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Family Background, Family Income, Maternal Work and Child Development

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Résumé:

Cette étude empirique présente les effets des caractéristiques familiales, du revenu familial et du travail des parents - en particulier celui des mères - sur le développement des jeunes enfants. Les indicateurs de développement analysés sont les scores obtenus par les enfants sur des échelles mesurant le développement cognitif (enfants âgés de 4 et 5 ans) et certains comportements sociaux négatifs et positifs (enfants âgés de 4 à 11 ans). Ces scores sont interprétés comme des indices du "stock" de capital humain des enfants au Canada ainsi que de leur bien-être. L'analyse s'appuie sur les micro-données de l'Enquête nationale longitudinale sur les enfants et les jeunes réalisée conjointement par le ministère du Développement des ressources humaines du Canada et par Statistique Canada. Les résultats indiquent que le travail des mères a des effets légèrement positifs ou nuls sur les indicateurs de développement des enfants. Ils suggèrent aussi que le revenu familial a peu d'effet pour l'enfant canadien typique. Cependant, il est vraisemblable que l'effet du revenu familial soit plus important pour les enfants vivant dans une famille à très faible revenu. Les variables qui prédisent le mieux les indicateurs mesurés de développement sont celles qui sont associées aux caractéristiques des parents et de la famille. Les implications des résultats pour la politique publique à l'égard des enfants sont discutées.

Abstract:

This paper presents estimates of the effects of family background, family income and parental work - especially maternal employment - on the *behavioural* development of young children. The particular outcomes analysed are children's scores on developmental-assessment instruments measuring cognitive development (4-to 5-year-old), problematic behaviours and pro-social behaviour (4-to 11-year-old). These outcomes are interpreted as measures of certain key components of the "human capital" stock of Canadian children and their well-being. The analysis is based on data from the National Longitudinal Survey of Children and Youth, Cycle 1 (Human Resources and Development Canada, and Statistics Canada, release 2, 1998). The results suggest that maternal work has very small positive or insignificant effects on young children developmental outcomes. The empirical findings are that current income effects are very small for the average child. However, it is possible, that they could be stronger for children in very poor families. The most important predictors of assessed scores are the personal characteristics of both of family and parents. The public policy implications of the main findings are also discussed.

Keywords:

Cognitive skills, problematic behaviours and pro-social behaviour, parental employment, family structure, low-income families, policy implications

JEL classification: J1, J2.

1. Introduction

This paper presents estimates of the effects of family background, family income and parental work - especially maternal employment - on the *behavioural* development of young children. The particular outcomes analysed are children's scores on developmental-assessment instruments measuring cognitive development (4-to 5-year-old), problematic behaviour and social adjustment (4-to 11-year-old). These outcomes are interpreted in this research as measures of certain key components of the "human capital" stock of Canadian children and their well-being. The analysis is based on data from the National Longitudinal Survey of Children and Youth, Cycle 1 (NLSCY, Human Resources and Development Canada, and Statistics Canada, release 2, 1998).

There are several motivations to uncover the strength of these effects. First, there is the increasing recognition that a child, at an early age, must acquire cognitive, behavioural and social skills to fully exploit the learning opportunities provided by the formal schooling system. Children who receive higher levels of cognitive stimulation are more likely to exhibit better language skills (receptive and expressive skills) which are a key dimension of school readiness (Doherty 1997). Low levels of behavioural problems and a high level of pro-social behaviour in middle childhood imply that children have internalised behavioural norms that should make them more competent at school. The child's ability to learn from school, in turn, influences academic performance and subsequent graduation. Educational attainment, occupational status and earnings are highly correlated as economic and social success at older ages are strongly linked with the ability to compete successfully in the job market. If child development outcomes measure elements of the human capital (which is multidimensional) of children, and if the human capital of children is closely related to adult outcomes, then the relationship is of interest to policy makers as well as social scientists.

Second, if we postulate that parents want their children to become successful adults then we expect them to invest in the human capital of their children. To obtain «child quality» which can be defined here as "levels" of child development, parents engage in a "production" process where child outcomes can be viewed as the output. Financial resources can be used to produce a rich learning environment. Time, also, plays an important part in this process, both as an input in the production of household services, especially in the nurturing and education of young children, but also as a constrained resource allocated between market work, home time and leisure. Hence parental

attributes, family income and time allocation are likely to play important roles in the development of a children.

Third, public policy sets the basic social and economic environment within which families make their choices. Tax and transfer programs that redistribute income towards families and children, finance resources to schooling, and create specific services provided to children in poverty such as subsidised child care and early education are likely to have direct and indirect impacts on the well-being of families and their children. One of many relevant issues for public policy is the relative desirability of subsidizing parental income (e.g. an increase in welfare benefits; an earned income supplement; a child tax credit) and in-kind programs aiming to provide directly for a child's basic needs (e.g. decent housing, food, medical care, and early education) in order to improve short-term and longer-term outcomes of children. To begin addressing the questions of the relative effectiveness of these policies we need to know the effect of income and parental characteristics on child development. Since the main way for families to enhance their material well-being is by allocating more of their time to paid employment which means invariably less home time spent with the children, policy makers need to know if increased income from working mothers will improve children's outcomes and whether this additional income will overcome the negative consequences of there being less time for child rearing activities by mothers. Policy makers will also want to know if outcomes are better when mothers leave welfare.

Finally, there is the opportunity to validate the data survey of NLSCY and to replicate studies done with similar American survey data. Also, since most of the results of the research literature on the cognitive, social, and behavioural development of young children relate to the American socioeconomic context, it may not be appropriate to take for granted the lessons that may be drawn from them.

The implementation of an empirical model characterising the links between parental employment and children's well-being that yield policy relevant results raises several difficulties. Among those are: theoretical considerations on the processes that are conducive to child development; the confounding of associations caused by the likely effect of parental characteristics on both family income and children's outcomes; the "counterfactual" to describe alternatives to actual situations as a basis for comparisons; and, the measurements of family background, parental

income, home time and employment time.

The paper is divided in nine sections. The next section highlights the research questions that should be addressed and discuss the conceptual and methodological issues. The third section reviews the existing evidence and formulates the hypotheses to be examined. The fourth section depicts the "reduced-form" model that is estimated. The fifth section provides the data, the definition of the variables used and their measurement. The next two sections present the results and a discussion of the findings. The eighth section outlines possible policy implications of the findings. And the final section offers some conclusions taking into account the limitations of the study.

2. Research questions, conceptual and methodological issues

2.1 Research questions

The parental circumstances in which children are raised have changed. Two major observable phenomena illustrate this point. The proportion of currently «married» (registered or common-law) mothers of preschool age children who are working has increased dramatically since the 1980's. By 1994, over half (56%) of women with children less than age 3 were employed, up from 39% in 1981 (see Statistics Canada 1996 for these statistics and the following). The employment rate of women whose youngest child was aged 3 to 5 also increased during this period, rising from 47% in 1981 to 59% in 1994. Second, the proportion of female headed lone-parent families has risen in the last two decades. In 1991, they represented 16% of all families with children, up from 10% in 1971.¹ This implies that there is a rising number of children who spend a significant proportion of their childhood in single-parent families. With the absence of a spouse, the family environment is altered and thus begins a long period of adjustment into poorer economic conditions with spells of poverty and welfare dependence. Female lone parents are considerably less likely than women in two-parent families to be employed. In fact, the proportion of female lone parents with jobs in 1994 was lower than in 1981: 50% versus 55%. This decline can be traced to a drop in employment among young lone mothers (Dooley 1996). In 1994, only 27% of lone mothers with children under age 3 and 47% of those whose youngest child is aged 3 to 5 were employed, compared with 60% of those whose

youngest child is aged 6 to 15.

In many respects children are better off than they have ever been. The typical child is more likely to have been the result of a planned decision by his parents, has a better chance of survival through infancy and childhood, completes more years of schooling, has more material goods, and has fewer siblings with whom to compete for the time and attention of parents. These parents in turn are better educated, dedicate more hours to market work, and are having their children later when earning power is greater.²

If family income is used as a summary measure of children's material well-being there are large differences according to the type of family children live in and whether the mother is strongly committed or not to the labour market. For example, in 1994-1995, for children aged 4-5 years in Canada (see table A1 and following sections for this particular sample used in the empirical analysis), mean family income in a two-parent family was 64,000\$ with a working mother and 46,000\$ with a "non-working" mother; in a single mother family, mean income was 26,000\$ with a working mother and 15,000\$ with a "non-working" mother.

At the same time, for the same children and for a larger window of children's ages, developmental outcomes can be assessed. In the areas of emotional and behavioural problems, social functioning and cognitive skills, it is observed that positive (scores) outcomes for children are strongly correlated with their parents' income. Moreover, a number of children are experiencing difficulties. They are likely to be assessed as developmentally "delayed". The children at risk are mostly those in single-parent families, those at the lower end of the income scale, those whose parents' educational levels are low, and those whose parents fare lowest in terms of parenting skills.³ Thus, with respect to child well-being, the move into the work force by the mother has potential influences depending on the outcomes of interest.

The preceding observations (and the existing evidence in the research literature which is reviewed in the next section) concerning the effects parental employment across *all* population groups suggest that three main research questions can be raised.

First, does maternal employment have positive or negative implications for children well-being independently from both child and family background characteristics that make some women more likely to work?

Parental employment will affect family life in two ways. First, decisions involving the employment of the mother, if we suppose that there is a spouse/partner who is already a labour force participant, invariably implicate increased (or decreased if she decides not to work) financial resources and their use to purchase market goods and services enhancing the well-being of the family. Second, given the absolute constraint on the amount of time available, although it is "renewable" each day, there is the problem of the allocation of each family member's time. Many sources of family well-being cannot be directly purchased in the market. They must be produced by combining family members' time with market goods purchased with financial resources obtained with each family member's labour market income. Although maternal employment increases the amount of market goods the family can accumulate, it may decrease the opportunity for mother's to provide nonmarket commodities, especially in the form of attention, monitoring, learning activities, and cognitive stimulation for her children. On the other hand, the additional market goods and services made available by the mother's earnings may fill the gap created by her decreased time at home when employed. Purchased substitute child care is an example of services increased financial resources permit.

Moreover, family work decisions not only determine the allocation of the family members' time between market and nonmarket activities, but they also cause changes in the intra-allocation of time spent on nonmarket activities (leisure, education, organization, home production, personal time). It is reasonable to expect that maternal employment will change household production and the allocation of available time. If the mother participates in the labour market, family members will generally shy away from labour-intensive home production techniques and move towards goods-intensive techniques. Time given up for paid work may have low returns and, in its place, employed mothers substitute other kinds of time that have higher returns. Alternately, to give up time for a low wage job instead of dedicating it to child care may also have low returns. Although we can measure parents' time spent with children in non-direct child-care-related activities (e.g. going to cinema, family eating together at restaurant)⁴ we have little or no knowledge of the process by which direct or indirect time spent with children relates to child development. When both parents are employed, men are likely to contribute somewhat more to home production.⁵

Finally, it has also been found (T. Duncan, 1990, 1992; Phipps and Burton, 1993) that

mothers' relative income (in two-parent families) has a definite impact on children expenditures. A one dollar increase in mothers' income translates into more expenditures on children goods than a similar increase in spouses' income.⁶ Thus, families in which mothers earn a relatively important share of total income may spend more on goods and services that are correlated with children development.

Second, do better outcomes for children actually reflect differences between families?

Observed differences in child outcomes - there are gaps not only by parental income but also according to parental education - may show the effects of preexisting differences in families' characteristics, especially the mother's. Mothers who gain employment differ in many important ways from mothers who do not. For example, on average, the former have more education directly influencing both child development and mothers' employment. These factors, that predispose some mothers towards employment, may be the real reason for the better outcomes.

A major general finding from social science research is the strong association between children's well-being and families socioeconomic background consisting evidently of financial resources but more importantly of own human capital (such as innate or learned skills, educational attainment, psychological and health status), personal or psychological resources (such as resiliency, positive outlook, motivation), and "social capital" (Coleman, 1988) (such as community ties, relations with neighbours and friends). These parental characteristics are resources used by parents for the socialization process of children and the provision of cognitive stimulation. These resources include cultural values inherited from the parents' own family of origin and life experiences. It is plausible that some of these resources might be positively affected by work experiences. On that account, Parcel and Menaghan (1990, 1994) argue that occupational conditions matter.⁷ On the one hand, parents' experience in paid work activities can bring to children forms of social control. Because market work imposes social discipline, having a job influences parental socialization efforts with children and the kinds of behaviour encouraged in children. On the other hand, long and low paid working hours may be accompanied by feelings of parental stress that may interfere with effective and positive parenting.

Evidently, families will differ in terms of their basic parental abilities and skills, in their

endowments of financial and human capital, and in their values. Parents of different socioeconomic conditions will raise their children in different ways, largely due to differences in parental characteristics and life experiences. Parents with more meagre economic resources may still efficiently use them in the child-rearing process. For instance, less educated and/or less financially well-off parents may not possess a great deal observable endowments. However, they can spend much quality time interacting with their children, so the children may have access to whatever human capital the parents do possess, including personal resources.

Although researchers differ in their estimates of the contribution of parental characteristics to differences in children's outcomes (see, for example, Heckman, 1995), there is general agreement that controlling for these differences is essential. The fundamental problem for empirical analysis is that some of these important parental characteristics are unmeasured or unobservable (see below).

Third, do better outcomes for children appear to be more strongly related to income from earnings than to income from government transfers?

This third question is incidental to this research and reaches far beyond it (not the least by the data that would be required to answer it). However, a "naive" and simple income model, in which children's well-being was seen as depending only on the level of their families' economic resources as well as the amount of time parents "invest" in them, would imply that one might expect to observe better outcomes with a transfer system in place than without it. Since income transfers, such as welfare assistance and child tax benefits, increase the income of poor families and make it possible for mothers to spend time with their children rather than in labour market, they should have a positive contribution. Allusion has already been made to the reverse causation that may exist between the observation that some families have low income that places them below the poverty level and so may have to depend on welfare. On this issue the following questions have been raised: do «culture of poverty» or underclass affiliation have effects independent of income? Will raising a child in a single-parent family and his exposure to a spell of poverty and welfare dependence cause delayed development? Alternate questions are: does low-wage maternal employment have detrimental outcomes effects for children living in poverty? Does combining welfare and work generate better children's outcomes? All these questions are difficult to answer because they are linked to the second research question.

