-1051.

Lefebvre, P., Merrigan, P., & Verstraete, M. (2008). The Effects of School Quality and Family Functioning on Youth Math Scores: a Canadian Longitudinal Analysis. Cahiers de recherche 0822, CIRPEE.

Lethbridge, L., & Phipps, S. (2006). Income and the outcomes of children. Analytical Studies Branch Research Paper Series 2006281e, Statistics Canada, Analytical Studies Branch.

Meyer, B. D., Mok, W. K., & Sullivan, J. X. (2009). The under-reporting of transfers in household surveys: its nature and consequences (No. w15181). National Bureau of Economic Research.
Mayer, S. (1997) What Money Can't Buy: Family Income and Children's Life Chances. Cambridge, Mass: Harvard University Press.

McLoyd, V. (1990) The Impact of Economic Hardship on Black Families and Children: Psychological Distress, Parenting and Socioemotional Development, Child Development, 61, 2, pp. 311–46

Milligan, K. (2005). Subsidizing the stork: New evidence on tax incentives and fertility. Review of Economics and statistics, 87(3), 539-555.

Milligan, K., & Stabile, M. (2011). Do Child Tax Benefits Affect the Well-being of Children? Evidence from Canadian Child Benefit Expansions. American Economic Journal: Economic Policy, 175-205.

Moffitt, R. (1992). Incentive effects of the US welfare system: A review. Journal of Economic Literature, 30(1), 1-61.

Morefield, B. (2011). Parental health events and children's skill development. Working Papers 10-11, University of North Carolina at Greensboro, Department of Economics.

Mühlenweg, A. M., Westermaier, F. G., & Morefield, B. (2015). Parental health and child behavior: evidence from parental health shocks. Review of Economics of the Household, 1-22.

Rege, M., Telle, K., & Votruba, M. (2011). Parental job loss and children's school performance. The Review of Economic Studies, rdr002.

Shea, J. (2000). Does parents' money matter?. Journal of public Economics, 77(2), 155-184.

Statistics Canada (2008). Participation and activity limitation survey 2006: labour force experience of people with disabilities in Canada, Catalogue no. 89-628-X — No. 007. http://www.statcan.gc.ca/pub/89-628-x/89-628-x2008007-eng.pdf. Accessed on May 26, 2016.

Stevens, A. H., & Schaller, J. (2011). Short-run effects of parental job loss on children's academic achievement. Economics of Education Review, 30(2), 289-299.

Todd, P. E., & Wolpin, K. I. (2007). The production of cognitive achievement in children: home, school, and racial test score gaps. Journal of Human Capital. 1(1): 91-36.

Table 1 Family poverty by parental disability status

	Average Household income (2008 $)	Average Equivalent household income (2008 $)	Percentage of two parent households with income below the LICO	Ratio of household income to the LICO	Percentage of children living in own home
Parents Non-disabled	$96,601	$45,696	5%	2.59	89.3%
Parents Disabled	$83,179	$39,661	9.95%	2.24	84%
Number of Disabilities					
= 1	$87,321	$41,242	6.35%	2.3	83.4%
> 1	$81,219	$38,858	10.8%	2.21	83.9%
Gender of disabled parent					
Father					
# disability = 1	$89,202	$41,572	6.82%	2.33	83.5%
# disability > 1	$79,313	$37,748	10.38%	2.16	85%
Mother					
# disability = 1	$85,593	$40,939	5.92%	2.26	83.3%
# disability > 1	$85,541	$41,119	7.94%	2.32	86%

Note: The sample includes all children under the age of 15 in the NLSCY. We use the Luxembourg Income Study scale (the square root of family size) to calculate "equivalent income." .

