Canadian International Labour Network

Labour Market Outcomes:

A Cross-National Study

CILN is a collaberative research venture between the Social Sciences and Humanities Research Council (SSHRC) and McMaster University. Additional funding is provided by the University of British Columbia, the University of Toronto, Queen's University, York University and Human Resources Development Canada (HRDC).

McMaster University

DEPARTMENT OF ECONOMICS

THE ROLE OF PERMANENT INCOME AND FAMILY STRUCTURE IN THE DETERMINATION OF CHILD HEALTH IN THE ONTARIO CHILD HEALTH STUDY

Lori Curtis, Department of Community Health and Epidemiology, Dalhousie University

Martin D. Dooley, Department of Economics, McMaster University

Ellen L. Lipman, Department of Psychiatry, McMaster University

David H. Feeny, Department of Economics and Institute of Pharmaco-Economics, University of Alberta

JEL Classification: I12; I31; I32; J32
Keywords: Child Health; Determinants of Health; Poverty; Lone-mother status.

Contact:

Lori Curtis, PhD
Community Health and Epidemiology
Faculty of Medicine, Dalhousie University
Halifax, Nova Scotia
B3H 4H7
E-mail address: lori.curtis@dal.ca
Phone: (902) 494-7043
Fax: (902) 494-159

Abstract

THE ROLE OF PERMANENT INCOME AND FAMILY STRUCTURE IN THE DETERMINATION OF CHILD HEALTH IN THE ONTARIO CHILD HEALTH STUDY

Lori Curtis, Martin D. Dooley, Ellen L. Lipman and David H. Feeny

We use data from the Ontario Child Health Study to assess how the empirical association between child health and both low-income and family status (lone-mother versus two-parent) changes when we move from a single cross-section to two waves of data. Our measures of health status include categorical indicators and the health utility score derived from the Health Utilities Index Mark 2 (HUI2) system. Consistent with the permanent income hypothesis, we find that most outcomes are more strongly related to low-average income (in 1982 and 1986) than to low-current income in either year. Lone-mother status is also negatively associated with most outcomes, but the lone mother-coefficients did not change significantly when we switched from low-current income to low-average income. This implies that the lone-mother coefficient in single cross-sections is not just a proxy for low permanent income.

1 Introduction

The overall goal of this paper is to improve our understanding of the link between family socioeconomic status and child health. Our ultimate purpose is to inform better the wide range of economic and social policies which have potential impacts on the health and development of children such as social assistance, child or family benefits, education and social support services. Canadian research on these specific policy questions is still at an early stage due to a lack of good data. Until recently, Canada had no national micro-data source with which to study this topic, but this situation has changed with the advent of the new National Longitudinal Survey of Children and Youth (NLSCY). Prior to the NLSCY, the best Canadian data came from the Ontario Child Health Study (OCHS) which provided a two-wave survey of a sample of families with children in 1983 and 1987. A series of studies have used the OCHS data to show that the incidence of psychiatric disorders and poor school performance are higher among poor children compared to non-poor children and among children in lone-parent families compared to children in two-parent families.

We return to OCHS data in this paper with two specific objectives. One objective arises from the fact that few studies of child health and family socioeconomic status have made use of both waves of the OCHS. We do so with several questions in mind. First, we test if child health is more strongly related to "low permanent income" than to "low current income" as would be implied by the permanent income hypothesis. Second, we test if the size of the (negative) relationship between child health and lone-mother status is sensitive to the low-income measure used. One interpretation of "effect" of lone motherhood on child health in cross-sectional studies is that this coefficient represents, in part, a low-permanent-income effect due to the fact that poor lone mothers are known to have longer periods of low income than poor couples. Third, we also assess the relationship between child health and both longer-run and shorter-run measures of family (lone-mother) status.

Our second objective arises from the measures of health status which we use. Most OCHS studies have focused on psychiatric disorders and poor school performance. We employ more global health indicators derived from the Health Utilities Index Mark 2 (HUI2) system. The HUI2 system is comprised of seven attributes (sensation [vision, hearing and speech], mobility, self-care, emotion, pain, cognition, and fertility) with three to five levels of functioning per attribute. A multi-attribute utility function has been estimated for the HUI2 system so that health status can be converted into a utility score reflecting health-related quality of life on a scale from 1.00 (no impairments) to 0.00

(dead). We analyse both the categorical measures of health status from the seven attributes and the health utility score which is a cardinal measure.

Why return to the OCHS data now that the NLSCY offers a much larger and a national random sample? We have several reasons. The first is that only one wave (or cycle) of the NLSCY is currently available. A second is that even when the second cycle is released, the NLSCY data will cover only a two-year span over which there may be relatively little within-family variation in such key variables as child health, income and family type. Third, it is highly important that the sensitivity of one's findings from any source be tested with data from alternative surveys. Our final reason is, we believe, the most substantive. The OCHS and the NLSCY cover two different decades, the 1980's and the 1990's respectively. During this time of span, many policy changes were enacted which were of potential relevance to the well-being of children. Among the most important of these were modifications in health care policy and in several income support programs for families such as social assistance, (un)employment insurance and family/child benefits. Studies of the relationships between child health and family socioeconomic status in each decade may help us to infer the possible impacts of these policy changes on children and their families. The best source of information for Canada in the 1980's is the OCHS. The NLSCY contains very limited retrospective data of any type, no income data prior to 1993 and very few children who were even born when the OCHS was initiated. One final note for readers unfamiliar with Canada is that, even though Ontario is only one of ten provinces (plus two territories), it contains 36% of the national population.

The outline of the paper is as follows. Section 2 contains a brief review of the literature. Section 3 describes the OCHS data and the Health Utilities Index Mark 2. The descriptive statistics and the results of our multivariate analysis are in Section 4. Section 5 is a summary and conclusion.

2 Literature Review

The Ontario Child Health Study was launched in 1983 and there was a follow-up survey in 1987. The principal objective was to estimate the prevalence of child psychiatric disorders, but data were also collected on physical health, social and educational functioning, and a variety of socioeconomic status variables. Most OCHS-based studies of economic disadvantage have used only the1983 data. They have demonstrated a consistent and significant association

between low income (or welfare status) and psychiatric disorder (Offord, Boyle and Jones, 1987). Among 4 to 11 year-old children, for example, the odds of one or more psychiatric disorders (attention deficit hyperactivity disorder, conduct disorder or emotional disorder) for a poor child are more than three times that for a non-poor child (Lipman, Offord and Boyle 1994). Studies of social and educational functioning have demonstrated a similar link between poverty and morbidity (Lipman and Offord 1994). Cadman et al. (1986a) demonstrated above-average rates of chronic physical health problems among children in low-income families.