2.2 Conceptual and methodological issues

In economics, the conceptual framework of the analysis to address these questions and to sort out these effects is dominated by the "investment theory" developed by Becker (1981; Becker and Tomes, 1976, 1979). In this theory, children's outcomes as adult are strongly related to the inter-generational transmission of endowments (genetic, human, cultural and financial) that parents transmit to their children, combined with what parents invest in their children. In particular, the decision to participate in the labour market and the choice of hours of work for each member in a family are the result of the maximization of a family utility (or well-being) function, given the budget and time constraints of the family. Time plays a unique role in this process, both as an input in the production of family services, but also as an argument in the family utility function. One of the family services produced are "child services" from which parents derive utility (such as the joy of having them, of raising them and of seeing them becoming "successful" adults). These "services" depend on both the quantity and the "quality" of children in the family. The quality of children is produced in part by the time parents are willing to allocate for the production of family services. Within this framework, the quantity and quality of children, labour participation and hours of work are jointly chosen variables. The data requirements to implement empirically such a "structural" model in its full generality are formidable. Rather than identifying all the mechanisms and measuring all variables, the studies employ some simplifying assumptions and most estimate a "reduced-form" model. In this latter approach, a "counterfactual" is used to describe the alternative (such as alternative children's outcomes) to actual events used as a basis of comparison.

2.2.1 Problems with the identification of the effects of work on child outcomes

The main goal of this paper is to identify whether children with mothers who work, all other things equal, do worse than children with a mother that stays home. Of course, if working was the result of a random draw, we could simply compare the mean scores of children with working mothers with the mean scores of children with non-working mothers and measure whether the differences between the means are statistically different from each other. Clearly, this is not the case.

Mothers who work generally hold more human capital than mothers without work. For example, they possess more years of education. Therefore, simply comparing means could confound the effects of education with the effects of work. A positive difference between means of working mothers with means of non-working mothers would be attributed to working, when it would be due to differences in education. But this is not a major problem, because regression analysis can control for years of education which is available in the data set. However, there remain other human capital variables that are not observable to the statistician. For example, mothers can have the same years of education but one can be an A student and the other a C student. We do not have any information on the quality of the education received and the work put into schooling by the mother. If we suppose that these non-observed human capital variables are positively correlated with the probability of working and with positive outcomes for children again we could be attributing positive effects to work while they are the positive effects of unobservable human capital variables. Finally, women who do not work may precisely not work because they love child-rearing while mothers who do work have no particular preferences for child-rearing. In this case, negative effects of work could be due to differences in preferences towards child-rearing. It is very difficult to find a proxy for child-rearing preferences in the data.

Ideally to identify the effects of work, one would need to find a variable (an instrument) that affects the probability of working but does not affect the children's outcomes. We initially thought that local area unemployment rates could be that variable. Unfortunately, this variable is very correlated with another variable used in the regression analysis which is the percentage of low-income families in the child's neighbourhood. This makes unfeasible the use of instrumental variable methods or selection bias correction methods for the identification of the effects of work on outcomes. However, the analysis has clearly identified what could be important sources of bias in the work effects on outcome and make important statements about the effects of work on outcomes. Section 4 will present the optimal estimation methodology while reiterating the caveats found in this section. In future work with panel data, more of these unobservable human capital effects will be taken into account since it will be possible to control for fixed family effects.

The same type of identification problems are also true of income effects, however regressions will be presented for two measures of income, one will be total family income, while the

other will be sources of income that are not from the mother, providing the analysis with an income variable that can vary independently from the mother's labour supply variable.

2.2.2 Timing effects

One important issue is the timing of the effects of maternal employment on child outcomes. Some psychologists emphasize the first years of life as a determinant for subsequent child outcomes (Belsky and Eggebeen 1991). But current circumstances in children's lives are also likely to influence measurable child outcomes such as cognitive ability and social adjustment. It is not obvious which set of influences is stronger and how to control for the persistence of earlier circumstances. It is not clear also that the first year of a child's life is more important than the second or third year.⁸ On this issue, the data set released from Cycle 1 of the NLSCY has one limitation, as it does not provide a complete history of work patterns (labour participation, vacation, sick leave, unpaid and paid maternity leaves) of women since the birth of the children (for the first and subsequent years of life for those children older than one year). So, the timing of the mother's return to work relative to the birth of her child cannot be taken into account, for those working women. Also, there is no information on the child's exposure to income insecurity (such as family welfare dependance and poverty spells) since all labour force and income information relate to the year preceding the interview.

3. Relevant literature and hypotheses

3.1 Review of empirical findings

Most of the American research studies published to date on cognitive outcomes or on social and behavioural development of children in their early and late childhood years (after entrance into school) have used the National Longitudinal Survey of Youth-Child Supplement (NLSY-CS), begun in 1986 and repeated every other year.⁹ The NLSY-CS has been used extensively by psychologists, sociologists, and other behavioural scientists to examine the effects of maternal employment on cognitive skills and on social development of the child. Most of this work (Datcher-Loury, 1988; Baydar and Brooks-Gunn, 1991; Desai

et al., 1989; Greenstein's, 1993, 1995; Parcel and Menaghan, 1990, 1994, 1997; Moore and Driscoll, 1997; Brook-Gunn et al., 1998) has attempted to analyse effects of part-time versus full-time work, influences of the timing of work after the birth of a child as well as whether or not families were poor. It is important to bear in mind that these studies look almost exclusively at families in which mothers voluntarily sought and gained employment, and in some cases used very small sample of children. The studies also differ in the way family income, home time investment and hours worked over the child's lifetime are measured, in the age of the children studied, and in the modelling of the different relationship involved. It can be argued that there are selection problems that cloud the interpretation of these data. In other words, the identification problem of section 3 is not solved. Findings among studies conflict, although they suggest that maternal employment itself is not harmful for young child developmental outcomes.

Two studies can be singled out because first they adopt an economic approach with control variables for family background, parental income and mother's time allocation and they also address the selectivity issue of the mother's participation to the labour market. Second, their work can be replicated with the advantages of using a larger and nationally representative of the population of children. Blau and Grossberg (1992), using a sample of 874 children, from the NLSY-CS, aged 36 to 59 months with employed and non-employed mothers, found that maternal employment during the child's first year of life has negative effects on cognitive skills, but employment in second and later years has positive effects, so that the net effect over the first three to four years is close to zero. They suggest that the indirect effect of the increase in family income when mothers work plays an important part in producing the positive total effect in the second and later years. In the same manner, the impact of time spent in female-headed families is not significant when family income is included in the model of analysis. Hill and O'Neill (1994) also analyse cognitive achievement among young children using a sample of 1,861 children from the NLSY-CS (1986 and 1988), and addressing selectivity issues with respect to the mother's fertility status, paid work status and welfare status. They find a significant negative association between a mother's hours at work and her child's cognitive skills after controlling for family income and the mother's human capital (years of schooling in particular), suggesting mother's work may outweigh the positive effects of higher money income. Finally, their results show that a mother's long-term welfare dependency is detrimental to the acquisition of cognitive skills among young children, and this effect is reinforced if the family lives in an underclass neighbourhood.

In another strand of the research literature the objective is not to measure implications of maternal employment but to investigate the main determinants of young children's outcomes and in particular the independent effect family income might have. Using a large array of cognitive and school assessments for young children from the NLSY-CS, the studies of Korenman and Winship¹⁰ (1995), and Currie and Thomas

(1995), present results showing that, after controlling for a variety of family and children observable characteristics, maternal skills (measured by AFQT), education and family income have the most powerful effects on children's outcomes.¹¹ The relative impact of these factors varies across outcomes and age of children assessed.

In the same vein, some recent studies assess the effect of parents' «poverty ratio» on children's outcomes. These reduced-form analyses try to estimate what would happen if families were simply given additional money so their income to needs ratio increased from less than the poverty line to one or more times the poverty lines. These estimates control for some of the main parental characteristics that affect both parental income and children's outcomes, independently of their effect on parental income. Although the controls for family background characteristics such as mother's education, family structure and parent's cognitive skills are not similar and the ways or time horizon used to measure family income and outcomes differ, the results of Korenman et al. (1995), Smith et al. (1997), Chase-Lansdale et al. (1997)¹² and Duncan et al. (1994)¹³ show that income matters, but is clearly small. Pronounced poverty (ratio less than 1) and experience of persistent poverty are detrimental to cognitive development for young children and cognitive achievement at school for older children. Moreover poverty is associated with more behavioural problems.

In a replication study with NLSY-CS data, Mayer (1997) concludes that income per se does not appreciably affect child outcomes, typically the effect of doubling family income from \$15,000 to \$30,000 raises child's test scores much less than half a standard deviation. Although it takes less money to obtain significant increases for very poor families. Mayer also argues that the «true» effect of income is overstated when unobserved parental characteristics are not controlled. She presents a series of tests that provide some support for the hypothesis that family income may not matter much for child outcomes, once family income covers the basic necessities of life. And, Blau (1997)¹⁴, with a more parsimonious reduced-form model, formulates the same conclusion. In summary, the main findings from these studies are that the effect of «permanent» income is much larger than the effect of current income; income effects are small compared to the effects of some important characteristics of the mother, the child and the family.

Whereas income from work appears to improve children's outcomes, welfare participation appears to reduce young children's test scores on a standardized test of vocabulary (Hill and O'Neil, 1994; Brook-Gunn et al., 1998). However, since welfare above all serves single-parent families, it will affect mainly children living in such families which poses the difficulty of controlling the differences between types of families. Moreover, the estimates might not correctly disentangle welfare participation and income effects since both are strongly correlated and could depend on the same unmeasured factors that affect children's outcomes.

Previous research on these issues by economists in a Canadian context is to our knowledge non-existent or scarce. Dooley and Lipman (1996), using longitudinal health data for children from Ontario, examined the association between family status, as well as maternal work and income, and child psychosocial morbidity. They found that young children of poor lone mothers were at particular risk of psychiatric disorder and poor school performance. Lipman, Offord and Dooley (1996), examining preliminary data from the NLSCY, found that four to 11-year-old children from lone-mother families have one or more behavioural problems. But they note that the majority of children from lone mother families do not have these problems and most children with these problems come from two-parent families.

3.2 Hypotheses

The postulate underlying the hypotheses which are tested is that the mother's time matters to the child's development. First, controlling for several relevant factors, we anticipate a small negative effect on children's outcomes of a mother's increased commitment to the labour market. The main alternative hypothesis is that others factors, positively correlated with work, may cut across this negative effect and produce, on balance, a positive or no effect of mother's work. Because some of these factors are present in the regressions, and others not (unobserved characteristics and self-selected behaviours) the direction of the bias of the estimated work effects is assessed. Second, it is expected that, controlling for several family background factors, the independent effect of family income on children's outcomes will be small. However, welfare receipt (indicating children living in a relatively very low-income family) would have negative effects on their outcomes.

4. Estimation Strategy

The estimation of the effect of maternal employment uses the same approach as most previous research. In particular, the basic reduced-form model is formulated as in the studies of Blau and Grossberg (1992), and Hill and O'Neill (1994). A child's cognitive development is measured by an assessment-score on the Peabody Picture Vocabulary Test (PPVT). Their regression equation is written as:

$$O (\text{outcome}) = \beta_0 + \beta_1 * \text{quantity of maternal time} + \beta_2 * \text{quality of parental time} + \beta_3 * \text{market goods} + \beta_4 * X + \epsilon, \quad (1)$$

where O is measured by each child's PPVT score; quantity of maternal time is measured by proportion of

weeks or hours worked in the child's life; the quality of parental time is measured by proxy variables of parental human capital (education, AFQT); and X is a vector of observed characteristics of the family and the child.

In replicating these studies more than one outcome (e.g. PPTV) is examined and the father's working time is included in the analysis as well as the decision of the mother to participate in paid work.¹⁵ Single mothers are also considered independently, that is separate regressions are run for single mothers and couples. In both cases, a distinction is made between children in families with working mothers and children in families where the mother stays home. However, the estimated parameters of the outcomes equations take into explicit consideration the decision to work. Formally, the ideal system of equations to estimate consists of three equations:

$$O = \theta_1'X + \epsilon_1 \text{ if } y^* > 0, \tag{2a}$$

$$O = \theta_2'X + \epsilon_2 \text{ if } y^* \leq 0, \tag{2b}$$

$$y^* = \alpha'Z + \epsilon_3. \tag{2c}$$

Where X is a vector of regressors based on the specification used in the cited papers, O represents outcomes, and y^* is a latent or unobserved variable which can be interpreted as the utility difference for the household between the mother working and not working. If this difference is positive then the relationship between X and O is represented by the first equation of the system (2a), if the opposite is true the relationship is expressed by (2b). Why would the parameters change with the mother's status in the labour market? For example, why would an extra dollar of income have the same effect on the O score whether the mother worked or not? This extra dollar could have, *ceteris paribus*, a stronger impact within families where mothers do not participate. Mothers at home may have more time and energy to create an environment where the extra dollar will produce better results. In economic words, the production of household services could be more efficient. Suppose the extra dollar is used to buy a book, a mother not working could find a more appropriate time and more relaxing circumstances to read this book to the child, on the other hand working mothers will be reading this book after a working day and can probably not expend the same amount of energy and concentration as a working mother. This explains why the coefficients in (2a) and (2b) might differ.

It does not explain why a simple least square regression (OLS) of (2a) and (2b) is not sufficient for the production of proper statistical results. Repeating the argument of section 3, if, for example, mothers with unobserved characteristics that have a positive effect on labour market participation and these characteristics increase their child O scores, then an OLS estimation of (2a) will lead to biased estimates. Hence, if we

computed the difference between predicted O scores from the estimated OLS versions of (2a) and (2b) we could possibly find an upward biased result. To obtain an unbiased result, maximum likelihood estimation or Heckman two-step estimation of the parameters in (2a), (2b), and (2c) is optimal. This self-selection process does not apply to fathers since more than 90 percent of them work in two-parent families. The three equations can also be re-estimated for the population of single mothers using the same strategy. The endogeneity of the single mother status is ignored however. Again, that there are strong reasons that the parameters of the O and labour participation equations should be different for single mothers. For the production of reliable results as was mentioned in section 3, we need a variable that appears in the Z vector that does not appear in the X vector, this variable should also be uncorrelated with the X vector. We could not find such a variable in the data set. For example, using the local unemployment rate in the Z vector and not in the X vector, conducted to very imprecise estimates of the work effect as in Blau and Grossberg (1992). Therefore we proceeded with OLS regression methods and a very thorough discussion of the possible biases as in the American studies.

5. Data, Sample and Measurement of Variables

5.1 Data and Sample

The data collected in 1994-95 for cycle 1 of the NLSCY were used.¹⁶ The analysis focuses on all children between 4 and 11 for which the values of the dependent or independent variables were observed.¹⁷ Children in single father families and children for whom the person most knowledgeable (PMK) is neither the mother nor the father were excluded.¹⁸

5.2 Measurement of variables

Dependent variables

The dependent variables are children's scores on developmental-assessment instruments. For cognitive skills one measure was used. The dependent variable is the child's standardized score on the Peabody Picture Vocabulary Test-Revisited (PPVT-R), for children aged 4 and 5. This indicator is widely used and cited as one of the best measures of verbal intelligence and scholastic aptitude among children. It is also considered a good predictor of elementary and middle school outcomes. The scores range from 50 to 160 (with a sample mean of 100 and a standard deviation of 15). A higher score indicates better vocabulary skills.