Table 2 Real Maximum Annual Disability Benefits (2008 Constant $)

	NL	PEI	NS	NB	QB	ON	MB	SK	AB	BC	Canada
1994	10,945	12,192	11,499	10,736	10,468	15,338	10,980	11,465	14,125	11,674	11,942
2000	10,325	10,515	10,760	8,337	10,568	… … 14,101	9,783	10,226	12,786	11,178	10,858
2002	10,123	10,681	9,630	8,223	10,493	… … 13,299	9,403	9,999	12,689	11,014	10,555
2004	9,639	10,052	9,598	8,253	10,463	… … 12,693	9,101	9,688	11,771	10,561	10,182
2006	10,044	9,579	9,251	8,285	10,392	… … 12,497	8,948	9,334	12,685	11,027	10,204
2008	10,878	8,623	9,088	8,275	10,500	… … 12,382	9,026	9,772	12,762	11,125	10,243
Real % change, 1994-2008	-0.61	-29.27	-20.97	-22.93	0.30	-19.27	-17.79	-14.77	-9.65	-4.70	-14.23
% difference from national average, 1994	-10.34	0.89	-3.37	-12.07	-17.91	22.47	-9.06	-5.33	22.11	-7.77	--
% difference from national average, 2000	-6.92	-1.30	-1.13	-24.34	-8.18	23.02	-14.20	-9.28	23.01	-2.80	--
% difference from national average, 2002	-4.01	-1.29	-7.85	-19.81	-4.73	20.28	-13.77	-8.06	17.51	0.92	--
% difference from national average, 2004	-5.24	-2.98	-6.07	-18.07	-0.69	20.31	-11.37	-6.76	11.06	1.37	--
% difference from national average, 2006	-2.60	-7.03	-10.93	-11.59	-2.51	17.04	-14.65	-12.13	17.71	4.11	--
% difference from national average, 2008	6.20	-15.29	-12.07	-20.89	-1.67	15.76	-14.26	-8.48	18.51	5.26	
Provincial Average	10,326	10,274	9,971	8,685	10,481	13,385	9,540	10,081	12,803	11,096	10,664

Note: Disability benefit information is collected from various issues of Welfare Incomes (1993-2007). All benefits are converted into 2008 dollars using the corresponding provincial seasonally adjusted Consumer Price Index (2011 basket content) from Statistics Canada's CANSIM (database) Table 326-0021: http://www5.statcan.gc.ca/cansim/home-accueil?lang=eng , accessed 4 April, 2014.

Table 3 Possible Observation Pairs for Parental Disability at Child Age 5 to 15 and Child PSE at age 19-21

Survey Year	Cohort		
	A	B	C
1994	5 to 7	7 to 9	9 to 11
2000	11 to 13	13 to 15	15
2002	13 to 15		
2004			19 to 21
2006		19 to 21	
2008	19 to 21		

Table 4 Possible Observations Pairs for Parental Disability at Child Age 5 to 15 and Child PSE at ages 19-25

Survey Year	Cohort			
	D	E	F	G
1994	5	6 to 7	8 to 9	10 to 11
2000	11	12 to 13	14 to 15	
2002	13	14 to 15		19
2004	15		19	20 to 21
2006		19	20 to 21	22 to 23
2008	19	20 to21	22 to 23	24 to 25

Table 5 Percentages of observations with at least one parent disabled
(In the first observation)

Nature of the Condition	Narrow Range 19-21 (Sample Size = 5,224)	Wide Range 19-25 (Sample Size = 7,444)
Parent Disabled	16.3%	14.3%
Number of Disabilities		
= 1	4.3%	3.8%
= 2	3.9%	3.6%
= 3	5%	4.4%
= 4	3.1%	2.5%
Gender of Disabled Parent		
Only Father Disabled	6.9%	6.2%
# of restricted domains = 1	1.6%	1.5%
= 2	1.9%	1.9%
= 3	2.2%	1.9%
= 4	1.2%	1%
Only Mother Disabled	7.4%	6.3%
# of restricted domains = 1	2.5%	2.1%
= 2	1.6%	1.4%
= 3	2%	1.7%
= 4	1.3%	1.1%
Both Parent Disabled	2%	1.8%

Note: This table reports the percentages of youth living with disabled parents by disability incidence, number of disabilities, and the gender of the disabled parent for the two analysis samples. Both samples consist of non-disabled youth living in two-parent families, whose parents were 18 and 65 years of age and did not have any university degree. More details on our sample selection criteria can be found in the text.