Three OCHS studies have examined the association between family structure and child psycho-social morbidity. Munroe Blum, Offord and Boyle (1988) found that children in single-parent families were at an increased risk of a variety of psychiatric and academic morbidities, but this relationship weakened with the inclusion of a measure for the receipt of welfare income. However, Lipman and Offord (1996) and Dooley and Lipman (1996) found that both lone-mother status and low-income status had significant independent relationships with poor schooling outcomes and psychiatric disorders. Three studies have focused on changes between the two waves of the OCHS but find that changes in income levels are very weakly correlated with changes in the levels of child health (Lipman and Offord 1996, Lipman, Offord and Boyle 1994 and Boyle et al. 1998).

Other data sets have confirmed the findings from the OCHS. Dooley et al. (1998) used data from Cycle One of the NLSCY and found a significant relationship between child psycho-social health (psychiatric disorders, schooling progress and social functioning) and both lone-mother status and low income. See Duncan and Brooks-Gunn (1996) for studies with non-Canadian data.

3. Data

3.1 The Ontario Child Health Study

The survey methods and instrumentation of the OCHS are described in detail in Boyle et al. (1987) and Offord, Boyle, Racine, et al. (1992). Statistics Canada surveyed a total of 1,869 families and 3,294 children age 4 to 16 in 1983. Information was collected from a parent (usually the mother) for all children, from a teacher for the 4 to 11 year-olds and from the youth for 12 to 16 year-olds. A follow-up survey was administered in early 1987.

Boyle et al. (1991, 1993) report that 27% of the 1983 OCHS sample was lost to attrition by 1987 where attrition

refers not just to observations with "no 1987 information" but also to observations with "(significantly) incomplete 1987 information". They also report that it is common to lose 20% to 30% of the original sample in the first follow-up of surveys concerning childhood psychiatric disorders. Their investigation of the consequences of attrition in the OCHS led to the conclusion that, although the sample loss was not entirely random, estimates of outcome and risk derived using the follow-up would be "reasonably accurate" and estimates of prognosis would "have a downward bias."

Our estimation sample includes 1,317 children out of the original 3,294. The most important single source of sample loss was that all 828 children age 13-16 in 1983 (and 17-20 in 1987) had to be dropped because data on family of origin was not collected for these children in 1987 and, as a result, we were unable to assign them to two-parent or lone-mother families in that year. Hence, all of the children in our sample were 4 to 12 years of age[1] in 1983. The other causes of sample loss were the following: there was no 1987 information for 400 otherwise usable observations; 432 (261) children were missing information for one or more variables which are used in this paper in 1983 (1987); and 56 children lived with a lone father. The economic status of lone fathers is much closer to that of couples than that of lone mothers. Hence, it is inappropriate to combine lone fathers and lone mothers in one group, but the former are too small in number for separate analysis.

We compared the distribution of the outcomes and socioeconomic characteristics of the children in our estimation sample (data are available in both 1983 and 1987) with those of children for whom complete information is available in 1983 only. The only significant differences are that there are slightly fewer poor families and substantially better educated mothers in our estimation sample.

3.2 Socioeconomic Characteristics

The definitions and descriptive statistics for the socioeconomic characteristics which we use as independent variables are presented in Table 1. The first panel contains four measures of low income the first two of which are "cross-sectional" or "current income " variables. These indicate that 15% and 13% of the children were from low-income families in 1982 and 1986 respectively.[2] The "low-average-income" measure indicates that 13% of children were from families which had an average income (in 1982 and 1986) below the LICO. The final measure indicates that 7% of the children were from families that had income below the LICO in both 1982 and 1986.

We hypothesize that brief spells of poverty have a smaller impact on child health than do extended spells. Hence, we anticipated coefficients of greater magnitude and statistical significance from measures of "low-permanent-income" status than from measures of "low-current-income" status, and we generally found this to be the case. In the tables of multivariate results below, we compare estimates obtained with the "low-average-income" measures and with the "current-low-income" measures. The two "low-permanent-income" measures, "low-average income" and "low income in both years", yield results which are similar qualitatively. We have chosen to focus on our estimates with the former for two reasons. First, we believe that the "low-average-income" measure is more reflective of the permanent income hypothesis. Second, the prevalence of "low income in both years" is quite small as indicated in Table 1 and estimates with this variable tended to be less precise.

We do not report estimates of models which make use of the changes in income between 1983 and 1987. At a theoretical level, it is not clear what to expect from such a specification. The economics literature emphasizes the role of permanent income, as opposed to transitory income fluctuations, in many family decisions which might possibly influence child health. Even assuming a role for short-run variations in income, there is no strong consensus in the health sciences literature concerning the lag with which such temporary changes in economic resources might influence child health. Finally, as we indicated on page 3, previous studies and our own efforts indicate that changes in income levels are not strongly and consistently correlated with either the levels of or changes in the levels of child health.

The second panel of Table 1 contains four measures of family structure. As with low income, the first two are "cross-sectional" or "current" measures which indicate that 8% and 9% of the children lived with a lone-mother family (as opposed to with two parents) in 1983 and 1987 respectively. [3] The third measure indicates that 12% of the children lived with a lone mother in either 1983 or 1987 or both. The final variable indicates that 5% of the children lived a lone mother in both 1983 and 1987.

Numerous studies have found a child-health deficit associated with this lone-mother status, but there are several possible interpretations of this finding. One is that the lone-mother coefficient reflects the longer and more severe (bigger poverty gap) periods of low income which poor -lone mothers face compared to poor couples. (Laroche 1998). If true, then one should find a smaller (in absolute size) lone-mother coefficient when controlling for low-permanent income compared to low-current income. Other interpretations of the lone-mother coefficient include, but are not

limited to, insufficient community and family support for lone-mother families and the stress associated with marital breakdown.