The measures of social and emotional development for children aged four to eleven years are based

on the frequency of items related to behaviour of the children as reported by the child's PMK. A factor score is derived using the items that characterize the behaviour. The following scores were used (a higher score indicating a higher level of the measured behaviour) : hyperactivity-inattention (0-16); emotional disorder-anxiety (0-16); conduct disorder-physical aggression (0-12); indirect aggression (0-10), and pro-social behaviour (0-20).

Independent variables

The set of independent variables used in the estimation reflect different aspects of maternal employment and family background.

Child characteristics. The literature suggests that the child's gender, ethnicity and health condition are factors that are likely to affect their cognitive development and patterns of social adjustment. It also shows that family size and birth order directly affects children's achievement (Hanushek 1992). These effects are controlled by the use of these variables: (1) the number of siblings, and child birth order; or, alternatively (1) the number of younger siblings, and (2) the number of older siblings. The inclusion of the child's age (except for PPVT which is age-standardised) assures comparability across ages. The particular circumstances in which an outcome is measured can influence the assessment. In the case of the PPVT score, on the presumption that a child might have a "bad" draw, variables were included for the presence of physical and health problems at the time the child took the test, and the level of distractions during the test.

*Parental characteristics.*¹⁹ Mothers, regardless of their maternal employment status, provide more direct care to young children than fathers. It can be expected that the mother's age at the child's birth and the mother's years of formal education will have a positive influence on the child's cognitive skills and social adjustment. Because better educated mothers could be superior at anticipating, preventing, or helping to solve problems that arise in the lives of children. Given the high level of labour force participation by men, paternal characteristics and extent of employment would seem secondary.²⁰ However, the father's years of education is controlled since with educational attainment is associated both human, social, and cultural capital.

Parental work. The extent of the mother's employment may also affect child outcomes. Results of contemporaneous maternal work hours, of the continuity and extent of mother's employment on child verbal facility and social adjustment are not very significant or evident in the cited studies. Negative effects are mostly associated with very long paid hours or with early employment after the child's birth. In general there is no statistically significant difference between children of mothers who work full time and those of mothers who work part time. Since full work history is not observed, three alternatives variables are created to

measure the extent of employment and to take into account the possibility that mothers might choose work arrangements because of the development level of the child.²¹ The first one, WORK, is a dummy variable that takes the value of one if the mother works more than 26 weeks in a year and zero otherwise. Mothers with more than 26 weeks are defined as mothers strongly attached to the labour market (SAM) and the others as having a low attachment to the labour market (LAM). This categorization follows from the observation that for LAM, practically 80 percent report no weeks worked, while more than 80 percent of SAM report 52 weeks worked in the year before the survey. The second one is WEEKS, which measures the number of weeks worked in the year, without any distinction between weeks worked part-time or full-time. The third measure is defined by two variables which are the number of weeks worked part-time (WEEKPT) and the number of weeks worked full-time (WEEKFT) in the year. For the spouse/partner the number of hours or weeks worked during the reference year was retained as the other labour supply variables in the study.

Family characteristics. Several studies suggest that race or ethnic background could influence maternal values and mother-child interaction. Thus, status relative to immigration, could be related to cognitive skills and social adjustment among children. The presence of two biological parents in the home could provide greater opportunity for parent-child interactions and a greater base of parental resources from which the child may draw. Thus, it is expected that other family structures may affect children's lives and outcomes. However, in the cited literature, when the mother's characteristics and family resources are taken into account, the effects of family structure are generally not statistically significant.

Parental characteristics such as education may largely set the tone, at least early in a child's life, for the types of activities in which children participate at home. Moreover, higher income provides resources for engaging in enriching activities outside and inside the home. However, the amount of time parents spend with children is difficult to calculate without time diaries of parent/child relations. Rather, participation in activities and the types of activities in which parents and children participate, not the amount of time, provide more reliable measures of parental time spent with children (Leibowitz, 1974). Levels of cognitive stimulation present in the home can be measured indirectly in the NLSCY by the frequency with which parents interact with their children (play sports, hobbies or games) or read to their children.²² Leibowitz (1977) found, that more highly educated mothers were more likely to participate in activities with their children that encourage the development of verbal skills, such as reading to their children, instead of activities such as watching television, which does not imply interactions. The frequency of reading to the child (aged 4 or 5) was used as a control variable since it may reflect more parental commitment to development and more home time.

Variation in total parental income measures the level of material resources that the family can use

to provide market goods and services enhancing the quality of the child's environment. Total income of the family is used in some models, considering it is a better measure of the potential investments in children that can be made by the family. Other models use an alternative measure of income which can be considered as more exogenous with respect to the mother's employment status and less strongly related to observed maternal characteristics. This variable, income from sources other than the mother (other family income), is defined as total family income less the mother's total personal income.²³ On the other hand, when a family is dependent on welfare for living or drawing a part of its annual income from social assistance it signals financial stress and in general, a poor environment for the child. Such situations might have negative effects on a child's outcomes. To represent this influence, a variable indicating receipt of welfare assistance in the year preceding the survey is used as a regressor.

Other control variables. In addition to these independent variables a series of control variables were included to model possible system effects associated with the province of residence of the children and the size of the urban area where they reside. In addition, the incidence of low income families in the child's neighbourhood is included. The literature indicates that community poverty may affect children's physical health, cognitive and verbal abilities, educational attainment, and social adjustment (Brook-Gunn et al. 1997). Controls were also included for the age in months the child took the PPVT test, the quality of the room where the test took place; whether the child was in a step or adopted family (for the full sample and the two-parent family sample) or whether the child lived in a single mother home (in the full sample); and whether the child was in school when he took the PPVT test. Since all these latter variables were always far from being significant and they did not affect the results they were simply omitted from the preferred specifications for the PPVT score regressions. The final specification is very close to the one in Hill and O'Neill (1994), who, however, control for many more background variables, particularly the mother's abilities and the grandparents' education. They also use the information on the full labour market experience and welfare participation history of the mother since the child's birth. Despite this, results are quite similar to theirs. The family structure variables were reintroduced in the regressions with the behavioural indicators as they have a strong and statistically significant effect.

6. Empirical findings

6.1 Descriptive statistic for cognitive development

Table A1 (in the statistical appendix), displays the sample means and standard deviations for

the variables used in the regression analysis for PPVT scores. Because of a better fit in the regressions, the log of PPVT scores was used as the dependent variable.

Full sample. Most children included in the sample are from large cities. Half are boys and half are girls. They have 1.32 brothers and sisters and have an average birth order of 1.49. The mean age for mothers is 28.6, family income is 51,000 dollars and 57 percent of mothers work more than 26 weeks per year. More than 60 percent of the children are read to by their parents at least once a day. Mothers have on average 12 and a half years of education and were for the most part born in Canada. Very few children were in poor health and heavily distracted during the test. Finally, about 15 percent of the children were in families receiving at least one payment of welfare assistance in the past year and most children came from neighbourhoods with low levels of poverty. Since the means for the full sample are very similar to the sample of two parent children, the next paragraph compares the means of two-parent children (TPC) with single mother children (SMC).

Comparing two-parent children (TPC) with single-mother children (SMC). The single mothers of the children in the sample gave birth much earlier than mothers in two-parent families. SMC have 0.89 brothers and sisters as compared to 1.40 for TPC. TPC have mothers with one more year of education who work considerably more weeks per year. The most important differences between these children are the income their family takes in, as two-parent families generate three times more income per year than single mothers, and the proportion of SMC in families receiving welfare is twice the proportion for TPC. PPVT scores of TPC are 5 percent higher than SMC.

Comparing children with mothers who have a strong attachment to the labour market (SAM) with children who have mothers with a low attachment to the labour market (LAM). In the case of two-parent children (TPC), SAM are exactly one year older than LAM, which is consistent with a Beckerian model of dynamic fertility decisions where it is optimal to delay fertility in order to capitalize on investments in human capital. In the same vein, they have less children and are more educated. However, SAM read as frequently to their children as LAM, which is surprising because they use up more time in the labour market. Average family income is of course much less in LAM families, concomitantly, they receive proportionally more welfare payments. Finally, slightly more LAM are immigrants and PPVT scores for children with SAM are slightly higher than for children with LAM (about 4 percent higher). In the case of single mother children (SMC), SAM are almost, on average, two years older than LAM, they also have less children, are better educated, and have ten thousand dollars more in income while receiving welfare payments in a much smaller proportion than LAM. Almost all children with SAM who are immigrants have settled in Canada

more than five years ago, they also read slightly more frequently than LAM. So differences between LAM and SAM for SMC are similar to differences for TPC. However, PPVT scores are lowest for SMC with LAM (6 percent lower than in the case of the full sample).

6.2 Regression results PPVT

6.2.1 Full sample

Table 1 singles out from the regression results the coefficients associated with the work and income variables. For the full sample, twelve regressions were performed. A set of four regressions were done with each of the three labour supply indicators: WORK, WEEKS, and WEEKFT and WEEKPT. There are two regressions for each measure of income (total family income, other income), one regression that includes a dummy for welfare receipt and one that does not. Columns 2 and 4 are the results for the regressions with income from other sources and Columns 1 and 3 present the results for regressions with the full income of the family.

First, for the results obtained with the work dummy as the labour supply indicator, the effects are strongest (as for the other labour supply indicators) for the specification with no welfare variable and the income from other sources variable. For this latter measure of income, the work variable will capture some of the income effects that come with mother's work since the income from their work is not included in the other income variable, however the effect of the work dummy is to increase approximately the PPVT score by only 1.5 percent. This would be an upper bound on the total effects of mother's employment. The three other specifications have lower values for the work dummy parameter and none are significant at the 95 percent level of confidence. Both the inclusion of the welfare variable and the use of total family income reduce the effect of the work dummy. The welfare effect is relatively strong and significant at the 99 percent level of confidence reducing scores by approximately 3.5 percent. However, we cannot be sure that this identifies a "pure" effect of welfare participation, it may rather capture a non-linearity in the income effects, which may be strongest for the very poor. This assumption is explored more thoroughly in Lefebvre and Merrigan (1998b). Income effects, despite being significant, are extremely weak. An increase of income in the order of 20,000 dollars will barely increase scores by one percent.

The results for the two other indicators of labour supply variables (WEEKS; WEEKFT and WEEKPT) basically replicate the results with the work dummy. The results are very similar to those of Hill and O'Neill. Since they control for more factors, such as grandparents education and the mother's skills, and they demonstrate that the introduction of these factors decreases considerably the effect of working hours

on PPVT scores, it is feasible that the presence of these factors in our specification could make the effect of the work variable negative and significant. Table 2 presents results of other specifications that provide evidence for this hypothesis. Starting from a purely demographic model and the work dummy variable, it is enriched with other variables to see whether the work dummy effect would be sensitive to specification choices. Again, results match those of Hill and O'Neill. In the demographic model, work has a relatively strong positive effect on scores. However, as more human capital and income variables are added, the work dummy variable becomes weaker and finally non-significant. Therefore, it is feasible that the introduction of these variables could render the work effects negative.

Full results are found in table 3 (columns 2, 3 and 4) for the specification with the WORK variable, the total family income variable, and the welfare dummy.²⁴ The mothers age at the birth of the child, region of residence, city size and immigration status all play a significant role in the PPVT score. The only demographic variable playing no role is the child's sex. Except for the case of immigration, the effects are relatively small. However, all other things being equal, a child from PEI with a recent immigrant mother who is 20 years old will, on average, have a PPVT score almost 15 percent lower than a child living in Manitoba with a 30 year old mother who is not an immigrant. Having younger siblings is very detrimental to scores while having older siblings has a relatively small and positive effect. So there can be relatively large differences in scores between children from families of different types.

Human capital variables have strong effects as well since the coefficient on the number of years of education is 0.011 (or 1.1 percent per year of education), almost three times larger than the coefficient on the age of the mother at birth of the child. Children with parents who read little or almost never to their child are expected, all other things kept equal, to score 5.8 percent lower than children with parents reading several times per day, and 3.9 percent lower than children read to once a day. This type of intervention seems to be very noteworthy as a tool to increase PPVT scores. Also, living in a neighbourhood with a high incidence of low income families will produce statistically significant lower PPVT scores. However, the effect is quite small as the incidence is measured in percentage points. It is difficult to ascertain what this effect is capturing, perhaps unobserved heterogeneity correlated with the incidence of low income families or the decreased chances of interacting with children from higher income families.

6.2.2 Splitting the sample in two-parent children (TPC) and single-mother children (SMC)

Columns four, five and six of Table 1 present results for two-parent and single-mother children. For the sample of TPC, the results presented are only with the welfare receipt dummy variable but still for two

measures of income and for the three work indicators. For the SMC only one specification, with the welfare participation dummy and family income, is presented. In this case, it makes less sense to include income from other sources as a regressor since in more than 90 percent of these families the mother is the sole provider. However, results are presented for the three different labour supply specifications.

In the case of two-parent children (TPC), the sample permits the introduction of controls for the spouse or partner's level of education (not necessarily the father's as step families are included) and his weeks worked in the preceding year. Again the mother's work effects are strongest with the income from other sources as the income variable. However, for none of the cases are the labour supply variables significant at the 95 percent level. The introduction of the two spouses related variables reduces considerably the effect of both types of income. The spouse's weeks worked variable has a positive and weak effect. The welfare effect is very similar to the full sample case. The other sociodemographic effects (see table 3, column 3) are similar to the full sample case. The spouse's years of education have a positive and significant effect. The incidence of low income neighbourhood families is no longer significant possibly reflecting the increasing control of the child's activities when two parents are present in the family or could simply reflect the reduction in the variance of the variable in this sample.

For single-mother children (SMC), the regression provides different results. The mother's work effects are non significant. The welfare effect is not significant while it is for TPC, given that welfare is very strongly correlated with income in this sample, including both may probably wash out both effects. In the case of demographic variables (see table 3, column 4), the urban and provincial dummies are jointly significant, the immigration dummies have also a significant effect, but the age effect is not significant. Years of education have a positive effect. Being in a low income neighbourhood, in contrast with TPC, has a negative and significant effect on scores.

6.2.3 Comparing children with SAM and children with LAM

The results presented in table 3 are for regressions performed with a sample of children with mothers working more than 26 weeks (SAM) in the preceding year, and a sample of children with mothers working less than 26 weeks in a year or not working at all (LAM). First, for two-parent children (TPC), the age of the mother, reading, immigration status, have significantly stronger effects for LAM (see table 3, columns 6 and 9). The opposite is true for mother's and spouse's education and hours of work. The large difference in the frequency of reading effects could reflect differences in time used for reading and the quality of reading time. LAM can more easily find periods of the day that are more optimal for the child's

concentration. The same can be said of the age at birth variable, it is easier for LAM in the labour market to use the human capital built up by experience. This reasoning however should apply to the education variable. However, the results in this case are counterintuitive and could reflect a sample selection if unobserved parental skills are positively correlated with work, increasing the probability a child has a SAM with higher education. On the other hand, the reading effects could reflect a negative correlation between preferences for investment in child-rearing and work.