Table 6 Means of variables measured at the first observation (4-15 years)

	Non-Disabled Parents	Disabled Parents	Parents with Single Disability	Parents with Multiple Restricted Domains
Gender				
Boy	51.4%	52.8%	58%	51.9%
Girl	48.6%	47.2%	47%	48.1%
Siblings	1.41	1.46	1.55*	1.42
Child age	12.7	12***	12.1**	12**
School grade	4.1	5.1***	4.6	5.4***
Relative age for grade	46.2%	44.9%	40.7%	46.2%
Mother education				
Some postsecondary	24.7%	24.4%	19.7%	24.8%
High school	58.3%	55.1%	62.2%	54%*
Less than high school	17%	20.4%	18.1%	21.2%
Father education				
Some postsecondary	26.6%	22.2%*	27.1%	20.2%**
High school	52.2%	53.6%	53%	53.5%
Less than high school	21.2%	24.2%	19.9%	26.3%
Either parent immigrant	17.6%	17.6%	22.2%	16.7%*
Mother age	39.9	38.7***	38.6	38.5***
Father age	42.2	41.5**	41.1	41.3
Step family	10.2%	10.5%	3.9%*	12.4%
Disability benefit level ($1,000)	12.1	12.2	12.2	12.2
N	4372	852	225	627

Note: The sample consists of non-disabled youth aged between 19 and 21 in two-parent families whose parents were 18 and 65 years of age and did not have any university degree. 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 7 Means of variables measured at the second observation (19-21 years)

	Non-Disabled Parents	Disabled Parents	Parents with Single Disability	Parents with Multiple Restricted Domains
PSE Participation	66.2%	59.7%**	60.9%	59.6%**
Change in the number of siblings	-0.6	-0.8	-0.9	-0.8
Child age				
19	42.1%	53%***	54.3%***	50.4%***
20	32.3%	27.6%*	24.7%***	30%
21	25.6%	19.3%***	21%*	19.6%***
Step family	6.4%	7.2%	2.6%*	8.3%
Youth unemployment rate (under 25)	11.7%	11.5%	11.2%**	11.7%
N	4372	852	225	627

Note: The sample consists of non-disabled youth aged between 19 and 21 in two-parent families whose parents were 18 and 65 years of age and did not have any university degree. 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 8 Estimated Parental Disability Benefit Effects on PSE Participation

	Narrow Range (19-21 years)				Wide Range (19-25 years)			
	Incidence		Severity		Incidence		Severity	
	M1	M2	M1	M2	M1	M2	M1	M2
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Benefit x Incidence	0.03***	0.03***			0.016***	0.015***		
	(0.006)	(0.006)			(0.005)	(0.005)		
Benefit x Severity			0.012***	0.012***			0.005**	0.004**
			(0.003)	(0.003)			(0.002)	(0.002)
Young in Class	-0.144***	-0.147***	-0.142***	-0.145***	-0.139***	-0.139***	-0.138***	-0.138***
	(0.041)	(0.041)	(0.043)	(0.042)	(0.024)	(0.024)	(0.025)	(0.025)
Youth UR (under 25)	0.023	0.024	0.024	0.024	0.011	0.011	0.011	0.011
	(0.014)	(0.014)	(0.014)	(0.014)	(0.011)	(0.011)	(0.011)	(0.011)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Disability Benefit Level	Yes		Yes		Yes		Yes	
Year x Province Fixed Effects		Yes		Yes		Yes		Yes
Mean(PSE)	0.597				0.627			
S.D.(PSE)	0.49				0.434			
N	5224				7444			

Note: 1. The table shows the OLS estimates of the parental disability benefit impact on PSE attendance for the youth of parents who did not have any university degree. The left and right panels focus on two windows of observations on PSE attendance 19-21 and 19-25 years. “Young in class” and “Youth Unemployment Rate” represent coefficients on a youth’s relative age for grade (i.e., whether the youth was born in six months prior to the school entry cut-off date and therefore became the youngest student in class), and the youth unemployment rate (under 25) at the province level at the time of college entry. 2. We control for two sets of covariates in the regressions. The first was measured at the time of disability, including child gender, number of siblings, family structure (step vs “intact” family), both parents' ages and age squared, immigration status, levels of education, and interaction terms between both parents' education and disability statuses. The second set was measured at college entry, including change in the number of siblings between the reports of parental disability and PSE attendance, and family structure. 3. The mean and standard deviation reported at the bottom of the table indicate those of the PSE participation for youth lived with a disabled parent. Robust standard errors (in parentheses) are clustered at the province level; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 9 Placebo Regressions for Unlikely Participants