One problem with all of these interpretations of the lone mother coefficient in the previous paragraph is that we very imperfectly understand the timing of these possible influences on child health. Consider, for example, the children whom we observe in two-parent families in 1983 and lone-mother families in 1987. Such marriages may have been characterised by high levels of stress or even abuse, the health effects of which are apparent even after the couple split. Kingston-Reichers (1998) found that 53% of women from dissolved first marriages reported physical abuse by their former partner, but that only 15% of currently married women reported physical abuse by their current partner. Next consider the children whom we observe in lone-mother families in 1983 and two-parent families in 1987. While in a single-parent family, such children may have experienced an extended period of severe poverty or of weak community and family support, the health effects of which may be felt beyond the formal period of lone motherhood. Our predictions about the relative size of various measures of lone-mother status were weaker than in the case of low-income status and, in fact, we did not find strong and consistent differences between the coefficients for different measures. The estimates obtained with the "lone mother in both years", which might be expected to show that largest effect, were also the least precise due possibly to the low proportion (5%) of children who lived in a lone-mother family in both 1983 and 1987. In the tables of multivariate results below, we present the estimates obtained with both the "cross-sectional" measures and with the "lone mother in either year" measure. As with low-income status, we do not report estimates of models which use measures of changes in family status. Lipman and Offord (1996) found that changes in child outcomes between 1983 and 1987 did not correlate well with changes in marital status. Our early results indicated the same.

We used only 1983 measures for all other variables. Several studies have found a link between parental education and child health even with controls for income (Dooley and Lipman 1996, Dooley *et al.* 1998). The OCHS data permit us to classify the mothers' schooling levels by the three categories in the third row of Table 1: less than high school (8%); high school (61%); and more than high school (31%).[4] Previous research has also indicated that mothers who are either very young or quite old at the birth of their children may have less healthy offspring (Panis and Lillard, 1994). We were not able to construct a reliable measure of the mother's exact age at birth.[5] We use instead

a simple dummy variable for the 45% of mothers who were age 35 and over in 1983. This variable may reflect many factors including experience both in parenting and in the labour market.

Our sample is restricted to children who were 12 years of age or under in 1983 (16 or under in 1987) due to difficulties in determining family status for the older children in 1987. Previous OCHS papers have often found that older children have more health problems than do younger ones. We use a dummy variable for the 44% of children who were age 8-12 in 1983. We experimented with linear and quadratic specifications for both the age of the mother and the child but these did not fit the data better than the simple step functions which we report below.

Low birth-weight is often associated with both impaired child health (Currie, 1995; Saigal et al. 1994a, b, and 1996) and low socioeconomic status. Hence, we included in our multivariate analyses a dummy variable for the 6% of the children in our sample who had a birth-weight of 5.5 pounds or less. Our objective was both to assess the partial correlation between low birth-weight and child outcomes, and to assess the possible health impacts of lone-mother status, poverty and maternal education independent of the correlation between these variables and low birth-weight.

A family characteristic that is sometimes included in studies of child outcomes and socioeconomic status is the number of children. Family size enters our analysis indirectly via the Low Income Cutoff. The 1983 OCHS data report both family size and the number of siblings but only the former is reported in 1987. In early work for this paper, we experimented both with models which included the number of children in 1983 and with models which included a variable for family size minus the number of parents in 1983 and 1987. These estimates usually indicated a positive but statistically insignificant relationship between child outcomes and the number of children. There were few substantive changes in the other estimates and, hence, we do not report models with this variable included in the tables below.

3.3 Health Outcomes

3.3.1 Description of the Health Utilities Index Mark 2

The Health Utilities Index Mark 2 system (HUI2) is a multi-attribute health status classification system which has been widely used to assess the health status of children (Barr et al. 1993, 1994, 1995; Billson and Walker 1994; Feeny et al. 1992, 1993; Gemke et al. 1995, 1996; Saigal et al. 1994a, 1994b, 1996). The HUI2 is comprised of two

components, the first of which is a seven attribute health status classification system (Feeny et al. 1995, 1996). The second component uses a multi-attribute utility function to translate categorical health status information into cardinal scores on the conventional scale of no impairments equals 1.00 and dead equals 0.00 (Torrance et al. 1995, 1996).

The seven attributes are sensation (vision, hearing, and speech), mobility, emotion, cognition[6], self-care, pain and fertility. The first six HUI2 attributes listed were judged to be the most important out of fifteen attributes of child health status in a survey conducted by Cadman et al. (1984, 1986b). The identification of these six key attributes also informed the construction of the OCHS survey. Fertility was added to capture sub-fertility and infertility sequella associated with some childhood cancers and their treatments.

There are three to five levels per attribute which range from “normal for age” to “severely impaired”. For instance, level 1 for cognition is "learns and remembers school work normally for age" and level 4 (the lowest) is "unable to learn and remember". The levels for each of the six attributes relevant for this study are described in Table 2. There are no fertility data in the OCHS and, therefore, each child is assigned level 1 for this attribute. The information available in the OCHS enabled us to describe 1,920 unique health states. Many of the health states to which we can not assign children describe extremely impaired health states which would be attained by very few, if any, of the children in our sample. See section 3.3.2 below for discussion of the application of the HUI2 to the OCHS.

The HUI2 was originally developed for survivors of childhood cancer. The initial goal was to distinguish among mild, moderate and severe levels of impairment. The levels of each attribute, therefore, were chosen to range from highly impaired to normal. Supra-normal capacity, such as above-normal physical fitness or emotional resilience, was not included. As a result, a high percentage of children in random samples, such as the OCHS, are classified as having no impairments and the HUI2 does not distinguish differences among unimpaired children (possible ceiling effects). Floor effects, on the other hand, pose little problem. The discriminative validity of the HUI2 has been demonstrated in a number of clinical populations including those with relatively few impairments (survivors of standard-risk acute lymphoblastic leukemia, ALL) and those with more severe impairments (survivors of brain tumours).

The valuation of health status in the second component of the HUI2 is based on preference measurements obtained from a random sample of 194 parents of general public school-aged children in Hamilton, Ontario. Parents

were asked to value a number of health states on a visual analog scale and with the standard gamble (based on von Neumann-Morgenstern utility theory). The calculation of the utility score is relatively complex. Torrance et al. (1996) present a simplified method of calculating the utility scores for the multi-attribute health states using both the single attribute and global multiplicative utility functions (also see Keeney and Raiffa 1993). The last column and final row of Table 2 present the simplified formula for calculating the utility scores. The multiplicative form of the utility function captures simple interactions in preferences among attributes. The more simple additive utility function was rejected by the data. Specifically, preferences in the sample revealed complementarity[7] among the attributes that comprise HUI2. The resulting utility scores provide a measure of the desirability of each health state on a scale with interval scale properties. The use of the preference function estimates in the second component of the HUI2 system is not without controversy. Extensive discussions of this topic can be found in Torrance (1986), Dolan (1998), Garber and Phelps (1997) and Johannesson, Jonson and Karlsson (1996). Here we very briefly review two of the more prominent concerns. The first is that the approach we adopt is not consistent with ordinal utility theory and, in particular, requires interpersonal utility comparisons. Our rationale is that, in practice, interpersonal utility comparisons by investigators and policy makers are not only routine but unavoidable. Drawing concrete policy implications from our research requires inter-personal comparisons. The only real choice is whether the basis for these comparisons is to be left implicit, as is ususally done, or to be made explicit. We believe that the latter approach has merit and explore the use of the HUI2 system for this purpose.