Second, for single-mother children (SMC), the most obvious difference between both groups are the effects of the human capital variables (see table 3, columns 7 and 10). The education and frequency of reading effect are positive and significant only for children with LAM. In fact, for these children, the difference between mothers reading at least once a day and those reading less than once a day is very large at about 7 percent, one of the strongest effects found in the regressions. These results are consistent with two assumptions. First, there is less time for SAM to read to their children even if they do it frequently, the time could be of poor quality, given that these mothers work and have to compromise with domestic production, child-rearing and the demands of work. The other possible reason for these results is that unobserved preferences for investing in children are negatively correlated with preferences for work. This is crucial in terms of policy, because if self-selection is the reason to these findings, shifting policy towards generating incentives for SAM to stay home will not produce a positive increase in their children's scores.²⁵ The recent immigrant effect is very negative for children with LAM, however there are very few recent immigrants in this sample. The welfare effect is very large and negative for SAM. Finally, the income effect is not significant for both groups.

6.3 Results for social adjustment indicators

6.3.1 Samples means

Table 4 presents the means of children's scores on instruments measuring problematic behaviours and pro-social behaviour for the full sample, a sample of TPC, a sample of SMC. The same samples are split up into samples of children with SAM and children with LAM. For the sample of 4 to 11 year old, the worst mean scores, by far except for pro-social behaviour, for all cases are obtained for children with single LAM. The best scores are obtained by TPC with LAM for HI, ED, IA, and for TPC in families with SAM, for CD and PB. However, scores for children in both types of families are very similar when children are in two-parent families, and children in single-mother families do much worse, on average, than children with two

parents.

For the four and five year old, we notice that the younger children are more hyperactive, score higher for conduct disorders and exhibit less pro-social behaviour, however they score lower on emotional disorders and indirect aggression. More importantly, in three out of the five indicators, children with single SAM are on average worst off. Only for the case of ED, do children with single LAM have a higher score. For children with two parents, we observe that for two indicators, children with LAM have higher scores, HI and PS, the opposite is true for CD and IA while the mean is practically the same for ED. Therefore, it seems that younger children could possibly be affected by the absence of mothers in the home when they are young and when they are in single-mother families.

6.3.2 Regression results

Table A2, in the statistical appendix, displays the samples mean and standard deviation for the variables used in the regression analysis for behavioural scores. Since the results for SAM and LAM are similar, only the results for three samples (full, TPC and SMC) are presented in table 5. For the sample of 4 and 5 year old the results are not as significant as for the full sample of 4- to 11-year-old children but are nevertheless presented for the full sample. The specifications are with the total family income variable. The specifications with the other income measure produce exactly the same effects as in the PPVT regressions, decreasing slightly the negative impacts of work on the outcomes.

First, for the full sample, it can be noted immediately that for HI, ED and CD children with SAM, all other things equal, have worst scores than children with LAM, and this difference is statistically significant. However, this difference is relatively small in comparison with other effects. For example, the family characteristics have a much stronger effect than work in the cases where the work dummy effect is statistically significant. For the case of HI, where the mean score is 4.56, the work dummy parameter is 0.121 while the welfare coefficient is 0.583, the step-family coefficient is 0.925 and the female headed family coefficient is 0.644. These characteristics have a strong and significant effect on all indicators, except for the pro-social indicator where only being in a female-headed family has a significant effect. The income effects, even when significant, are particularly weak. The strongest effect, in general, is the gender effect, in particular for HI, CD and PB, where these effects evaluated at their respective means are, 30, 41 and 12 percent. Indirect aggression is however used more frequently by girls and the estimated effect of being a girl is to increase by 12 percent the value this indicator. The other child characteristics in the regression are statistically significant for all indicators. The elasticities for age are respectively for, HI, ED, CD, IA, and PB, .22, .32, .41, .57, and .14. The effect of the number of siblings is also, for all cases, statistically

significant. The elasticities are, respectively, .06, .16, .11, .04, and .03. Finally, birth order is also always statistically significant with elasticities of .05, .25, .10, .06, and .03. Therefore, the age of the child is second to sex in terms of the amplitude of the effects of child characteristics. Aging has beneficial effects on HI, CD and PB, the number of siblings has beneficial effects on HI, ED and birth order is beneficial for HI, IA and PB.

For the mother's characteristics, the age of the mother is significant for 4 out of 5 indicators, while years of education change significantly 3 out of the 5 indicators. For the age of the mother, the elasticities are for HI, CD, IA and PB, .21, .38, .41, and .04. For years of education, elasticities are for HI, IA, PB are .31, .29 and .11. An intriguing result is that children of immigrant mothers do quite well, particularly with recent immigrant mothers for HI, ED and CD. The differences between recent immigrant and Canadian born mothers is very large. For example, in the case of CD it is almost 50 percent. Finally, the low income neighbourhood variable is significant for IA and PS. It increases IA and PB.

The results are very similar for the sample of TPC. The spouse's education, an added explanatory variable, is significant for three indicators, and in all cases increases the child's outcomes. For the case of ED, the spouse's education has a significant impact even though the mother's does not. For the two other cases it is significant, the effect is however considerably smaller than the mother's. Controlling for the spouse's labour supply changed the results very little, since it was not significant the final specifications did not use the variable.

Surprisingly, for the sample of SMC, child characteristics, age of mother, years of education, immigration status of the mother coefficients are quite similar to the coefficients found with the sample of TPC. The major differences are that the work dummy and income effects are never significant for SMC. The means of the dependent variables for SMC left the impression that work was a determinant factor for these children.

7. Discussion

The upper bound on the positive effect of work on scores is very small for the PPVT scores while it is zero for the behavioural indicators. These upper bounds are found by excluding the mother's income from the income variable used in the regressions. Therefore, the hypotheses that by properly controlling for all unobservable other human capital enhancing effects correlated with work, work could have a negative effect on cognitive scores, as in Hill and O'Neill (1994), and on behaviours scores. However, it would be surprising that these potential negative effects be very strong. One possible explanation is that the mothers

of the children in the NLSCY sample, compared to those in the American NLSY-CS, are relatively older and are more educated, whether they work or not.

Income effects are very small as in the work of Mayer (1997) and Blau (1997). However, the very strong negative effects of welfare could be indicating non-linear effects of income as in Mayer (1997). Hence, increasing income would have much stronger effects for the very poor (children with mothers on welfare) than for the working poor families for example. However, Mayer (1997, chapter 9) suggest that government income support programs have been relatively successful in maintaining the material living standard of most poor children, thus reducing the consequences of material hardship. From this standpoint, it is well know that Canadian programs are more generous than their American counterparts. This makes non-economic factors, such as parental competence and parent-child interactions, play a bigger role as determinants of child outcomes.

The parents' human capital variables all have positive effects, whether they operate through education, income, or child-parent interactions such as frequency of reading (particularly non-working mothers). Therefore, making sure young women get good schooling could be a key pre-emptive measure against cognitive delay and behavioural problems for children.

The main caveat in the study is the possibility that parents do not consider the specific indicators chose for the study, which are related only to children in their middle or late childhood, as important factors in the well-being of their child. Parents may attach more weight in their preferences to physical health and development, and other personal traits, considering them as more important determinants of later life outcomes. In this case, it would be not be surprising to find that the elements under their control (such as work, income, parental time, non-parental child care, book) have relatively small effects on children's outcomes.

All these results are tentative as some identification problems could not be solved. However, we believe that we have shown that the main source of bias is the absence of other human capital variables as regressors in the specifications and that the introduction of these variables and valid instrumental variable methods would not produce very much different results. More work with the future waves of the panel will be required to address these issues of child development outcomes and the possible explanations of the estimated effects.

8. Policy implications

The results described above may not have wide implications for the development of children and

for the public policy toward children and the means of family support. When budget expenditures are fixed, difficult trade-offs have to be made when determining public problems for family support. The following questions are frequently raised. Do we increase targeted benefits toward poor families? Should child care be considered, and financed as a public service? Should quality early child care be offered to poor and lone parent families? Should programs encourage labour force participation of lone mothers and what age should the child be before welfare programs consider that mothers be compelled to reconcile their occupational and maternal roles? At what age should education in nurseries begin and what resources should be supplied by the public sector? Although results cannot answer directly these questions there are some prescriptions for policy if results are correct.

1. Policies creating more incentives, for the average not-employed woman, to work will not decrease in an important manner the human capital stock of children.

2. Increasing the income of the very poor or those who are on welfare could have the strongest positive effects. As of now, the new child tax benefit does not supplement the income of the very poor but only of the working poor families. It is also doubtful that the new work income supplements created at the provincial level are important enough to induce welfare mothers or parents to re-integrate the job market. It could be that they simply do not have the minimal skills to find work. Hence, welfare children seem be the ones who are the most at risk of not being school ready and there is little in the way of federal new policy that is changing their situation.

3. If the frequency of reading effects on PPVT scores are not spurious, programs inciting mothers to read to their children often and for a substantial amount of time could be valuable for welfare mothers. For working mothers, substitute care should include reading sessions to children. Given the low caregiver-child ratio in child care facilities, it would be surprising that one to one reading sessions be available. Government programs could be more aggressive in this regard. The child development initiatives taken by Health Canada, such as the Community Action Program for Children and the Canada Prenatal Nutrition Program, which focuses on lifestyle issues, parenting practices and parenting education, are likely to make a difference for, at risk, young children.

4. Finally, strategies that create incentives to delay first birth and to have more young women get good schooling could have strong impacts on children's outcomes as this gives a chance for mothers to invest more in human capital and increase the amount of resources available for their children.

9. Conclusion and limitations

The purpose in this paper has been to analyse the determinants of child cognitive development among 4- to 5-year-old children and of several behavioural indicators among 4- to 11-year-old children. The empirical analysis by measuring the relative strength of the relationship between family background, parental work, family income, and children outcomes throws light on the implications for inter-generational transmission of human capital of some of the significant social changes that have occurred over the past two decades in children lives. In particular, two pervasive changes were noted, the increase in the labour force participation of the mothers and the raising numbers of children in one-parent families.

The findings are similar to the ones found in earlier American analyses and point to the quality and relevance of the data survey of the NLSCY. The most important finding may be a positive one. First, parental work and maternal non-employment do not have direct effects on cognitive outcomes of 4- to 5-year-old children. Second, even if maternal full-time work is associated with higher levels of negative behavioural outcomes (three out of the four scores for the full sample) of 4- to 11-year-old children, these negative effects are small relative to the effects of the others co-variables.

The most important predictors of cognitive scores (PPTV) and of behavioural scores were the personal characteristics as well as maternal characteristics and spouse's education. Controlling for income, the mother's human capital and other relevant factors, no association is found between parental work or maternal nonemployment and the cognitive achievement of young children. On average, children's PPVT scores are almost identical whether their mother is strongly or weakly attached to the labour market. The exception are children with a lone mother weakly attached to the labour market who score significantly lower. Two caveats should be kept in mind. One is that strongly and weakly attached mothers may differ in their unmeasured characteristics related to the production of child development. The other caveat is that no control is exercised for the timing and duration of paid work after the birth of 4- to 5-year-old.

It might be expected that marital disruption, single parent families and «re-composed» families could have a negative effect on children's outcomes. Once taken into account family income and other «personal» characteristics, the results do not show that children in «disrupted» or «re-composed» families do not have lower test scores on the PPVT than children from two-parent families. However, in interpreting this result it must be reminded that single mother children on average have a score that is 5% lower than two parents children. Second, a large proportion of single-parent families receive welfare payments and their income level is considerably smaller than the income of two-parent families. Although, the results do not establish that monetary poverty per se has negative effects on children outcomes, they nonetheless suggest that economic difficulties (like having received welfare and living in a neighbourhood with a higher poverty rate) are detrimental to children achievement.

Turning to the behavioural indicators, there is no negative effect associated with work for the full sample and two-parent children. However, they turn out to be relatively small compared to family composition effects, receipt of welfare effects and the sex of the child which turn out to be very strong. As for income effects, they are quite weak. However, the method used might not correctly disentangle welfare and income effects since both could depend on the same factors and are strongly correlated.

Regarding the compatibility of work and family with reference to implications for child cognition and social adjustment, policies need to be framed in ways that allow parents to make their decisions concerning the advantages of different work patterns. Under these conditions we can be optimistic on the effects of both maternal and paternal work for children development.

Since income does not significantly increase PPVT scores or improve behavioural scores, income based policies that target the working poor would be ineffective for increasing scores. But more research must be done to be sure that the income effect is correctly identified. The analysis also find that reading to the child has much stronger effects when the mother is at home for two-parent children and single-mother children. This suggests that direct intervention aimed at helping mothers reading to their children could be profitable for increasing PPVT scores.

Futures waves of the NLSCY will permit to remove two limitations of the study. The first limitation is the timing of the effects of maternal employment and of "permanent" family income levels on child outcomes. The second limitation is the issue of income endogeneity. When more children (siblings) in the same family will be assessed, it will be possible to control for unobserved characteristics, genetic or environmental influences specific to the mother and the family.