	Narrow Range (19-21 years)				Wide Range (19-25 years)			
	Incidence		Severity		Incidence		Severity	
	M1	M2	M1	M2	M1	M2	M1	M2
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Benefit x Incidence	0.022	0.024			0.013	0.013		
	(0.015)	(0.015)			(0.012)	(0.013)		
Benefit x Severity			0.011	0.012			0.006	0.007
			(0.007)	(0.007)			(0.006)	(0.006)
Young in Class	-0.062**	-0.06**	-0.062**	-0.061**	-0.032*	-0.03*	-0.032*	-0.03*
	(0.021)	(0.022)	(0.02)	(0.021)	(0.015)	(0.016)	(0.014)	(0.016)
Youth UR (under 25)	0.032**	0.028**	0.032**	0.028**	0.018	0.016	0.017	0.016
	(0.011)	(0.011)	(0.011)	(0.011)	(0.01)	(0.01)	(0.01)	(0.01)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Disability Benefit Level	Yes		Yes		Yes		Yes	
Year x Province Fixed Effects		Yes		Yes		Yes		Yes
Mean(PSE = 1)	0.798				0.816			
Sd(PSE = 1)	0.4				0.388			
N	1915				2611			

Note: The table replicates the models in Table 8 for youth whose either parent has a university degree. The covariates are identical to those reported in Table 8, except for the additional category of parental education (i.e. university degree) and the interactions between parents' university education and disability status. The mean and standard deviation of the PSE participation are shown for youth lived with a disabled parent. Robust standard errors (in parentheses) are clustered at the province level; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 10 Additional Robustness Checks

	19-21 years		19-25 years	
	(1)	(2)	(1)	(2)
Panel A: Original models with three additional controls				
Benefit x Incidence	0.042***		0.022**	
	(0.008)		(0.007)	
Benefit x Severity		0.016***		0.007**
		(0.003)		(0.003)
Child Non-White (1=yes; 0=otherwise)	0.083	0.075	0.082*	0.077*
	(0.059)	(0.061)	(0.038)	(0.039)
Home Ownership (1=yes; 0=otherwise)	0.156**	0.156**	0.149**	0.149**
	(0.056)	(0.056)	(0.047)	(0.047)
French-Speaking (1=yes; 0=otherwise)	0.061	0.061	0.076	0.078
	(0.05)	(0.05)	(0.054)	(0.053)
Number of Observations	4873		6811	
Panel B: Randomly keeping one observation for each youth				
Benefit x Incidence	0.037***		0.03***	
	(0.008)		(0.009)	
Benefit x Severity		0.011**		0.008**
		(0.004)		(0.003)
Young in Class	-0.029	-0.027	-0.017	-0.017
	(0.021)	(0.021)	(0.021)	(0.021)
Youth UR (under 25)	0.019	0.019	0.014	0.014
	(0.011)	(0.011)	(0.009)	(0.009)
N	1985		2092	

Note: The upper panel of the table reports results from the original model (M2 of Table 8) augmented with controls for the child's ethnicity (a dummy for being non-white), family wealth (a dummy for home ownership), and French minority (a dummy for French as first language). The lower panel of the table reports results for the subsamples of 19-21 and 19-25-year-olds that randomly keeping one observation for each youth. Robust standard errors (in parentheses) are clustered at the province level; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 11 Pathways: Estimated impact of parental disability benefits on cognitive, social/behavioral, and emotional outcomes