There are several systems of axioms within cardinal utility that permit inter-personal comparisons (Harsanyi, Keeney). The HUI2 scoring system is based on von-Neumman-Morgenstern expected utility theory. This theory is widely viewed as the leading normative (prescriptive) model of decision making under risk. The axioms upon which vN-M utilities are based are among the weakest assumptions necessary to obtain a cardinal utility function. HUI2 is based on an extension of vN-M utility theory to consider utility functions with multiple attributes (or dimensions; see Keeney and Raiffa). The theory and underlying assumptions are explicit. This cannot be said for many alternative measures of health status and health-related quality of life. In practical terms, our approach is to examine variations in health-related quality of life under the following arbitrary assumptions (Torrance and Feeny 1989). It is assumed that "everyone" gets the same utility from a year of perfect health and everyone gets the same utility from the lack of

health status (dead). The scoring function is based on "one person, one vote"; it is based on the mean of the responses in the preference measurement survey.

A second major concern with regard to the HUI scoring function is that of "generalizability". The evidence from a wide variety of studies does reveal substantial heterogeneity of preferences for health states among individuals, that is, there is considerable variation in the scores which different individuals will assign to a given state. There is little variation, however, across samples in the mean scores which individuals will assign to a given health state or in the estimated scoring functions. For instance, the original mean scores for the Quality of Well Being scale, which were derived from a random sample of the general population in San Diego, California, differed little from the scores derived from surveys of arthritic patients in the Northeast United States (Balaban et al. 1986) and the general public in Oregon (Kaplan 1994).[8] The same was true of the scoring system estimated for the Sickness Impact Profile in both Seattle, Washington and from an English survey (Patrick et al. 1985). Mean scores for states described using the EuroQol system obtained from postal surveys in several European countries were also very similar (Stouthard and Essink-Bot 1992; Essink-Bot 1993). Furlong (1996) found similar mean utility scores, including HUI2 scores, for a wide variety of health-state descriptions collected from three general population samples in southern Ontario, Canada. Finally, virtually no differences were observed between a HUI2 scoring function based on preference scores from a random sample of parents and from a sample of convenience of parents of children with cancer in Hamilton, Ontario (Torrance et al. 1996).

Studies have also found that individual variation in preference scores associated with a given health state is not correlated with the socioeconomic characteristics of respondents such as age, gender, income, education, religion, and frequency of participation in religious services (Richardson and Nord 1997, Sackett and Torrance 1978, Dolan et al. 1996, Froberg and Kane 1989, Gold et al. 1996, Hadorn and Uebersax 1995 and Furlong 1996.) While interesting, this last finding is not crucial to our study because we use the estimated scoring function to assign the same utility score to all individuals, regardless of socioeconomic characteristics, in a given health state.

3.3.2 Application of the Health Utilities Index Mark 2 to the Ontario Child Health Survey.

We used only the OCHS parental reports to assess child health status. The OCHS did elicit responses from the

youths age 12 to 16 in 1983, but, as indicated above, our sample (age 12 and under) consists mainly of children for whom there are no self-reports. The OCHS also surveyed the teachers of children age 4 to 11 in 1983, but there was too much missing information for these reports to be used in our study. See Curtis (1998) for a detailed description of the manner in which the OCHS responses were used to assign children to the most appropriate attribute levels. In a few cases, there was insufficient information in the OCHS to assign a child to a particular level. (As indicated above, all children were assigned Level 1 for fertility.) There were only two OCHS questions concerning self-care. Children who could "care for themselves" were assigned to level 1 and those who could not to level 2. Furthermore, there was insufficient information to assign children to level 4 in the case of cognition and to level 5 in the case of mobility and pain. Our general strategy was to classify individuals so as to underestimate morbidity whenever any ambiguity existed as to the appropriate assignment of the level for an attribute.

3.3.3 Summary Measures of Outcome Variables

Table 3 contains summary measures for the categorical health indicators in the HUI2 system. We include the proportion of children with no impairments for any attribute, the proportion with no emotional impairment and the proportion with no cognitive impairment. We have singled out emotional and cognitive impairments because these are both the most common problems and the problems most strongly related to socioeconomic characteristics. The second column of Table 3 indicates that just over half (56%) of all children in our sample had no health impairments in 1983 and that this figure fell to 48% in 1987. One-third of the sample had no problems in either year which indicates substantial turnover in the subset of children with an impairment. Emotional problems are the most common and almost one-half (47%) of children have such an impairment in at least one of the two years. Cognitive problems are next most common but 87% of the children have no such problems in either year.

The last four columns of Table 3 show that there are substantial differences in the prevalence of impairments by low-income status and lone-mother status. A significantly higher percentage of the children from two-parent families have no impairments compared to children from lone-mother families. The difference ranges from 5 percentage points for "no emotional problems in 1983" to 18 percentage points for "no health problems in 1983." Furthermore, in all rows except one (no emotional problems in 1983), a significantly higher percentage of children from low-income

families experience problems compared to children from non-low-income families. The differences range from 4 percentage points for "no emotional problems in 1983" to 14 percentage points for "no emotional problems in 1987" and "no emotional problems ever".

Table 4 provides the distribution of the HUI2 utility scores. By this standard, most children in the OCHS have a high health-related quality of life. Averaged between 1983 and 1987, the mean score in the full sample is 0.93 and even the 10th percentile is 0.82. Despite these high scores, the last four columns reveal significant differences between groups. All of the measures in Table 4 indicate a significantly better distribution of scores for children in two-parent families compared to those from lone-mother families. This difference is especially marked at the 10th percentile. Precisely the same is true of differences between children from poor and non-poor families where the greatest differences are in the tail especially at the 10th percentile. In order to place these values in context, the scores of children from two-parent families are similar to scores from other general population groups such as those reported for a control group of children at age 8 by Saigal *et al*. 1994. Our scores for children in lone-mother or poor families are similar to scores reported by Barr et al. (1993) for survivors of high-risk acute lymphoblastic leukemia.