Notes

1. Data from the NLSCY indicates that, in 1994-1995, 84.2% of children in Canada aged 0 to 11 years lived in a two-parent family, 15.7% lived with a single parent (among them most - 92.8% - lived with a single mother).
2. Garnett and Myles (1996) present the following evidence for children aged 0-6 between 1973 and 1991: "the share of children in families with two or more adult earners rose from 38 to 62 percent; the proportion of children in families where the highest earner has at least some postsecondary education rose from 25 to over 40 percent; the percentage of children with more than two children declined from 40 to 29 percent; and, the age at which families are having children rose (the proportion of children with the highest earner under age 26 fell from 18 to 11 percent)" 253.
3. In this area there is the important problem of sorting out cause and effect. For example, children living in persistent poverty or in low income families are more likely to have lower developmental outcomes. However, family income is a "marker" for other observables and non-observables variables. Parents in low income families are more likely to have less education which is associated with lack of success in the job market, to show symptoms of depression, to have less self-esteem, to adopt less competent parenting practices that indirectly benefits children. Causation could run in both directions.
4. From Statistics Canada survey's on the use of time.
5. See Lefebvre and Merrigan (1998a) who also show using two surveys on the use of time in Canada that the proportion of total time spent with children in families where the youngest child is four or younger also rose in the 80's, whether mothers were employed or not. The increase is certainly related to the growing knowledge of the high payoff of investing time in children, particularly when they are very young.
6. Qualitatively, the same effect has been observed for a child benefit (allowance) that does not depend on household income, marital status or labour market status (see Kooreman, 1998).
7. The relationship between working parents' jobs characteristics and working conditions and a child's outcomes has never been addressed in the Canadian literature. The rich information of the NLSCY on different dimensions of jobs and parent and children's outcomes represents a unique opportunity to disentangle the many channels by which parents' work affects children. This particular aspect is the subject of a companion forthcoming research paper.
8. In Canada, most employed mothers giving birth to a child either give up temporarily paid work or go on maternity leave. In 1991, there were 164,000 maternity leaves from work (in the same year 403 000 Canadians were born), almost double the number in 1980.
9. The NLSY began as a panel of young men and women aged between 14 and 21 years when first interviewed in 1979 and who have been surveyed yearly. Each year, the women are asked about childbearing. They enter the Child Supplement when they become mothers. Their children have been assessed every other year, from 1986 through 1998. Some analyses include cohorts assessed in 1988 and 1990. We are not aware of published studies using more recently assessed cohorts. It is important to note that the children under study are not, themselves, the results of a probability sampling procedure. They are approximately typical of children who have been born to a nationally representative sample of American women who had only

reached ages 21 to 28 in 1986. As a result samples used in American published studies over represent children of relatively younger, less educated and disadvantaged (lower social and occupational status) mothers. Minority children are also over represented. Mothers who have postponed childbearing in order to pursue further schooling or employment instead of parenthood have little chance to be in the samples of 1986, 1988, and 1990. Thus, there is a sample bias. The Canadian counterpart of the NLSY, the NLSCY because it is not tainted by this sample selection bias, is superior on that account. Moreover, the sample size of children in the NLSCY is much larger because of the requirements to produce reliable estimates for all children (0 to 11 years of age) in each of the 10 provinces and at the Canadian level for seven key age cohorts.

10. This study also includes an index of behavioural problems and of motor and social development for very young children.

11. Incidentally, Korenman's study shows that parents' social and economic status (SES) - measured by parental education, occupation and income - is a poor and biased index of family background. The Currie study uses the sub-components scores of maternal AFQT rather than relying only on this summary statistic. In some studies, AFQT is taken as a proxy of IQ because they are highly correlated. Results show that some of the skills measured under AFQT are more highly valued by the labour market and have little relationship with the cognitive achievement of children; some measured skills acquired at school or at work, are not associated with wages but do affect children's outcomes.

12. This study includes neighbourhood characteristics and controls for mother's employment status.

13. This study does not use data from the NLSY-CS. But the study of Smith et al. (1997) shows that results are similar to the ones obtained with the NLSY-CS data set.

14. This study also uses siblings to control for some of the unobserved parental characteristics.

15. Since employed mothers are a self-selected group, Blau and Grossberg estimate their variable quantity of maternal time (measured by the proportion of weeks worked by the mother since the child's birth) by a two-limit Tobit estimate for this proportion. Hill and O'Neill use the same technique for their variable which is measured by the proportion of potential hours worked (set to a maximum of 2,000 per year) by the mother from the time of each child's birth until the time the test was administered. Moreover, Hill and O'Neill first estimate the probability of having a child in the PPVT sample to correct for potential sample selection bias. The same kind of correction is applied to their variable mother's welfare participation measured as the proportion of years since the birth of her first child in which she received benefits for two months or more.

16. As some variables of interest (e.g. family income) are suppressed on the public-release Microdata file, the non-public-release Microdata file, which contains 95% of the sampled children, is used.

17. For the 4 to 5 age group there are 3,490 children in the NLSCY sample. After deleting the observations with no score or a partial test, 3,119 observations are left. The sample used, comprised of all children with non-missing values for the the independent variables and exclusions, contains 2,840 observations.

18. For the general NLSCY sample there is too few single father families (around 230) to justify their inclusion in the analysis. The child's mother or father may be an adoptive or a step parent. For about 10% of the children, the PMK is the father. Sometimes this restricts the available information on the child's parents even though for two-parent families most variables of the NLSCY are constructed symmetrically for

the PMK and the spouse/partner. For example, the work status for the year for the PMK is finely decomposed in 9 categories but the same information is not given for the spouse due to the poor quality of the measure.

19. The NLSCY does not provide information on the family background of the child's parents nor on their skills or abilities (like the AFQT test for women in the American NLSCY), except for self-declared information on health and parenting behaviours. The education attainment of the parents are then the only "marker" of the cognitive and psychological traits that are associated with schooling levels.

20. One reviewer keenly suggested that the "matching" process of spouses could influence the findings. If spouses self-select on the basis of unobserved characteristics, observed child outcomes might simply reflect the matching process: high-income men being matched to high-income women, strongly attached to the labour market, who nevertheless enjoy an absolute advantage in child-rearing activities; high income men being matched to low-income women with a low attachment to work who have a comparative advantage in child-rearing activities. Then, family income would have little, if any impact on outcomes.

21. See note 18 for a fourth variable that could be created if children are not considered when the PMK is the father.

22. It is difficult to which one more or less weight should be given since these activities might depend on the age and personality of the child.

23. Unfortunately, the NLSCY survey does not indicate the exact sources of family income nor of earned or unearned income of the PMK and the spouse/partner.

24. Since the regression results are basically the same for the alternatives (mothers) work indicator variables (as for the effect associated with the spouse/partner work indicators - hours or weeks), they are not presented but can be obtained from the authors.

25. To check whether mothers with stronger preferences for work will invest less in their children, a regression was performed which included only children with mothers who did not work the preceding year and a dummy variable which took a value of 1 if the mother said she did not work because she wanted to stay with her children and 0 if the primary reason she was home was because she was laid off or could not find work. The dummy variable had no effect on PPVT scores. Therefore, it is possible that the frequency of reading effect is due to the fact that LAM mothers have more time to read to their children.

Appendix A

Tables of results and tables of samples means

Table 1: Regression coefficients on Work and Income Variables

All Families				Two-parent Families		One-parent families
Model 1	Model 2	Model 3	Model 4	Model 3	Model 4	Model 3

A. WORK	0.0097 (1.65)	0.0151 (2.63)	0.0054 (0.96)	0.0097 (1.64)	0.0054 (0.85)	0.0086 (1.37)	0.0245 (1.16)
Family income	0.0044 (3.56)		0.0032 (2.50)		0.0021 -0.0035 (1.65)		-0.0078 (0.43)
Income square	-0.0059 (2.93)		-0.0044 (2.15)				0.0000 (0.81)
Other income		0.0054 (4.30)		0.0039 (2.98)		0.0032 (2.10)	
Other income square		-0.0000 (3.43)		-0.0000 (2.51)		-0.0000 (2.09)	
Welfare			-0.0364 (4.26)	-0.337 (3.86)	-0.033 (2.83)	-0.0325 (2.79)	
Spouse weeks					0.0005 (2.12)	0.0004 (1.87)	
B. WEEKS	0.0002 (1.91)	0.0003 (2.94)	0.0001 (1.08)	0.0002 (1.86)	0.0002 (1.19)	0.0002 (1.72)	0.0005 (1.04)
Family income	0.0043 (3.46)		0.0031 (2.45)		0.0020 (1.42)		-0.0074 (0.41)
Income square	-0.0058 (2.87)		-0.0044 (2.12)		-0.0034 (1.58)		0.0000 (0.80)
Other income		0.0054 (4.31)		0.0096 (3.02)		0.0033 (2.14)	
Other income square		-0.0000 (3.44)		-0.0000 (2.53)		-0.0000 (2.12)	
Welfare			-0.0360 (4.20)	-0.0328 (3.75)	-0.0324 (2.77)	-0.0317 (2.71)	-0.0262 (1.21)
Spouse weeks					0.0005 (2.13)	0.0004 (1.86)	
C. WEEKS full-time	0.0002 (1.59)	0.0004 (2.80)	0.0001 (0.86)	0.0002 (1.77)	0.0002 (1.04)	0.0002 (1.66)	0.0004 (0.78)
C. WEEKS part-time	0.0002 (1.69)	0.0003 (2.04)	0.0002 (1.03)	0.0002 (1.35)	0.0002 (0.98)	0.0002 (1.21)	0.0006 (1.03)
Family income	0.0043 (3.48)		0.0031 (2.47)		0.0020 (1.42)		-0.0064 (0.35)
Income square	-0.0058 (2.88)		-0.0044 (2.14)		-0.0034 (1.59)		0.0000 (0.76)
Other income		0.0055 (4.33)		0.0040 (3.01)		0.0033 (2.15)	
Other income square		-0.0000 (3.46)		-0.0000 (2.54)		-0.0000 (2.13)	
Welfare			-0.0360 (4.20)	-0.0328 (3.74)	-0.0325 (2.77)	-0.0317 (2.71)	-0.027 (1.24)
Spouse weeks					0.0005 (2.13)	0.0004 (1.86)	
Sample size	2,840	2,840	2,840	2,840	2,436	2,436	381

Table 2: Effects of Changes in Model Specification on the Mother's Work Variable¹ Coefficients (t-ratios in parentheses)

	Model Specification	Full Sample	Two-parent families	One-parent families
1.	Includes only work plus child's gender, mother's age at child birth, provinces and urban area	0.0260 (5.00)	0.0184 (2.98)	0.0682 (3.99)
2.	Also Includes PPVT circumstances (child's health problem and distraction during test)	0.0237 (4.48)	0.0181 (2.84)	0.0664 (3.87)
3.	Also includes child's siblings	0.0226 (4.96)	0.0217 (3.51)	0.0644 (3.78)
4.	Also includes mother's education and frequency of reading to the child (and spouse/partner's weeks of work and education two-parent families)	0.0161 (2.81)	0.0099 (1.59)	0.0450 (2.57)
5.	Also includes family income	0.0102 (1.72)	0.0074 (1.17)	0.0382 (1.98)
6.	Also includes low income neighbourhood	0.0097 (1.65)	0.0073 (1.16)	0.0349 (1.78)
7.	Also includes welfare	0.0054 (0.90)	0.0054 (0.85)	0.0245 (1.16)
5a	Also includes other income	0.0161 (2.,81)	0.1100 (1.77)	0.0440 (2.49)
6a	Also includes low income neighbourhood	0.0151 (2.63)	0.1080 (1.48)	0.0377 (2.11)
7a	Also includes welfare	0.0097 (1.64)	0.0085 (1.37)	0.0251 (1.23)

1. Paid Work for 26 weeks or more (see text).

Table 3: OLS regression results for 4- and 5-year-old children: dependant variable logarithm of standardized PPVT-R score (t-ratios in parentheses)

	Full sample			Mothers working full time			Mothers working part time or unemployed		
	Two-parent	One-parent	All	With spouse	Lone	All	With spouse	Lone	
Child characteristics									
PPVTHealth	-0.025 (1.74)	-0.038 (2.36)	0.031 (0.87)	-0.022 (1.15)	-0.010 (2.63)	-0.003 (2.28)	-0.002 (1.57)	-0.003 (1.12)	
PPVTDistraction	-0.003 (3.85)	-0.002 (2.31)	-0.007 (3.15)	-0.002 (1.87)	-0.019 (0.73)	0.009 (1.09)	0.009 (0.98)	0.006 (0.27)	
Male	0.002 (0.32)	0.002 (0.27)	-0.004 (0.23)	0.003 (0.43)	-0.033 (1.91)	-0.026 (5.57)	-0.028 (5.36)	-0.014 (0.98)	
Number of siblings	-0.021 (6.30)	-0.020 (5.90)	-0.021 (2.00)	-0.011 (2.16)	-0.184 (1.09)	0.056 (0.20)	-0.004 (0.12)	-0.221 (2.22)	
Birth order	0.021 (4.23)	0.029 (3.96)	-0.157 (1.91)	0.067 (2.45)					
Mother's characteristics									
Age at child's birth	0.004 (5.65)	0.004 (5.74)	0.002 (0.14)	0.002 (2.61)	0.002 (0.77)	0.005 (5.27)	0.006 (5.28)	-0.001 (0.45)	
Years of education	0.010 (6.70)	0.008 (4.37)	0.014 (2.69)	0.010 (4.26)	0.004 (0.41)	0.009 (3.75)	0.005 (1.82)	0.024 (3.65)	
Immigrant1 (>9years)	-0.042 (3.67)	-0.049 (3.96)	-0.028 (0.82)	-0.040 (2.59)	0.023 (0.45)	-0.055 (2.96)	-0.060 (2.94)	-0.065 (1.37)	
Immigrant2 (5-9years)	-0.011 (5.65)	-0.105 (5.11)	-0.230 (3.69)	-0.103 (3.40)	0.014 (0.09)	-0.128 (4.78)	-0.108 (3.68)	-0.037 (4.52)	
Immigrant3 (<5 years)	-0.083 (2.75)	-0.090 (3.05)		0.070 (1.00)		-0.085 (2.46)	-0.096 (2.70)		
Paid work	0.016 (0.27)	0.001 (0.17)	0.022 (1.05)						
Spouse's characteristics									
Years of education	0.005 (3.48)		0.005 (2.68)				0.005 (2.20)		
Weeks of work	0.001 (1.70)		0.000 (1.75)				-0.000 (0.01)		
Family characteristics									
Family income/10,000	0.003 (2.57)	0.002 (1.44)	-0.001 (0.38)	0.001 (0.89)	-0.003 (1.16)	0.005 (1.50)	0.002 (0.70)	0.007 (1.06)	
Family income squared	-0.000 (2.18)	-0.000 (1.66)	0.000 (0.58)	-0.000 (1.38)	0.000 (1.37)	-0.000 (0.91)	-0.000 (0.40)	-0.000 (1.17)	
Received welfare	-0.036 (4.28)	-0.034 (2.95)	-0.023 (1.10)	-0.020 (1.49)	-0.036 (1.88)	-0.033 (2.80)	-0.038 (2.41)	0.020 (0.64)	
Readchild2: weekly	0.021 (0.13)	0.001 (0.06)		-0.014 (0.59)		0.013 (0.53)	0.015 (0.54)		
Readchild3: daily	0.036 (2.22)	0.029 (1.62)	0.058 (3.49)	0.016 (0.67)	0.034 (1.32)	0.048 (2.02)	0.042 (1.49)	0.073 (3.13)	
Readchild4: >daily	0.052 (2.83)	0.046 (2.27)		0.029 (1.10)		0.072 (2.64)	0.065 (2.07)		
Area characteristics									
Newfoundland	0.006 (0.47)	0.012 (0.87)	0.005 (0.15)	0.020 (0.87)	0.043 (0.87)	0.001 (0.07)	0.009 (0.41)	-0.028 (0.63)	
Prince Edward Island	-0.022 (1.43)	-0.027 (1.66)	0.043 (1.00)	-0.020 (1.00)	-0.015 (0.20)	-0.027 (1.04)	-0.043 (1.47)	0.089 (1.59)	
Nova Scotia	0.011 (0.92)	-0.002 (0.13)	0.064 (2.05)	-0.016 (0.95)	0.074 (1.41)	-0.023 (1.29)	0.012 (0.63)	0.045 (1.09)	
New Brunswick	-0.018 (1.57)	-0.019 (1.48)	-0.024 (0.72)	-0.045 (2.70)	-0.015 (0.30)	0.004 (0.22)	0.008 (0.39)	-0.052 (1.04)	
Quebec	0.025 (3.00)	0.023 (2.51)	0.046 (1.72)	0.033 (2.89)	0.068 (1.04)	0.013 (0.93)	0.012 (0.82)	0.031 (0.84)	
Manitoba	0.030 (2.54)	0.025 (1.90)	0.066 (1.96)	0.020 (1.27)	0.097 (1.98)	0.020 (0.97)	0.026 (1.15)	0.000 (0.01)	
Saskatchewan	0.018 (1.62)	0.013 (1.20)	0.039 (1.22)	0.013 (0.98)	0.037 (0.76)	0.015 (0.75)	0.011 (0.46)	0.031 (0.73)	
Alberta	0.023 (2.18)	0.021 (1.85)	0.063 (1.59)	0.005 (0.40)	0.053 (0.90)	0.036 (2.08)	0.040 (2.12)	0.045 (0.84)	
British Columbia	-0.007 (0.68)	-0.014 (1.17)	0.040 (1.37)	-0.012 (0.79)	0.003 (0.06)	-0.007 (0.41)	-0.016 (0.83)	0.055 (1.50)	
Urban area1 (+500)	-0.012 (1.35)	-0.014 (1.47)	-0.008 (0.26)	-0.016 (1.01)	-0.010 (0.21)	-0.009 (0.60)	-0.008 (0.46)	-0.018 (0.41)	
Urban area2 (100-500)	0.018 (2.75)	0.014 (1.59)	0.047 (1.79)	0.020 (1.89)	0.071 (1.58)	0.010 (0.75)	0.006 (0.42)	0.010 (0.27)	
Urban area3 (30-100)	0.015 (1.50)	0.011 (1.00)	0.018 (0.63)	0.002 (0.16)	0.033 (0.74)	0.025 (1.55)	0.027 (1.46)	-0.032 (0.77)	
Urban area4 (15-30)	-0.001 (0.01)	-0.003 (0.29)	-0.008 (0.25)	0.012 (0.77)	0.022 (0.48)	-0.023 (1.33)	-0.021 (1.00)	-0.063 (1.38)	
Urban area5 (<15)	0.008 (0.83)	0.002 (0.43)	0.029 (0.96)	0.011 (0.85)	0.056 (1.12)	-0.001 (0.03)	-0.005 (0.30)	-0.010 (0.24)	
Low income neighbour	-0.055 (1.75)	-0.015 (0.43)	-0.186 (2.51)	-0.054 (1.05)	-0.094 (0.63)	-0.054 (1.20)	-0.022 (0.05)	-0.175 (1.93)	
Constant	4.34 (143.8)	4.30 (128.1)	4.517 (44.9)	4.284 (85.1)	4.670 (26.8)	4.317 (84.7)	4.293 (74.9)	4.391 (28.0)	
Sample size	2,840	2,422	381	1,387	156	1,282	1,035	225	
Adjusted R-squared	0.141	0.130	0.185	0.113	0.085	0.150	0.133	0.200	
lnPPVT score	4.5899	4.5951	4.5574	4.6043	4.5978	4.5711	4.5808	4.5308	