	Standardized Math Test Score		Parent-report Hyperactive / Inattentive Scale		Parent-report Emotional Anxiety Scale	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Narrow Range (19-21 years)						
Benefit x Incidence	2.888***		0.006		-0.085***	
	(0.751)		(0.04)		(0.021)	
Benefit x Severity		1.643***		0.012		-0.027*
		(0.488)		(0.037)		(0.015)
Young in Class	1.192	1.293	0.502***	0.51***	0.31***	0.315***
	(4.722)	(4.734)	(0.054)	(0.057)	(0.062)	(0.06)
Mean(PSE)	505		3.881		2.603	
S.D.(PSE)	100		3.125		2.355	
N	3044		2647		2654	
Panel B: Wide Range (19-25 years)						
Benefit x Incidence	3.301***		-0.004		-0.102***	
	(0.754)		(0.04)		(0.024)	
Benefit x Severity		1.776***		0.012		-0.036***
		(0.447)		(0.03)		(0.011)
Young in Class	1.774	1.875	0.62***	0.63***	0.346***	0.356***
	(4.941)	(4.96)	(0.071)	(0.074)	(0.067)	(0.069)
Mean(PSE = 1)	504		4.065		2.793	
Sd(PSE = 1)	100		3.26		2.551	
N	3417		3235		3242	

Note: The table shows the estimated impacts of parental disability benefits on children's cognitive, behavioral, and emotional well-being outcomes, as measured by standardized math test score, parent-report hyperactive/inattentive and emotional anxiety symptoms. A higher value of the hyperactivity and anxiety scores indicate worse outcomes. More details on the definition of the dependent variables can be found in the text. The covariates controlled in all regressions but are not reported include child age in month, child age squared, gender, relative age for grade (i.e., whether the youth was born in six months prior to the school entry cut-off date), number of siblings living in the household, family structure (step vs "intact" family), both parents' ages and age squared, immigration status, education, and interaction terms between both parents' education and disability statuses. Since the difficulty of the math test in the NLSCY varies with the school grade of the child, the standardized scores increases as a child grows older (Lefebvre, Merrigan and Verstraete 2008). We thus additionally control for parent-report school grade (K through ten) for the child in our math test score regressions. The mean and standard deviation indicate those of the dependent variable used in the regression. Robust standard errors (in parentheses) are clustered at the province level; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 12 Heterogeneous Effects on PSE Participation: Paternal vs. Maternal Disabilities

	Narrow Range (19-21 years)		Wide Range (19-25 years)	
	(1)	(2)	(3)	(4)
Father				
Benefit x Incidence	0.055***		0.024*	
	(0.014)		(0.012)	
Benefit x Severity		0.025***		0.011**
		(0.005)		(0.004)
Mother				
Benefit x Incidence	0.026		0.017	
	(0.015)		(0.015)	
Benefit x Severity		0.01*		0.007
		(0.005)		(0.004)
Young in Class	-0.026	-0.024	-0.005	-0.005
	(0.028)	(0.028)	(0.022)	(0.022)
Youth UR (under 25)	0.024	0.024	0.01	0.01
	(0.014)	(0.014)	(0.01)	(0.01)
Mean(PSE = 1)	0.610		0.654	
Sd(PSE = 1)	0.488		0.476	
N	5122		2689	

Note: The table shows the effects of parental disability benefits breaking down by the gender of the disabled parent for the youth of parents who did not have any university degrees. Since only 102 and 134 youths lived with two disabled parent in the two age ranges, respectively, we exclude them from the analysis for easy of interpretation. The covariates controlled in all regressions are identical to those in our preferred model specification, M2 of Table 8. The mean and standard deviation of the PSE participation are shown for children lived with a disabled parent. Robust standard errors (in parentheses) are clustered at the province level; * $p < 0.1$, $p < 0.05$, *** $p < 0.01$.