4. Multivariate Results

Tables 5, 6 and 7 contain logit model estimates for the probability of no health problems, no emotional problems and no cognitive problems respectively. Table 8 contains Tobit estimates for the expected value of the utility score and Table 9 contains quantile regression estimates for the 20th percentile of the score. Our efforts are confined to single equation models with a small set of independent variables. We realize that the causal relations among child health, family income and parental status are much more complex than the picture portrayed in these five tables. Unfortunately, the small set of variables in the OCHS contains few if any instruments with which to estimate more elaborate specifications. The relatively small size of the usable sample also limits the number of parameters which we can estimate with precision. The values of the "Pseudo R-squared" are low in an absolute sense (all save one are below 0.10), but are similar in magnitude to what has been found in other studies on this topic.

The main body of Table 5 contains three sets of logit estimates. The first two are for the likelihood of no health problems in 1983 and 1987 respectively and the third set is for the likelihood of no health problems in both 1983 and

1987. All three of these models employ the "lone mother in either year" measure of family status and low-average-income measure of economic status. We also estimated the models for the 1983 and 1987 outcomes using cross-sectional measures of both lone-mother status and low-income status in order to assess the changes in the coefficients for these variables. At the bottom of Table 5, therefore, we present the estimates we obtained for these coefficients when we used cross-sectional measures of each variable and when we used the cross-sectional measure of lone-mother status and low-average income. We present these two sets of additional estimates in order to reveal the impact of changing these variables one at a time. There were only minor changes in the other coefficient estimates and the full set of results is available upon request.

Entries in the column labelled "marg effects" show the partial impact of the variable on the expected value of the dependent variable. The "marginal effect" of the constant represents the conditional probability of no health problems for a child in the omitted category which is a non-poor, non-low-birth-weight daughter, age 4-8, of a married mother who is age <35 with a secondary school education. This value is 0.59 for the first set of estimates in Table 5 which is quite close to the value of the sample proportion (56%). The marginal effect for the lone mother coeffcient indicates the change in the conditional probability of no health problems for a child with the same characteristics as the omitted category, except that she has a lone mother. This change is -0.09 which implies that the predicted conditional probability for such a child is 0.50 = 0.59 - 0.09. Note also that the standard errors in Tables 5 (and 6 and 7) were adjusted, using White's (1980) method, for the fact that some families have more than one child in the sample. This adjustment usually increased the standard errors by a modest amount.

Lone-mother status is weakly associated with the likelihood of no health problems in each of 1983 and 1987 though not in the "Both 1983 and 1987" specification. (We have included the p-values so that readers may apply their own standards of "statistical significance". Given the small size of the sample, we shall refer to a p-value of 0.10 or less as "significant".) The strongest estimates of this coefficient are in 1983 with a cross-sectional measure as shown at the bottom of the table. Note, however, that this particular estimate is not sensitive to the use of low-current-income versus low-average-income. Finally, as indicated in Section 3.2, the addition to the cross-sectional specification of a dummy variable for lone mother-status in both years (or in the non-current) year invariably yields a non-significant coefficient in Tables 5 through 9.

All of the estimated effects of low income, both average and current, and are quite weak in the sense of both coefficient magnitude and statistical precision. The two variables for maternal education always have the expected sign but the only significant coefficient is for less than a high school education and no health problems in both 1983 and 1987. A child with mother age 35 or older has a significantly lower probability of any health problems although this effect is relatively weak in 1987. There is no discernible difference between girls and boys. Older children, however, have a much stronger likelihood of an impairment.

The low birth-weight coefficient is consistently negative but insignificant in Table 5 and in Tables 6 through 9. This may reflect the moderate cutoff (<5.5 pounds) which we use. Those studies which find a significantly negative relationship between low birth-weight and subsequent health (Saigal et al. 1994a, b, and 1996) usually employ a lower threshold of 3.3 pounds (1,500 grams) or even 2.2 pounds (<1,000 grams). Only 6% of our OCHS sample had a birth-weight under 5.5 pounds and only 1.5% were under 4.5 pounds. This latter cutoff also provided negative but statistically insignificant coefficients.

This relatively weak results in Table 5 reflect the fact that variation in four of the six attributes in the HUI2 system (sensation, mobility, self-care and pain) are not strongly related to socioeconomic variables in the OCHS. We turn now to the two attributes with the strongest socioeconomic links - emotion and cognition. In Table 6, the likelihood of no emotional health problems is significantly related to lone-mother status and this coefficient is strongest (in the sense of both marginal effect and p-value) for the cross-section measures as shown in the bottom of the table. Note in the two bottom panels that the (cross-sectional) lone-mother coefficient is stronger in (absolute) size and statistical significance when the "low-current income" is used as opposed to "low-average income". This implies that at least part of the cross-sectional lone-mother coefficient represents an income effect.

None of the low-income coefficients are significant for 1983 outcomes. Low average income, however, has a p-value of 0.10 (or less) for 1987 and for "both 1983 and 1987". The low-income coefficients obtained with the cross-sectional measures are not even of the expected sign. Lone-mother status and low-average income have similar marginal effects. Each variable lowers the predicted probability of no emotional health problems in both 1983 and 1987 from 51% in the omitted category to 42%.

Both measures of mother's education have the expected signs and are significant in the "both 1983 and 1987"

specification. The marginal effects imply a difference of 17 percentage points in the likelihood of a health problem between a mother with no secondary schooling and a mother with post-secondary schooling. The children of older mothers are consistently less likely to have a problem and older children are somewhat more likely to have a problem. Emotional health appears to be unrelated to both the sex of the child and our low birth-weight measure.

Table 7 presents the results for cognitive health problems. The coefficients for lone-mother status are all quite weak. The estimates for low-average income, however, are all significant and have large marginal effects. For example, the final column implies that low income increases the conditional probability of a cognitive health problem by 7 percentage points from 8% in the omitted category to 15%. Note also that low-average income has a much stronger effect than current-low-income measure in 1987 though not in 1983. Table 7 also confirms previous findings that boys have substantially more cognitive problems than do girls. In 1983, there is evidence that older children and the children of mothers with less than high school have a greater probability of an impairment.

Table 8 contains the Tobit function estimates for the expected value of the utility score. The reason for using a Tobit function is that, as shown in Table 3, a very large proportion of the children in our sample have the upper bound value of 1.0 for the HUI2 score in one or both years. The coefficients for lone-mother status and low-average income in the top of the table are all significantly negative and relatively large in magnitude. The seemingly small size of the marginal effects must be placed in the context of the fact that the HUI2 scores only range from 0 to 1.0 and are heavily concentrated in the upper end. A child with the characteristics of the omitted category has an expected score of 0.94 averaged over 1983 and 1987. Both lone-mother and low-income status each lower this expected value by 2 percentage points. The bottom of Table 8 indicates that the lone-mother coefficients are essentially the same regardless of the measure used for either lone-mother or low-income status. However, the difference in the low-income coefficients is dramatic. In 1983 and in1987, low-current income has a very weak (in size and precision) effect and, consistent with the permanent income hypothesis, low-average income has a strong effect.