Table 4: Weighted samples means for 4- to 11-year-old and 4- and 5-year old children, behavioural scores (standard deviation in parentheses)

Samples	Behavioural scores				
	Hyperactivity -Inattention	Emotional disorder	Conduct disorder	Indirect aggression	Pro-social behaviour
	HI	ED	CD	IA	PS
<u>4- to 11-year-old</u>					
Full sample	4.56 (3.59)	2.56 (2.59)	1.37 (1.85)	1.19 (1.69)	12.35 (3.89)
Mothers work full time	4.56 (3.57)	2.54 (2.53)	1.29 (1.77)	1.17 (1.66)	12.40 (3.86)
Mothers no work/part time	4.57 (3.63)	2.61 (2.68)	1.45 (1.98)	1.24 (1.75)	12.27 (3.92)
Two parents	4.40 (3.52)	2.43 (2.48)	1.27 (1.74)	1.12 (1.62)	12.39 (3.88)
Mothers working full time	4.47 (3.51)	2.46 (2.47)	1.25 (1.71)	1.14 (1.64)	12.43 (3.84)
Mothers no work/part time	4.28 (3.53)	2.39 (2.51)	1.31 (1.79)	1.10 (1.59)	12.31 (3.94)
Lone mothers	5.47 (3.85)	3.31 (2.99)	1.84 (2.32)	1.59 (2.00)	12.12 (3.92)
Mothers work full time	5.20 (3.87)	3.11 (2.86)	1.62 (2.09)	1.38 (1.76)	12.15 (4.00)
Mothers no work/part time	5.74 (3.81)	3.53 (3.11)	2.06 (2.52)	1.81 (2.19)	12.10 (3.83)
<u>4- and 5-year-old</u>					
Full sample	4.90 (3.44)	2.10 (2.20)	1.57 (1.92)	0.79 (1.38)	11.17 (4.09)
Mothers work full time	4.98 (3.45)	2.05 (2.19)	1.55 (1.88)	0.79 (1.41)	10.98 (4.07)
Mothers no work/part time	4.81 (3.42)	2.15 (2.20)	1.60 (1.97)	0.79 (1.34)	11.40 (4.11)
Two parents	4.71 (3.40)	2.01 (2.16)	1.52 (1.85)	0.74 (1.33)	11.22 (4.14)
Mothers working full time	4.83 (3.44)	2.00 (2.16)	1.49 (1.81)	0.75 (1.39)	11.04 (4.05)
Mothers no work/part time	4.55 (3.35)	2.02 (2.15)	1.56 (1.91)	0.72 (1.23)	11.48 (4.25)
Lone mothers	6.00 (3.43)	2.62 (2.35)	1.86 (2.26)	1.09 (1.62)	10.86 (3.78)
Mothers work full time	6.23 (3.34)	2.50 (2.44)	2.04 (2.41)	1.13 (1.55)	10.51 (4.16)
Mothers no work/part time	5.86 (3.49)	2.69 (2.29)	1.75 (2.16)	1.07 (1.67)	11.10 (3.49)

Source: Micro-data from the NLSCY, cycle 1.

Table 5: OLS regression results for 4- to 11-year-old and 4- and 5-year-old children: dependent variables behavioural scores (t-ratios in parentheses)

	Full sample 4- to 11-year-old					Two-parent 4- to 11-year-old				
	Hyperactivity -inattention HI	Emotional disorder ED	Conduct disorder CD	Indirect aggression IA	Pro-social behaviour PS	Hyperactivity -inattention HI	Emotional disorder ED	Conduct disorder CD	Indirect aggression IA	Pro-social behaviour PS
Child characteristics										
Age	-0.137 (9.24)	0.111 (10.3)	-0.076 (9.48)	0.091 (12.5)	0.242 (15.0)	-0.141 (8.95)	0.106 (9.38)	-0.076 (9.23)	0.090 (11.8)	0.231 (13.3)
Male	1.381 (22.5)	0.098 (2.20)	0.556 (16.8)	-0.145 (4.85)	-1.452 (21.8)	1.364 (21.0)	0.075 (1.62)	0.501 (14.7)	-0.151 (4.82)	-1.471 (20.5)
Number of siblings	-0.213 (5.71)	-0.314 (11.5)	0.126 (6.23)	0.044 (2.39)	-0.338 (8.30)	-0.233 (5.92)	-0.330 (11.7)	0.104 (5.04)	0.030 (1.55)	-0.312 (7.16)
Birth order	-0.167 (3.38)	0.450 (12.6)	0.093 (3.49)	-0.050 (2.06)	0.313 (5.84)	-0.144 (2.79)	0.450 (12.2)	0.097 (3.57)	-0.045 (1.83)	0.336 (5.92)
Mother's characteristics										
Age at child's birth	-0.033 (4.29)	-0.001 (0.11)	-0.018 (4.35)	-0.017 (4.42)	-0.019 (2.26)	-0.031 (3.77)	-0.003 (0.43)	-0.010 (4.25)	-0.017 (4.24)	-0.014 (1.52)
Years of education	-0.108 (6.69)	-0.002 (0.14)	-0.010 (1.18)	-0.027 (3.40)	0.103 (5.84)	-0.105 (6.20)	-0.003 (0.24)	-0.008 (0.92)	-0.023 (2.72)	0.092 (4.83)
Immigrant1(>9years)	-0.276 (2.23)	-0.163 (1.82)	-0.260 (3.89)	-0.043 (0.71)	0.277 (2.06)	-0.141 (1.09)	-0.005 (0.57)	-0.202 (2.98)	-0.000 (0.01)	0.282 (1.97)
Immigrant2(5-9years)	-0.539 (2.24)	-0.324 (1.86)	-0.467 (3.61)	-0.002 (0.02)	-0.419 (1.60)	-0.449 (1.79)	-0.186 (1.03)	-0.425 (3.12)	0.131 (1.07)	-0.379 (1.36)
Immigrant3(<5 years)	-1.092 (3.59)	-0.624 (2.82)	-0.595 (3.61)	-0.180 (1.19)	-0.291 (0.87)	-1.012 (3.21)	-0.514 (2.28)	-0.525 (3.16)	-0.043 (0.21)	-0.397 (1.13)
Paid work	0.121 (1.75)	0.105 (2.10)	0.076 (2.05)	0.040 (1.18)	-0.025 (0.33)	0.125 (1.74)	0.085 (1.66)	0.075 (1.98)	0.042 (1.21)	-0.019 (0.24)
Spouse's characteristics										
Years of education						-0.001 (0.49)	-0.007 (3.16)	-0.004 (2.32)	-0.003 (2.30)	0.004 (1.30)
Family characteristics										
Family income (000)	-0.004 (3.55)	-0.002 (2.81)	-0.002 (2.90)	-0.000 (0.28)	-0.001 (1.02)	-0.004 (3.49)	-0.002 (2.66)	-0.002 (2.95)	-0.000 (0.41)	-0.001 (0.76)
Received welfare	0.583 (5.44)	0.472 (6.07)	0.284 (4.96)	0.289 (5.52)	0.076 (0.65)	0.606 (4.66)	0.451 (4.85)	0.264 (3.85)	0.223 (3.56)	-0.076 (0.11)
Step-family	0.925 (8.58)	0.451 (5.76)	0.166 (2.85)	0.223 (4.25)	0.031 (0.27)	0.932 (8.76)	0.455 (5.96)	0.174 (3.11)	0.242 (4.72)	0.037 (0.32)
Female-head family	0.644 (6.05)	0.594 (7.68)	0.385 (6.69)	0.302 (5.82)	-0.392 (3.37)					
Area characteristics (*)										
Newfoundland	-0.785 (5.44)	-0.762 (7.28)	-0.562 (7.20)	-0.134 (1.88)	-0.829 (5.27)	-0.694 (4.55)	-0.725 (6.63)	-0.500 (6.22)	-0.038 (0.51)	-0.770 (4.56)
Prince Edouard Island	0.115 (0.65)	-0.176 (1.37)	-0.163 (1.71)	-0.120 (1.41)	-0.618 (3.24)	0.081 (0.44)	-0.288 (2.16)	-0.184 (1.88)	-0.029 (1.45)	-0.440 (2.15)
Nova Scotia	0.005 (0.38)	-0.102 (1.04)	-0.066 (0.90)	-0.011 (0.16)	0.201 (1.30)	0.036 (0.25)	-0.012 (0.12)	-0.052 (0.69)	0.040 (0.57)	0.349 (2.18)
New Brunswick	-0.325 (2.34)	-0.252 (2.49)	-0.245 (3.26)	-0.264 (3.90)	-0.167 (1.11)	-0.023 (1.59)	-0.197 (1.88)	-0.172 (2.25)	-0.234 (3.32)	-0.062 (0.39)
Québec	0.406 (4.18)	0.200 (2.83)	-0.075 (1.44)	-0.070 (1.48)	-0.678 (6.41)	0.434 (4.20)	0.232 (3.14)	-0.014 (0.26)	-0.031 (0.63)	-0.599 (5.25)
Manitoba	-0.219 (1.66)	0.078 (0.81)	-0.005 (0.07)	-0.229 (3.54)	-0.320 (2.23)	-0.251 (1.81)	0.049 (0.49)	0.051 (0.70)	-0.211 (3.14)	-0.273 (1.77)
Saskatchewan	-0.027 (0.21)	-0.083 (0.91)	-0.010 (0.15)	0.027 (0.44)	-0.206 (1.51)	0.004 (0.03)	-0.049 (0.51)	0.035 (0.49)	0.064 (0.99)	-0.193 (1.31)
Alberta	-0.021 (0.18)	0.003 (0.04)	-0.008 (0.12)	-0.077 (1.33)	-0.249 (1.92)	-0.020 (0.16)	0.015 (0.16)	0.070 (1.07)	-0.041 (0.69)	-0.223 (1.62)
British Columbia	-0.020 (0.16)	0.130 (1.45)	0.021 (0.31)	-0.041 (0.68)	0.089 (0.67)	-0.001 (0.00)	0.127 (1.32)	0.046 (0.65)	0.011 (0.17)	0.102 (0.69)
Low income neigh.	-0.001 (0.34)	0.004 (1.52)	-0.002 (0.85)	0.006 (3.39)	0.012 (2.76)	0.000 (0.06)	0.004 (1.23)	-0.004 (1.75)	0.004 (2.04)	0.015 (3.05)
Constant	7.600 (24.6)	1.141 (5.08)	2.032 (12.2)	1.272 (8.41)	10.77 (32.1)	7.537 (22.8)	1.347 (5.69)	2.090 (12.0)	1.294 (8.10)	10.64 (29.2)
Sample size	12,329	12,342	12,312	11,939	12,070	10,579	10,587	10,566	10,249	10,372
Adjusted R-squared	0.095	0.063	0.064	0.046	0.080	0.085	0.053	0.054	0.035	0.082

* Urban area variables are also included in the estimation.