Table 13 Heterogeneous Effects on PSE Participation: Male vs. Female Students

Narrow Range (19-21 years)

	Male Students		Female Students	
	(1)	(2)	(3)	(4)
Benefit x Incidence	0.033**		0.025**	
	(0.012)		(0.008)	
Benefit x Severity		0.014**		0.01***
		(0.005)		(0.003)
Young in Class	-0.047	-0.045	-0.027	-0.026
	(0.032)	(0.033)	(0.025)	(0.026)
Youth UR (under 25)	0.043***	0.043***	-0.001	-0.0004
	(0.011)	(0.011)	(0.02)	(0.018)
Mean(PSE = 1)	0.546		0.654	
Sd(PSE = 1)	0.499		0.476	
N	2535		2689	

Wide Range (19-25 years)

	Male Students		Female Students	
	(1)	(2)	(3)	(4)
Benefit x Incidence	0.015		0.017**	
	(0.009)		(0.006)	
Benefit x Severity		0.003		0.007***
		(0.003)		(0.002)
Young in Class	-0.01	-0.01	-0.013	-0.013
	(0.019)	(0.019)	(0.023)	(0.022)
Youth UR (under 25)	0.025***	0.025***	-0.003	-0.002
	(0.006)	(0.006)	(0.017)	(0.017)
Mean(PSE = 1)	0.576		0.673	
Sd(PSE = 1)	0.495		0.47	
N	3592		3852	

Note: The table shows the effects of parental disability benefits breaking down by the gender of the student. The covariates controlled in all regressions are identical to those in our preferred model specification, M2 of Table 8. The mean and standard deviation of the PSE participation are shown for children lived with a disabled parent. Robust standard errors (in parentheses) are clustered at the province level; * $p < 0.1$, $p < 0.05$, *** $p < 0.01$.

Table 14 Estimated Parental Disability Benefit Effect by Childhood Stage

	19 to 21 years		19 to 25 years	
	M1	M2	M1	M2
Benefit x Incidence x Age	-0.012**		-0.001	
	(0.005)		(0.003)	
Base category: 14 to 15				
Benefit x Incidence x 5 to 7		0.07*		0.004
		(0.031)		(0.019)
Benefit x Incidence x 8 to 10		0.124**		0.015
		(0.05)		(0.026)
Benefit x Incidence x 10 to 13		0.08		0.075***
		(0.052)		(0.022)
	M1	M2	M1	M2
Benefit x Severity x Age	-0.005**		-0.0003	
	(0.002)		(0.001)	
Base category: 14 to 15				
Benefit x Severity x 5 to 7		0.023**		0.007
		(0.009)		(0.009)
Benefit x Severity x 8 to 10		0.052**		0.015
		(0.017)		(0.011)
Benefit x Severity x 10 to 13		-0.008		0.017**
		(0.014)		(0.006)
Mean(PSE = 1)	0.633		0.661	
Sd(PSE = 1)	0.482		0.42	
N	1985		2902	

Notes: This table reports results testing whether the timing of disability benefit receipt matters. We augment the preferred model specification (M2) in Table 8 with the interaction of child age and estimated disability benefit effect, together with all lower order interactions among DIS, BEN and child age for the subsamples of 19-21 (columns 1-2) and 19-25 (columns 3-4) years old that randomly keep one observation per youth. Child age is modelled in three ways: linear (M1), quadratic, and categorical (M2). Only model specifications with statistically significant results are reported.

Appendix Table 1 Disability Designations in Ten Disability Benefit Programs

Province/Disability Benefit Programs	Disability Designation
NL[49] (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[50] (Social Assistance Program)	A person in need "who has an ongoing intellectual, mental or physical impairment".
NS[51] (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 [52](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[53] (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[54] (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[55] (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[56] (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[57] (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[58] (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.