Maternal schooling of less than high school is significantly and negatively related to the HUI2 score. Post-secondary education for the mother has a positive relationship with the HUI2 score but a p-value of less than 0.10 only in 1983. The children of older mothers have a higher health-related quality of life and the age of the child has a persistently negative association with the HUI2 score. Being a male child has a significantly negative effect in 1983

and on average but not in 1987. As with the categorical outcome measures, we find that low birth-weight has a consistent negative but statistically significant relationship with child health.

The quantile regression estimates for the 20th percentile are presented in Table 9. Our results for the 10th percentile are very similar to those in Table 9 and are available upon request. The estimates for lone-mother status in 1983 are weaker than in Table 8 except when we us the cross-sectional measures for both lone-mother and low-income status. The estimates for low-income status are quite similar to those in Table 8. The coefficients for low-average income are quite significant and predict a difference of 4-7 percentage points which is large given the value in the omitted category of 88%-92% for the 20th percentile. Current-low income, however, yields small coefficients with high p-values. Most of the remaining findings in Table 9 are similar to those in Table 8. The 20th percentile is significantly lower for older children, for boys and for children of younger mothers with less than a high school education.

5 Summary and Conclusion

We use data from the Ontario Child Health Study in order to achieve two objectives. The first is to assess how the empirical association between child health and both income and family status (lone-mother versus two-parent) changes when we move from a single cross-section to two waves of data. Our second objective was to apply the global measures of child health indicators derived from the Health Utilities Index Mark 2 (HUI2) system to the OCHS data. We analyzed both categorical measures of health status and the health utility score which is a cardinal measure.

The majority of Ontario children are very healthy as measured by the HUI2 system. Approximately one-half of the children sample in 1983 have no problems and one-half of the children sample in 1987 have no problems. One-third have no problems in both years. The most common health problems were emotional and cognitive. Over fifty percent report no emotional problems and almost 90% report no cognitive problems at any point in the sample. The good health of Ontario's children is also reflected in the distribution of HUI2 scores. These can can range from 0 to 1, but the mean score over the two years of data is 0.93 and the 10th percentile is 0.80.

A variety of multivariate approaches to the data were employed including logit functions for categorical outcomes (no health problems, no emotional problems and no cognitive problems), and both a tobit function and quantile

regressions for the expected value and "lower percentiles" (20th and 10th) of the health utility score. We estimated models with 1983 outcomes, 1987 outcomes and joint or average outcome measures. Our most notable finding was that the majority of our outcomes are much more strongly related to low-average income (1982 and 1986) than to low-current income. This result not only supports the permanent income hypothesis in a child-health-related context but also demonstrates the importance of gathering income data from multiple periods in population health surveys.

Lone-mother status is also negatively associated with most of our outcome measures and our panel indicated two additional insights about this finding. First, unlike the case of low-income, the size and statistical significance of the lone-mother coefficient did not vary dramatically with the nature of the family-status measure, specifically, if the child was in a lone mother in a given year, either year or both years. When differences were apparent, however, the cross-sectional measure of lone-mother status usually yielded stronger results. This implies that factors concurrent with the actual period of lone motherhood are especially important for child health status. Second, the size and statistical significance of the lone mother-coefficient did not vary systematically with the low-income measure used. This implies that the lone-mother coefficient in single cross-sections is not just a proxy for a more appropriately measured (long-run) low income effect.

An important task for future work is to compare our findings with data from the first two cycles of the NLSCY when the second one becomes available. This will permit us to see if the relationship between child health and socioeconomic factors changed between the quite different economic and social policy environments of the 1980's and the 1990's in Canada and Ontario.

References

Balaban, Donald J., Philip C. Sagi and Neil I. Goldfarb (1986) "Weights for scoring the quality of well-being instrument among rheumatoid arthritics: a comparison to general population weights." Medical Care, 24 (11): 973-980.

Barr, Ronald D., William Furlong, Susan Dawson, Anthony C. Whitton, Ingrid Strautmanis, Mohan Pai, David Feeny, and George W. Torrance, (1993) "An Assessment of Global Health Status in Survivors of Acute Lymphoblastic Leukemia in Childhood." American Journal of Pediatric Haematology/ Oncology; 15 (4): 284-290.

Barr, Ronald D., Mohan K. R. Pai, Sheila Weitzman, David Feeny, William Furlong, Peter Rosenbaum, and George W. Torrance, (1994) " A Multi-Attribute Approach to Health Status Measurement and Clinical Management - Illustrated by an Application to Brain Tumours in Childhood." International Journal of Oncology; 4: 639-648.

Barr, Ronald D., David Feeny, William Furlong, Sheila Weitzman, and George W. Torrance, (1995) "A Preference-Based Approach to Health-Related Quality of Life in Children with Cancer." International Journal of Pediatric Haematology/Oncology; 2: 305-315.

Billson, Amanda L. and David A. Walker, (1994) "Assessment of Health Status in Survivors of Cancer." Archives of Disease in Childhood; 70: 200-204.

Boyle, M.H., D.R. Offord, H.F. Hoffman, G.P. Catlin, J.A. Byles, D.T. Cadman, J.W. Crawford, P.S. Links, N.I. Rae-Grant, and P. Szatmari, (1987) "Ontario Child Health Study: I. Methodology." Archives of General Psychiatry; 44: 826-831

Boyle, M.H., Offord, D. R., Racine, Y. and Catlin, G. (1991) "Ontario Child Health Study Follow-up: Evaluation of Sample Loss." Journal of the American Academy of Child and Adolescent Psychiatry, 30: 449-456.

Boyle, M.H., Wheaton, B., Offord, D. R., Racine, Y. and Catlin, G. (1993) "Ontario Child Health Study Follow-up: Evaluation of Sample Loss Part II." In Symposium 92 Design and Analysis of Longitudinal Surveys Proceedings. Edited by J. Armstrong, N. Darcovich and P. Lavalee. Ottawa: Statistics Canada.

Boyle, M.H., D. R. Offord, Y. A. Racine, E.L. Lipman, and R. Mazumdar, (1998) "Influence of Child, Parent and Family Characteristics on Childhood Problem Behaviour." Centre for Studies of Children at Risk, McMaster University.

Cadman, David, Charles C. Goldsmith, and P. Bashim, (1984) "Values, preferences, and decisions in the care of children with developmental disabilities." Developmental and Behaviourial Pediatrics; 5: 60-64.