Table 5 end: OLS regression results for 4- to 11-year-old and 4- and 5-year-old children: dependent variables behavioural scores (t-ratios in parentheses)

	Lone-mothers 4- to 11-year old					Full sample 4- and 5-year-old				
	Hyperactivity Inattention HI	Emotional disorder ED	Conduct disorder CD	Indirect aggression IA	Pro-social behaviour PS	Hyperactivity Inattention HI	Emotional disorder ED	Conduct disorder CD	Indirect aggression IA	Pro-social behaviour PS
Child characteristics										
Age	-0.122 (2.74)	0.136 (3.97)	-0.067 (2.52)	0.100 (4.36)	0.315 (7.05)	-0.548 (4.75)	0.117 (1.58)	-0.377 (4.93)	0.240 (5.02)	0.732 (5.33)
Male	1.491 (8.23)	0.244 (1.76)	0.901 (8.34)	-0.119 (1.20)	-1.342 (7.41)	0.920 (7.97)	-0.002 (0.03)	0.454 (6.63)	-0.078 (1.62)	-1.324 (9.69)
Number of siblings	-0.040 (0.59)	-0.182 (2.01)	0.271 (3.85)	0.149 (2.47)	-0.502 (4.26)	-0.236 (3.42)	-0.308 (7.05)	0.156 (3.86)	0.045 (1.58)	-0.538 (6.63)
Birth order	-0.346 (2.11)	0.413 (3.29)	0.050 (0.51)	-0.114 (1.35)	0.163 (1.08)	-0.057 (0.55)	0.642 (9.73)	0.070 (1.15)	-0.053 (1.24)	-0.850 (6.95)
Mother's characteristics										
Age at child's birth	-0.046 (2.21)	0.003 (0.20)	-0.017 (1.39)	-0.018 (1.69)	-0.038 (1.83)	-0.064 (4.52)	0.006 (0.67)	-0.028 (3.31)	-0.016 (2.66)	-0.013 (0.79)
Years of education	-0.111 (2.26)	0.023 (0.62)	-0.007 (0.24)	-0.028 (1.10)	0.138 (2.81)	-0.069 (2.23)	-0.009 (0.47)	-0.003 (0.18)	-0.013 (0.98)	0.052 (1.41)
Immigrant1(>9years)	-1.128 (3.11)	-0.877 (2.78)	-0.627 (2.56)	-0.307 (1.46)	0.250 (0.61)	-0.140 (0.58)	-0.131 (0.85)	-0.034 (0.24)	0.032 (0.32)	0.316 (1.09)
Immigrant2(5-9years)	-1.130 (1.47)	-1.214 (2.06)	-0.765 (1.67)	-0.991 (2.57)	-0.616 (0.80)	-0.333 (0.82)	-0.344 (1.32)	-0.306 (1.27)	0.171 (1.00)	-1.160 (2.36)
Immigrant3(<5 years)	-1.871 (1.69)	-1.577 (1.86)	-1.031 (1.56)	-1.205 (2.16)	0.878 (0.81)	-0.687 (1.17)	0.402 (1.07)	-0.262 (0.75)	0.107 (0.43)	-1.316 (1.86)
Paid work	0.039 (0.16)	0.217 (1.18)	-0.093 (0.65)	0.105 (0.86)	0.088 (0.37)	0.138 (1.07)	0.112 (1.36)	0.163 (2.13)	0.033 (0.62)	-0.195 (1.27)
Spouse's characteristics										
Years of education										
Family characteristics										
Family income (000)	-0.002 (0.28)	0.002 (0.29)	-0.003 (0.61)	0.001 (0.22)	-0.000 (1.58)	-0.005 (1.90)	-0.004 (2.03)	-0.002 (1.09)	-0.001 (0.71)	-0.000 (0.07)
Received welfare	0.475 (1.92)	0.640 (3.38)	0.223 (1.51)	0.408 (3.23)	0.266 (1.08)	0.501 (2.56)	0.383 (3.06)	0.007 (0.06)	0.076 (0.93)	0.212 (0.91)
Step-family										
Female-head family										
Area characteristics (*)										
Newfoundland	-1.422 (3.25)	-1.049 (3.14)	-0.961 (3.66)	-0.694 (3.05)	-1.125 (2.56)	-0.838 (2.92)	-0.754 (4.12)	-0.422 (2.48)	-0.138 (1.16)	-1.242 (3.64)
Prince Edouard Island	0.448 (0.83)	0.710 (1.71)	0.052 (0.16)	-0.056 (0.21)	-1.643 (3.02)	0.558 (1.68)	-0.025 (0.12)	0.204 (1.04)	0.136 (1.00)	-0.807 (2.06)
Nova Scotia	-0.158 (0.43)	-0.528 (1.86)	-0.225 (1.02)	-0.361 (1.92)	-0.405 (1.10)	0.172 (0.68)	0.021 (0.13)	-0.134 (0.89)	0.067 (0.63)	-0.392 (1.29)
New Brunswick	-0.978 (2.28)	-0.601 (1.83)	-0.754 (2.93)	-0.414 (1.89)	-0.799 (1.86)	-0.010 (0.04)	-0.197 (1.19)	-0.148 (0.97)	-0.178 (1.67)	-0.409 (1.34)
Quebec	0.215 (0.73)	0.007 (0.03)	-0.455 (2.58)	-0.250 (1.65)	-1.121 (3.78)	0.302 (1.66)	0.094 (0.81)	0.153 (1.44)	0.000 (0.01)	-1.062 (4.90)
Manitoba	-0.060 (0.15)	0.299 (0.96)	-0.381 (1.57)	-0.391 (1.86)	-0.542 (1.33)	0.254 (1.01)	0.389 (2.41)	0.398 (2.67)	-0.176 (1.69)	-0.524 (1.76)
Saskatchewan	-0.217 (0.58)	-0.136 (0.48)	-0.261 (1.17)	-0.160 (0.83)	-0.310 (0.83)	0.332 (1.43)	0.118 (0.78)	0.272 (1.97)	-0.068 (0.71)	-0.244 (0.88)
Alberta	0.075 (0.19)	0.169 (0.55)	-0.460 (0.94)	-0.266 (1.32)	-0.509 (1.29)	0.153 (0.67)	-0.019 (0.13)	0.191 (1.42)	0.006 (0.07)	-0.530 (1.97)
British Columbia	0.026 (0.08)	0.174 (0.69)	-0.152 (0.75)	-0.297 (1.76)	-0.083 (0.25)	0.655 (2.86)	0.398 (2.71)	-0.502 (3.70)	0.041 (0.44)	-0.315 (1.15)
Low income neigh.	-0.001 (0.64)	0.006 (0.90)	-0.004 (0.73)	0.013 (2.86)	0.002 (0.25)	-0.299 (0.45)	0.067 (0.16)	-0.487 (1.22)	-0.283 (1.00)	-0.715 (0.88)
Constant	9.000 (9.80)	1.077 (1.53)	2.428 (4.43)	1.451 (3.09)	10.77 (11.7)	9.880 (13.1)	0.737 (1.52)	3.283 (7.32)	0.323 (1.03)	8.542 (9.49)
Sample size	1,750	1,755	1,746	1,690	1,698	3,255	3,262	3,250	3,181	3,174
Adjusted R-squared	0.069	0.057	0.071	0.048	0.089	0.073	0.067	0.046	0.021	0.077

* Urban area variables are also included in the estimation.

Table A1: Explanatory variables (reference category in parentheses) and weighted samples means for 4- and 5-year-old children, PPVT-R (standard deviation in parentheses)

	Full sample			One-parent			Mothers working full time			Mothers working part time or unemployed		
	Two-parent	One-parent	Lone	All	With spouse	Lone	All	With spouse	Lone	All	With spouse	Lone
Child characteristics												
PPVTHealth	0.03 (0.18)	0.03 (0.17)	0.05 (0.22)	0.03 (0.17)	0.03 (0.17)	0.01 (0.11)	0.04 (0.19)	0.02 (0.14)	0.07 (0.26)	0.04 (0.19)	0.02 (0.14)	0.07 (0.26)
PPVTDistract	2.00 (3.00)	1.96 (3.00)	2.33 (3.40)	1.80 (2.80)	1.76 (2.70)	2.23 (3.50)	2.26 (3.30)	2.25 (3.40)	2.39 (3.30)	2.26 (3.30)	2.25 (3.40)	2.39 (3.30)
Male	0.51 (0.50)	0.50 (0.50)	0.52 (0.50)	0.52 (0.50)	0.52 (0.50)	0.47 (0.50)	0.49 (0.50)	0.47 (0.50)	0.55 (0.50)	0.49 (0.50)	0.47 (0.50)	0.55 (0.50)
Number of siblings	1.33 (0.95)	1.40 (0.94)	0.89 (0.89)	1.24 (0.85)	1.29 (0.81)	0.82 (0.90)	1.43 (1.10)	1.55 (1.08)	0.94 (0.89)	1.43 (1.10)	1.55 (1.08)	0.94 (0.89)
Birth order	1.49 (0.62)	1.53 (0.62)	1.28 (0.51)	1.43 (0.57)	1.45 (0.58)	1.15 (0.41)	1.58 (0.66)	1.63 (0.68)	1.40 (0.55)	1.58 (0.66)	1.63 (0.68)	1.40 (0.55)
Mother's characteristics												
Age at child's birth	28.6 (5.00)	29.0 (4.82)	26.4 (5.50)	29.0 (4.70)	29.2 (4.58)	27.4 (5.10)	28.0 (5.40)	28.7 (5.15)	25.8 (5.70)	28.0 (5.40)	28.7 (5.15)	25.8 (5.70)
Years of education	12.5 (2.25)	12.7 (2.25)	11.6 (2.00)	12.9 (2.10)	12.9 (2.16)	12.4 (1.80)	12.3 (2.30)	12.3 (2.30)	11.3 (1.90)	12.3 (2.30)	12.3 (2.30)	11.3 (1.90)
(Non immigrant)	0.82 (0.80)	0.82 (0.80)	0.85 (0.81)	0.84 (0.81)	0.84 (0.81)	0.87 (0.83)	0.81 (0.80)	0.79 (0.80)	0.86 (0.81)	0.81 (0.80)	0.79 (0.80)	0.86 (0.81)
Immigrant (>9 years)	0.11 (0.31)	0.11 (0.31)	0.11 (0.31)	0.11 (0.31)	0.10 (0.30)	0.16 (0.37)	0.11 (0.32)	0.12 (0.32)	0.08 (0.27)	0.11 (0.32)	0.12 (0.32)	0.08 (0.27)
Immigrant (5-9 years)	0.05 (0.21)	0.05 (0.21)	0.04 (0.18)	0.04 (0.20)	0.05 (0.21)	0.01 (0.03)	0.05 (0.22)	0.05 (0.22)	0.06 (0.23)	0.05 (0.22)	0.05 (0.22)	0.06 (0.23)
Immigrant (<5 years)	0.02 (0.13)	0.02 (0.13)		0.01 (0.20)	0.01 (0.07)		0.03 (0.18)	0.04 (0.18)		0.03 (0.18)	0.04 (0.18)	
Paid work	0.57 (0.50)	0.60 (0.49)	0.40 (0.49)			0.40 (0.49)						
Spouse's characteristics												
Years of education	12.8 (2.76)	12.8 (2.76)		12.9 (2.60)	12.9 (2.60)		12.9 (2.86)	12.8 (2.86)		12.9 (2.86)	12.8 (2.86)	
Hours of work (00)	21.2 (9.71)	21.2 (9.71)		21.8 (8.70)	21.8 (8.70)		20.4 (11.0)	20.4 (11.0)		20.4 (11.0)	20.4 (11.0)	
Family characteristics												
Family income (000)	51.5 (38.5)	56.2 (38.9)	19.3 (11.6)	59.9 (39.5)	63.6 (39.7)	26.0 (14.6)	40.5 (34.2)	46.2 (35.5)	14.9 (6.06)	40.5 (34.2)	46.2 (35.5)	14.9 (6.06)
Received welfare	0.16 (0.35)	0.08 (0.27)	0.61 (0.49)	0.07 (0.26)	0.05 (0.21)	0.33 (0.47)	0.26 (0.43)	0.13 (0.34)	0.79 (0.41)	0.26 (0.43)	0.13 (0.34)	0.79 (0.41)
Readchild1: <weekly	0.03 (0.60)	0.03 (0.60)		0.03 (0.60)	0.03 (0.60)		0.04 (0.61)	0.04 (0.61)		0.04 (0.61)	0.04 (0.61)	
Readchild2: weekly	0.34 (0.48)	0.33 (0.47)	0.42 (0.47)	0.34 (0.47)	0.34 (0.48)	0.40 (0.49)	0.35 (0.48)	0.32 (0.46)	0.44 (0.50)	0.35 (0.48)	0.32 (0.46)	0.44 (0.50)
Readchild3: daily	0.54 (0.50)	0.55 (0.50)	0.58 (0.49)	0.55 (0.50)	0.55 (0.50)	0.60 (0.50)	0.52 (0.50)	0.54 (0.50)	0.56 (0.50)	0.52 (0.50)	0.54 (0.50)	0.56 (0.50)
Readchild4: >daily	0.09 (0.28)	0.09 (0.28)		0.08 (0.27)	0.08 (0.27)		0.09 (0.29)	0.10 (0.31)		0.09 (0.29)	0.10 (0.31)	
Area characteristics												
Newfoundland	0.02 (0.14)	0.02 (0.13)	0.04 (0.18)	0.01 (0.12)	0.01 (0.11)	0.02 (0.15)	0.03 (0.17)	0.03 (0.15)	0.04 (0.20)	0.03 (0.17)	0.03 (0.15)	0.04 (0.20)
Prince Edouard Island	0.01 (0.07)	0.01 (0.07)	0.01 (0.07)	0.01 (0.07)	0.01 (0.07)	0.01 (0.07)	0.01 (0.07)	0.01 (0.06)	0.01 (0.07)	0.01 (0.07)	0.01 (0.06)	0.01 (0.07)
Nova Scotia	0.03 (0.18)	0.03 (0.17)	0.04 (0.19)	0.03 (0.16)	0.02 (0.15)	0.04 (0.19)	0.04 (0.20)	0.04 (0.19)	0.04 (0.20)	0.04 (0.20)	0.04 (0.19)	0.04 (0.20)
New Brunswick	0.02 (0.15)	0.02 (0.15)	0.02 (0.16)	0.02 (0.15)	0.02 (0.14)	0.03 (0.17)	0.03 (0.16)	0.03 (0.16)	0.02 (0.15)	0.03 (0.16)	0.03 (0.16)	0.02 (0.15)
Québec	0.24 (0.43)	0.25 (0.43)	0.21 (0.40)	0.24 (0.43)	0.24 (0.43)	0.21 (0.41)	0.25 (0.43)	0.25 (0.43)	0.20 (0.40)	0.25 (0.43)	0.25 (0.43)	0.20 (0.40)
(Ontario)	0.39 (0.48)	0.37 (0.47)	0.38 (0.48)	0.39 (0.48)	0.45 (0.50)	0.40 (0.48)	0.35 (0.46)	0.37 (0.48)	0.39 (0.48)	0.35 (0.46)	0.37 (0.48)	0.39 (0.48)
Manitoba	0.04 (0.19)	0.04 (0.19)	0.04 (0.20)	0.04 (0.19)	0.04 (0.19)	0.04 (0.20)	0.03 (0.18)	0.03 (0.18)	0.04 (0.19)	0.03 (0.18)	0.03 (0.18)	0.04 (0.19)
Saskatchewan	0.04 (0.18)	0.04 (0.19)	0.04 (0.19)	0.04 (0.20)	0.04 (0.20)	0.05 (0.21)	0.03 (0.16)	0.02 (0.16)	0.03 (0.17)	0.03 (0.16)	0.02 (0.16)	0.03 (0.17)
Alberta	0.10 (0.30)	0.11 (0.32)	0.08 (0.27)	0.11 (0.31)	0.11 (0.31)	0.08 (0.27)	0.10 (0.30)	0.10 (0.32)	0.08 (0.27)	0.10 (0.30)	0.10 (0.32)	0.08 (0.27)
British Columbia	0.11 (0.32)	0.11 (0.31)	0.14 (0.35)	0.11 (0.31)	0.10 (0.30)	0.12 (0.33)	0.13 (0.33)	0.12 (0.33)	0.15 (0.36)	0.13 (0.33)	0.12 (0.33)	0.15 (0.36)
Urban area1 (+500)	0.45 (0.50)	0.45 (0.50)	0.44 (0.50)	0.44 (0.50)	0.46 (0.50)	0.41 (0.50)	0.45 (0.50)	0.45 (0.50)	0.47 (0.50)	0.45 (0.50)	0.45 (0.50)	0.47 (0.50)
Urban area2 (100-500)	0.18 (0.38)	0.17 (0.38)	0.20 (0.40)	0.19 (0.39)	0.18 (0.39)	0.19 (0.39)	0.17 (0.38)	0.16 (0.37)	0.22 (0.41)	0.17 (0.38)	0.16 (0.37)	0.22 (0.41)
Urban area3 (30-100)	0.08 (0.27)	0.07 (0.25)	0.13 (0.34)	0.08 (0.27)	0.07 (0.26)	0.13 (0.34)	0.08 (0.26)	0.06 (0.25)	0.13 (0.34)	0.08 (0.26)	0.06 (0.25)	0.13 (0.34)
Urban area4 (15-30)	0.04 (0.19)	0.04 (0.19)	0.04 (0.20)	0.04 (0.19)	0.03 (0.18)	0.07 (0.25)	0.04 (0.19)	0.04 (0.21)	0.02 (0.15)	0.04 (0.19)	0.04 (0.21)	0.02 (0.15)
Urban area5 (<15)	0.08 (0.28)	0.08 (0.27)	0.09 (0.29)	0.08 (0.28)	0.08 (0.28)	0.09 (0.29)	0.08 (0.28)	0.08 (0.27)	0.09 (0.29)	0.08 (0.28)	0.08 (0.27)	0.09 (0.29)
(Rural area)	0.17 (0.37)	0.19 (0.38)	0.10 (0.30)	0.17 (0.38)	0.19 (0.39)	0.11 (0.35)	0.18 (0.38)	0.21 (0.39)	0.07 (0.10)	0.18 (0.38)	0.21 (0.39)	0.07 (0.10)
Low income neighbourh.	0.12 (0.09)	0.10 (0.08)	0.17 (0.12)	0.11 (0.08)	0.10 (0.07)	0.14 (0.09)	0.13 (0.11)	0.11 (0.09)	0.19 (0.13)	0.13 (0.11)	0.11 (0.09)	0.19 (0.13)
Sample size (000)	610	519	83	346	310	33	265	210	50	265	210	50
PPVT score	98.49	99.06	95.34	99.91	99.95	99.30	96.70	97.60	92.80	96.70	97.60	92.80