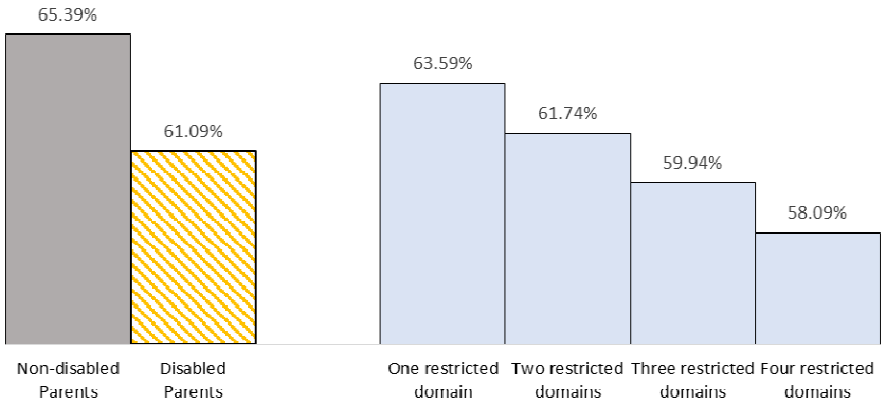
[49] NL: Income and Employment Support Regulations. www.hrle.gov.nl.ca/hrle
[50] PEI: Social Assistance Policy Manual http://www.gov.pe.ca/sss/index.php3?number=1028464&lang=E
[51] NS: http://www.gov.ns.ca/coms/disabilities/documents/GlossaryofTerms.html
[52] NB: Social Assistance Policy Manual. http://www.gnb.ca/0017/Policy%20Manual/POL-E/policy1.htm#blind
[53] Quebec: Individual and Family Assistance Act. http://www.mess.gouv.qc.ca/solidarite-sociale/programmes-mesures/assistance-emploi/index_en.asp
[54] Ontario: Income Support Directives. http://www.mcss.gov.on.ca/en/mcss/programs/social/directives/ODSP_incomesupport.aspx
[55] MB: Income Assistance for Persons with Disabilities. http://www.gov.mb.ca/fs/pwd/iapd.html#content
[56] 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
[57] AB: AISH Policy Manual. http://www.seniors.alberta.ca/aish/PolicyManual/Policy/Eligibility/Eligibility_Criteria.htm
[58] BC: Persons with disabilities. http://www.hsd.gov.bc.ca/factsheets/2004/pwd.htm

Appendix Table 2 Pathways: Disability Benefit Impact on Math Test Score by Demographic Groups

	Narrow Range (19-21-year-olds)						Wide Range (19-25-year-olds)					
	Male Students		Female Students		Paternal vs Maternal Disability		Male Students		Female Students		Paternal vs Maternal Disability	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
BEN x Incidence	4.394***		1.835				4.69***		2.711**			
	(1.271)		(1.07)				(1.420)		(1.197)			
BEN x Severity		2.858***		0.894				2.778***		1.37**		
		(0.713)		(0.567)				(0.714)		(0.574)		
Father												
BEN x Incidence					2.971						3.135	
					(1.965)						(1.945)	
BEN x Severity						1.584**						1.566**
						(0.659)						(0.609)
Mother												
BEN x Incidence					4.709**						4.824**	
					(1.876)						(1.878)	
BEN x Severity						2.893***						2.762***
						(0.829)						(0.823)
Young in Class	-5.973	-5.519	6.566	6.923	1.45	1.535	-7.201	-6.851	8.418	8.854	1.616	1.704
	(6.444)	(6.576)	(6.167)	(6.145)	(4.517)	(4.511)	(6.16)	(6.196)	(5.679)	(5.67)	(4.687)	(4.7)
Mean(Math Score)	507		503		508		507		501		506	
Sd(Math Score)	104		96		101		103		97		101	
N	1452		1592		2981		1639		1778		3340	

Note: The table shows the effects of parental disability benefits on standardized math test scores, breaking down by the gender of the student and by the gender of the disabled parent. We exclude 63 and 77 youths in the above two age ranges who lived with two disabled parents, respectively, from the analysis for easy of interpretation. The covariates controlled in all regressions are identical to those in M2 of Table 8. The mean and standard deviation of the math test scores are for children lived with a disabled parent. Robust standard errors (in parentheses) are clustered at the province level; * $p < 0.1$, $p < 0.05$, *** $p < 0.01$.

Figure 1 PSE participation by number of functional domains in which parent is limited



Note: The figure shows the predicted probabilities of PSE participation adjusting age and gender for NLSCY youth aged 19-21. The probabilities are computed for a hypothetical youth with the mean age of the sample (i.e., 12 when participation in PSE is assessed).