Cadman, D., Boyle, M.H., Offord, D.R., Szatmari, P., Rae-Grant, N.I., Crawford, J., Byles, J. (1986a) "Chronic illness and functional limitation in Ontario children: findings of the Ontario Child Health Study." Canadian Medical Association Journal; 135:761-767.

Cadman, David, and Charles Goldsmith, (1986b) "Construction of Social Value or Utility-Based Health Indices: The Usefulness of Factorial Experimental Design Plans." Journal of Chronic Disease; 39 (8): 643-651.

Currie, Janet (1995) "Socio-Economic Status and Child Health: Does Public Health Insurance Narrow the Gap?" Scandinavian Journal of Economics; 9(4):603-620.

Curtis, L. J. (1998) "The Health Utility Index Mark 2: Applying the Health Utility Index to the Ontario Child Health Survey Data", Chapter 4 of "The Health Status of Mothers and Children", Ph.D. Thesis, Department of Economics, McMaster University.

Dolan, Paul, Claire Gudex, Paul Kind, and Alan Williams., (1996) "The time trade-off method: results from a general population study." Health Economics, 5 (2):141-154.

Dooley, M.D., Lipman, E.L., (1996) "Child psychiatric disorders and poor school performance: the roles of family type, maternal market work and low income." In: Towards the XXIst Century: Emerging Sociodemongraphic Trends and Policy Issues in Canada. Proceedings of a Symposium of the Federation of Canadian Demographers.

Dooley, M.D., Lori Curtis, Ellen Lipman and David Feeny, (1998) "Child Behaviour Problems, Poor School Performance and Social Problems: The Roles of Family Structure and Low Income in Cycle One of the National Longitudinal Survey of Children and Youth." In Labour Markets, Social Institutions, and the Future of Canada's Children. Edited by Miles Corak, Statistics Canada.

Duncan, G., Brooks-Gunn, J., (1996) Growing Up Poor, Russell Sage Foundation: New York Press.

Essink-Bot, Marie-Louise, Marlies E. A. Stouthard, Gouke J. Bonsel. (1993) "Generalizability of valuation on health states collected with the EuroQol questionnaire." Health Economics, 2(3): 237-246.

Feeny, David, William Furlong, Ronald D. Barr, George W. Torrance, Peter Rosenbaum, and Sheila Weitzman, (1992) "A Comprehensive Multiattribute System for Classifying the Health Status of Survivors of Childhood Cancer." Journal of Clinical Oncology; 10 (6): 923-928.

Feeny, David H., Alison Leiper, Ronald D. Barr, William Furlong, George W. Torrance, Peter Rosenbaum, and Sheila Weitzman, (1993), "The Comprehensive Assessment of Health Status in Survivors of Childhood Cancer: Application to High-Risk Acute Lymphoblastic Leukaemia." British Journal of Cancer; 67: 1047-1052.

Feeny, David, William Furlong, Michael Boyle, and George W. Torrance, (1995) "Multi-Attribute Health Status Classification Systems: Health Utilities Index." PharmacoEconomics; 7 (6): 490-502.

Feeny, David H., George W. Torrance, and William J. Furlong, (1996) "Health Utilities Index," In Bert Spilker, ed. Quality of Life and Pharmacoeconomics in Clinical Trials. Second Edition. Philadelphia: Lippincott-Raven Press, pp 239-252.

Froberg, D.G. and R.L. Kane., (1989) "Methodology for measuring health-state preferences-III: population and context effects." Journal of Clinical Epidemiology, 42 (6):585-592.

Furlong, William J., (1996) "Variability of utility scores for health states among general population groups." MSc thesis, McMaster University.

Gold, Marthe R., Donald L. Patrick, George W. Torrance, Dennis G. Fryback, David C. Hadorn, Mark S. Kamlet, Norman Daniels, and Milton C. Weinstein., (1996) "Identifying and valuing outcomes," Chapter 4 in Marthe R. Gold, Joanne E. Siegel, Louise B. Russell, and Milton C. Weinstein, eds., Cost-Effectiveness in Health and Medicine. New York: Oxford University Press, pp 82-134.

Hadorn, David D., and J. Uebersax, (1995) "Large-scale outcome evaluation: how should quality of life be measured? I. Calibration of a brief questionnaire and a search for preference subgroups." Journal of Clinical Epidemiology, 46:607-618

Garber, A.M. and Phelps, C. E., (1997) "Economic foundations of cost-effectiveness analysis." Journal of Health Economics, 16(1):1-31.

Gemke, Reinoud J. B. J., Gouke J. Bonsel, and A. Johannes van Vught, (1995) "Long Term Survival and State of Health after Paediatric Intensive Care." Archives of Disease in Childhood; 73 (September): 196-201.

Gemke, Reinoud J. B. J., and Gouke J. Bonsel (1996) "Reliability and Validity of a Comprehensive Health Status Measure in a Heterogenous Population of Children Admitted to Intensive Care." Journal of Clinical Epidemiology., 49(3):327-333.

Johannesson, M., B. Jonsson, and G. Karlsson (1996) "Outcome Measurement in Economic Evaluation." Health Economics, 5(4):279-296.

Keeney, Ralph L., and Howard Raiffa, (1993) Decisions with Multiple Objectives: Preferences and Value Tradeoffs. New York: Cambridge University Press, First Edition: John Wiley & Sons.

Kaplan, Robert M. (1994) “Value judgement in the Oregon medicaid experiment.” Medical Care, 32 (10):975-988.

Kingston-Riechers, JoAnn, (1998) "The Association Between the Frequency of Wife Assault and Marital Dissolution" Chapter II in The Association Between Wife Assault and the Socioeconomic Characteristics of Women and their Families. PhD. Dissertation, McMaster University.

Laroche, Mireille. 1998. “In and Out of Low Income.” Canadian Social Trends, 50: 20-24.

Lipman, E.L., Offord, D.R. (1994). Disadvantaged children. In The Canadian Guide to Clinical Preventive Health Care. The Canadian Task Force on the Periodic Health Examination, Minister of Supply & Services Canada, Ottawa, Ontario, (Cat. No. H21-117/1994E), pp 356-368.

Lipman, E.L., Offord, D.R., Boyle, M.H. (1994). Economic disadvantage and child psycho-social morbidity. Canadian Medical Association Journal; 151:431-437.

Lipman, E.L., Offord, D.R. (1996). Psychosocial morbidity among poor children in Ontario. In: G. Duncan, J. Brooks-Gunn (eds.), Growing Up Poor. Russell Sage Foundation.