Table A2: Explanatory variables (reference category in parentheses) and weighted samples means for 4- to 11-year-old and 4- and 5-year-old children, behavioural scores (standard deviation in parentheses)

	4- to 11-year-old			4- and 5-year-old
	Full sample	Two-parent	Lone-mothers	Full sample
<u>Child characteristics</u>				
Age	7.50 (2.30)	7.50 (2.30)	7.40 (2.30)	4.90 (0.50)
Male	0.50 (0.50)	0.51 (0.50)	0.48 (0.50)	0.51 (0.50)
Number of siblings	1.45 (1.01)	1.51 (1.02)	1.11 (0.94)	1.33 (0.98)
Birth order	1.64 (0.76)	1.68 (0.97)	1.47 (0.69)	1.49 (0.62)
<u>Mother's characteristics</u>				
Age at child's birth	27.9 (4.90)	28.2 (4.80)	26.4 (5.20)	28.6 (5.05)
Years of education	12.5 (2.30)	12.6 (2.30)	11.8 (2.30)	12.5 (2.28)
(Non immigrant)	0.81 (0.80)	0.80 (0.80)	0.83 (0.81)	0.81 (0.80)
Immigrant1 (>9 years)	0.12 (0.33)	0.13 (0.30)	0.10 (0.30)	0.11 (0.31)
Immigrant2 (5-9 years)	0.04 (0.20)	0.04 (0.20)	0.04 (0.19)	0.05 (0.22)
Immigrant3 (<5 years)	0.03 (0.16)	0.03 (0.16)	0.03 (0.16)	0.03 (0.16)
Paid work	0.61 (0.49)	0.62 (0.48)	0.51 (0.50)	0.56 (0.50)
<u>Spouse's characteristics</u>				
Years of education		13.8 (10.3)		
<u>Family characteristics</u>				
Family income (000)	52.7 (38.0)	57.9 (39.0)	23.6 (16.0)	50.4 (37.9)
Received welfare	0.15 (0.36)	0.08 (0.28)	0.52 (0.50)	0.17 (0.38)
Stepfamily	0.09 (0.28)	0.10 (0.30)		0.08 (0.28)
Femalehead family	0.15 (0.36)		1.00 (0.00)	0.15 (0.35)
<u>Area characteristics</u>				
Newfoundland	0.02 (0.14)	0.02 (0.14)	0.02 (0.14)	0.02 (0.14)
Prince Edouard Island	0.01 (0.07)	0.01 (0.07)	0.01 (0.07)	0.01 (0.07)
Nova Scotia	0.03 (0.18)	0.03 (0.17)	0.04 (0.20)	0.03 (0.17)
New Brunswick	0.03 (0.16)	0.03 (0.16)	0.02 (0.14)	0.03 (0.15)
Québec	0.24 (0.43)	0.24 (0.43)	0.24 (0.43)	0.25 (0.43)
(Ontario)	0.39 (0.48)	0.37 (0.47)	0.36 (0.47)	0.36 (0.47)
Manitoba	0.04 (0.19)	0.04 (0.19)	0.04 (0.18)	0.04 (0.19)
Saskatchewan	0.04 (0.19)	0.04 (0.19)	0.04 (0.19)	0.04 (0.19)
Alberta	0.10 (0.30)	0.11 (0.30)	0.09 (0.29)	0.10 (0.30)
British Columbia	0.12 (0.32)	0.11 (0.31)	0.14 (0.35)	0.12 (0.32)
Low income neighbourhood	0.08 (0.09)	0.08 (0.09)	0.12 (0.12)	0.12 (0.10)
Sample size (000)	2,716	2,306	410	699

Source: Micro-data from the NLSCY, cycle 1.

References

- Baydar, N. and Brooks-Gunn, J. (1991). "Effects of Maternal Employment and Child-Care Arrangements on Preschoolers' Cognitive and Behavioral Outcomes: Evidence from the Children of the National Longitudinal Survey of Youth", *Development Psychology*, 27, 932-945.
- Becker, G. (1981). *A Treatise on the Family*. Harvard University Press.
- Becker, G. and Tomes, N. (1976). "Child Endowments and the Quantity and Quality of Children", *Journal of Political Economy*, 84, 4, S143-S162.
- Becker, G. and Tomes, N. (1979). "An Equilibrium Theory of the Distribution of Income and Intergenerational Mobility", *Journal of Political Economy*, 87, 6, 1153-1189.
- Belsky, J. and Eggebeen, D. (1991). "Early and Extensive Maternal Employment and Young Children's Socioemotional Development: Children of the National Longitudinal Survey of Youth", *Journal of Marriage and the Family*, 53, 1083-98.
- Blau, F. and Grossberg, A. (1992). "Maternal Labor Supply and Children's Cognitive Development", *Review of Economics and Statistics*, 74, 474-481.
- Blau, D. 1997. "The Effect of Income on Child Development." Department of Economics and Carolina Population Center, University of North Carolina at Chapel Hill.
- Brooks-Gunn, J., Duncan and G., Aber, L., editors. (1997). *Neighborhood Poverty: Context and Consequences for Children*, vol. 1. Russell Sage Foundation, New York.
- Brooks-Gunn, J., Smith, J., Berlin, L. and Lee, K. (1998, in press). Family work: Welfare changes, Parenting, and Young Children. In G. Brookins (Ed.), *Exits from Poverty*, NY: Cambridge University Press.
- Chase-Lansdale, P. L., R. Gordon, J. Brooks-Gunn, and P. Klebanov. 1997. "Neighborhood and Family Influences on the Intellectual and Behavioral Competence of Preschool and Early School-Age Children." In *Neighborhood Poverty*, edited by J. Brooks-Gunn, G. Duncan, and L. Aber. New York: Russell Sage Foundation. Volume 1, 79-145.
- Coleman, J. (1988). "Social Capital in the Creation of Human Capital", *American Journal of Sociology*, 94, S95-120.
- Currie, J., and D. Thomas. 1995. "Race, Children's Cognitive Achievement and the Bell Curve." National Bureau of Economic Research: Working Paper No. 5240.
- Datcher-Loury, L. (1988). "Effects of Mother's Home Time on Children's Schooling", *Review of Economics and Statistics*. 367-601.
- Desai, S., Chase-Lansdale, L. and Michael R. (1989). "Mother or Market? Effects of Maternal Employment on the Intellectual Ability of 4-Year-Old Children", *Demography*, 26, 545-561.

- Doherty, G. (1997). "Zero to Six: The Basis for School Readiness", Applied Research Branch Strategic Policy. Research Papers R-97-8E. Human Resources Development Canada.
- Dooley, M. (1996). "The Evolution of Welfare Participation Among Canadian Lone Mothers". Working Paper No. 96-2, Department of Economics, McMaster University.
- Dooley, M. and Lipman, E. (1996). "Child Psychiatric Disorders and Poor School Performance: The Roles of Family type, Maternal Work and Low Income", in *Towards the XXIst Century: Emerging Sociodemographic Trends and Policy Issues in Canada*. Proceedings of a Symposium of the Federation of Canadian Demographers.
- Duncan, T. (1990). "Intra-Household Resource Allocation", *Journal of Human Resources*, 25, 4, 635-664.
- Duncan, T. and Strauss, J. (1992). "Prices, Infrastructure, Household Characteristics and Child Height", *Journal of Development Economics*, 39, 301-331.
- Duncan, G., Brooks-Gunn, J. and Klebanov, P. (1994). "Economic Deprivation and Early Childhood Development", *Child Development*, 62, 2, 296-318.
- Garnett, P. and Myles, J. (1996). "Social Transfers, Changing Family Structure and Low Income Among Children", *Canadian Public Policy-Analyse de Politiques*, 22, 3, 244-267.
- Greenstein, T. (1993). "Maternal Employment and Child Behavioral Outcomes", *Journal of Family Issues*, 14, 3, 323-354.
- Greenstein, T. (1995). "Are the «Most Advantaged» Children Truly Disadvantaged by Early Maternal Employment? Effects on Child Cognitive Outcomes", *Journal of Family Issues*, 16, 2, 149-169.
- Hanushek, E. (1992). "The Trade-Off Between Child Quantity and Quality", *Journal of Political Economy*, 100, 1, 84-117.
- Heckman, J. (1995). "Lessons from the Bell Curve", *Journal of Political Economy*, 103, 5, 1091-1120.
- Hill, A. and O'Neill, J. (1994). "Family Endowments and the Achievements of Young Children with Special Reference to the Underclass", *Journal of Human Resources*, 24, 4, 1064-1100.
- Human Resources Development Canada and Statistics Canada. *National Longitudinal Survey of Children and Youth*, User's Handbook and Microdata Guide, Release 2, 1998.
- Korenman, S., and C. Winship. 1995. "A Reanalysis of the Bell Curve." National Bureau of Economic Research: Working Paper No. 5230.
- Korenman, S., J. Miller, and J. Sjaastad. 1995. "Long-Term Poverty and Children Development Evidence from the NLSY." *Children and Youth Services Review*. 17, 1-2, 127-55.
- Lefebvre, P. and Merrigan, P. (1998a). "Arbitrages du temps quotidien des pères et des mères de famille au Canada: une analyse économique sur données individuelles du budget-temps de 1986 et de 1992". Sous la direction de Louise Ethier et Jacques Alary, *Comprendre la famille*, Presses de l'Université du Québec, Sainte-Foy, 1998, p.149-183.

- Lefebvre, P. and Merrigan, P. (1998b). "Work Schedules, job Characteristics, Parenting Practices and Children's Outcomes", Working Paper, Human Resources Development Canada, November 1998.
- Leibowitz, A. (1974). "Home Investments in Children", *Journal of Political Economy*. 111-131.
- Leibowitz, A. (1977). "Parental Inputs and Children's Achievement", *Journal of Human Resources*. 247-249.
- Lipman, E., Offord, D. and Dooley, M. (1996). "What do we know about children from single-mother families? Questions and answers from the National Longitudinal survey of Children and Youth". *Growing Up in Canada*. Human Resources Development Canada and Statistics Canada, cat. No. 89-550-MPE, no. 1., 83-91.
- Mayer, S. (1997). *What Money Can't Buy: Family Income and Children's Life Chances*. Cambridge: Harvard University Press.
- Moore, K. and Driscoll, A. (1997). "Low-wage Maternal Employment and Outcomes for Children: A Study", *Futures of Children*, 7, 122-127.
- Parcel, T. and Menaghan, E. (1990). "Maternal Working Conditions and Children's Verbal Facility: Studying the Intergenerational Transmission of Inequality from Mothers to Young Children", *Social Psychology Quarterly*. 132-147.
- Parcel, T. and Menaghan, E. (1994). *Parents' Jobs and Children's Lives*. Aldine de Gruyter, New York.
- Parcel, T. and Menaghan, E. (1997). "Effects of Low-Wage Employment on Family Well-Being", *Futures of Children*, 7, 116-121.
- Phipps, S. and Burton, P. (1993). "Collective Models of Family Behaviour: Implications for Economic Policy", *Canadian Public Policy - Analyse de Politiques*, 22, 2, 129-43.
- Smith, J., J. Brooks-Gunn, and P. Klebanov. 1997. "Consequences of Living in Poverty for Young Children's Cognitive and Verbal Ability and Early School Achievement." In *Consequences of Growing Up Poor*, edited by Duncan, G., and J. Brooks-Gunn. New York: Russell Sage Foundation. 132-89.
- Statistics Canada (1996). *Women in Canada*. Third Edition. Catalogue No. 89-503E.