Figure 2 PSE participation by benefit generosity

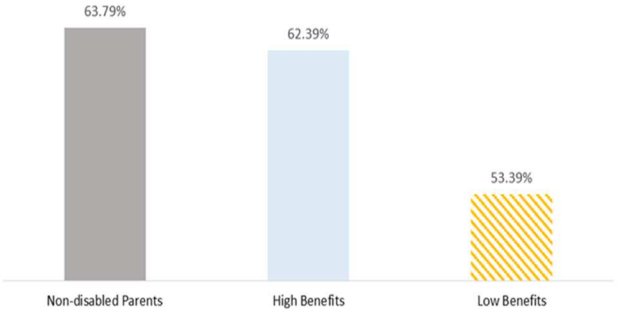


Figure 3 Math scores by benefit generosity

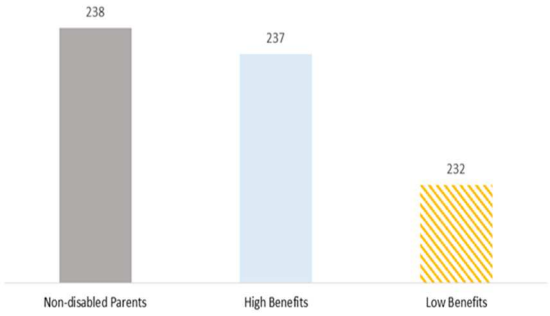
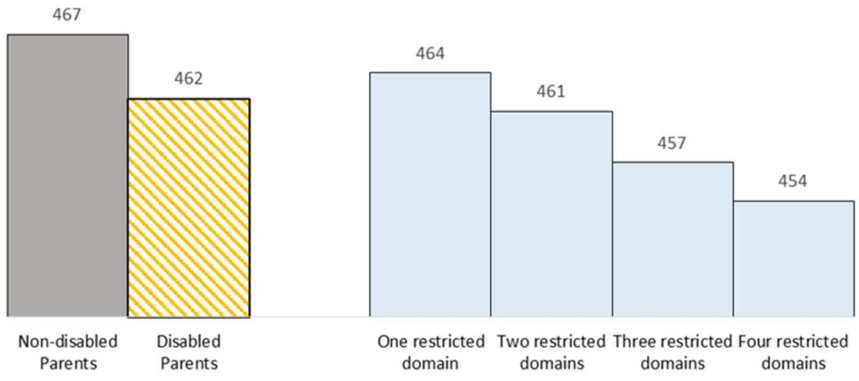


Figure 4 Standardized math test score by parental functional status
(Students in grades two through ten)



Note: Figures 4-6 show the predicted standardized math test score, parent-report hyperactive/inattentive and anxiety symptoms, respectively. They adjust for the child's age and gender for all NLSCY youth with observed education status at 19-21. For math test scores, we additionally control for the child's school grade at the time of the test. All outcomes are computed for a hypothetic child with the mean age and school grade (i.e., 4th grade when participation in PSE is assessed) of the sample.

Figure 5 Parent-report hyperactive/inattentive symptoms by parental functional status (Children aged 5-11)

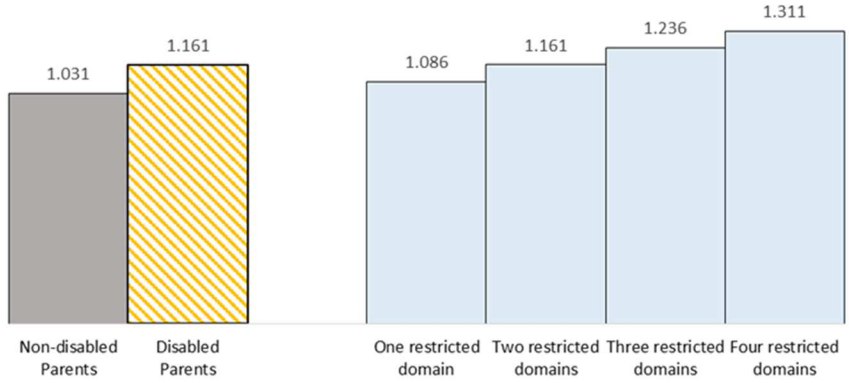


Figure 6 Parent-report anxiety symptoms by parental functional status (Children aged 5-11)