Lipman, E.L., Offord, D.R., Dooley, M.D., 1996, “What do we know about children from single-mother families? Questions and answers from the National Longitudinal Survey of Children and Youth.” Release 1 NLSCY publication.

Munroe Blum, H., Boyle, M.H., Offord, D.R. (1988). Single parent families: child psychiatric disorder and school performance. Journal of the American Academy of Child and Adolescent Psychiatry; 27:214-219.

Offord, D.R., Boyle, M.H., Jones, B.R., (1987) “Psychiatric disorder and poor school performance among welfare children in Ontario.” Canadian Journal of Psychiatry; 32:518-525.

Offord, D.R., Boyle, M.H., Racine, Y.A. et al., (1992) Outcome, prognosis and risk in a longitudinal follow-up study. Journal of the American Academy of Child and Adolescent Psychiatry; 31:916-923.

Offord, D.R., Bennett, K., (1994) “Conduct disorder: long-term outcomes and intervention effectiveness.” Journal of the American Academy of Child and Adolescent Psychiatry; 33: 1069-1078.

Panis, C.WA. and L.A. Lillard, (1994) “Health Inputs and Child Mortality: Malaysia.” Journal of Health Economics, 13: 455-489.

Patrick, D.L., Y. Sittampalam, S.M. Somerville, W.B. Carter and M. Bergner,(1985) “A cross-cultural comparison of health status values.” American Journal of Public Health, 75:1402-1407.

Richardson, Jeff, and Erik Nord, (1997) “The Importance of Perspective in the Measurement of Quality-Adjusted Life Years.” Medical Decision Making, 17(1):33-41.

Sackett, David L. and George W. Torrance, (1978) “The utility of different health states as perceived by the general public.” Journal of Chronic Diseases, 31(11):697-702.

Saigal, Saroj, David Feeny, William Furlong, Peter Rosenbaum, Elizabeth Burrows, and George Torrance, (1994a) "Comparison of the Health-Related Quality of Life of Extremely Low Birthweight Children and a Reference Group of Children at Age Eight Years." Journal of Pediatrics; 125 (3): 418-425.

Saigal, Saroj, Peter Rosenbaum, Barbara Stoskopf, Lorraine Hoult, William Furlong, David Feeny, Elizabeth Burrows, and George Torrance, (1994b) "Comprehensive Assessment of the Health Status of Extremely Low Birthweight Children at Eight Years of Age: Comparison with a Reference Group." Journal of Pediatrics; 125 (3): 411-417.

Saigal, Saroj, David Feeny, Peter Rosenbaum, William Furlong, Elizabeth Burrows, Barbara Stoskopf, and Lorraine Hoult, (1996) "Self-Perceived Health Status and Health-Related Quality of Life of Extremely Low Birthweight Teenagers: Comparison with Term Controls." Journal of the American Medical Association., 276(6):453-459.

Stouthard, MEA and M.L. Essink-Bot, (1992) "EuroQol 1991 – the rotterdam survey results." In: Bjork S, ed. EuroQol Conference Proceedings. Lund: IHE Working Paper.

Torrance, George W., (1986), "Measurement of Health State Utilities for Economic Appraisal - A Review." Journal of Health Economics, 5(1):1-30.

Torrance, George W., and David Feeny, (1989), "Utilities and Quality-Adjusted Life Years." International Journal of Technology Assessment in Health Care, 5(4):559-575.

Torrance, George W., William Furlong, David Feeny, and Michael Boyle, (1995), "Multi-Attribute Preference Functions: Health Utilities Index." PharmacoEconomics; 7 (6): 503-520.

Torrance, George W., David H. Feeny, William J. Furlong, Ronald D. Barr, Yueming Zhang, and Qinan Wang, (1996), "Multi-Attribute Preference Functions for A Comprehensive Health Status Classification System: Health Utilities Index Mark 2." Medical Care; 34 (7): 1-21.

White, H., (1980), "A Heteroskedasticity-consistent Covariance Matrix Estimator And A Direct Test For Heteroskedasticity." Econometrica; 48: 817-830.

Endnotes

The support of Statistics Canada, the National Health Research and Development Program, the Social Sciences and Humanities Research Council, the Ontario Mental Health Foundation and the Canadian International Labour Network is gratefully acknowledged.

1. There are 3 children who were 13 in 1983 but were 16 when interviewed in 1987. Except for these 3, all children were 12 years of age or under in 1983.

2. The only income information in the two OCHS surveys is a categorical measure of total family income in 1982 or 1986 recorded in increments of $5,000 up to a maximum category of $60,000 or more. The amounts of income received from different sources, such as individual earnings, are not reported. The information on family size and area of residence in the OCHS was sufficient to assign to each family its approximate Statistics Canada Low Income Cutoff (LICO), and therefore low-income status, based on the 1969 Survey of Family Expenditures. The nature of the data made it difficult to apply LICOs based on more recent Surveys of Family Expenditures.

3. The only information available in the OCHS is the child's current living arrangements which, in some cases, will not provide an accurate picture of the family structure(s) in which the child has been raised.

4. Mother's education did change over the time period for 33% of the children. For 13% of the total sample, however, the mother's educational level decreased between 1983 and 1987. It is possible for a female parent's educational level to have decreased in this data if divorce and remarriage has occurred over the period. That is, it is possible for a child to have a new female "parent" in 1987 who has less education than the previous parent. We find it unlikely, though, that this is the case for 13% of the children. Therefore, we did not use the change in mother's education in our analyses.

5. When we subtracted the age of the child from the age of the mother, the resulting values ranged 10 to 55. This very wide range may reflect not just measurement error but also the fact that the person identified in the survey as the child's mother is not necessarily the biological mother. Unfortunately there is no information to determine whether a child is part of a step or blended family.

6. The underlying concept for the attribute cognition in the HUI2 is intellectual capacity with respect to memory, thinking and problem solving. The focus is on capacity, but the description of the levels for this attribute can be interpreted as performance based. The questions in the OCHS are geared towards problems in learning and performance in school performance indicators. For convenience sake, we will continue to use the term cognition but as more accurate description would be "cognitive impairments or learning and schooling problems."

7. Consider the following illustrative thought experiment. State A represents the "disutility", the decrement in health-related quality of life, associated with going from level 1 cognition to level 4 cognition while holding all other attributes at level 1. State B represents the disutility in going from level 1 emotion ("generally happy and free from worry") to level 5 emotion ("extremely fretful, angry, irritable, or depressed, usually requiring hospitalization or psychiatric institutional care") while holding all other attributes at level 1. State C represents the disutility of simultaneously going from level 1 cognition to level 4 cognition and from level 1 emotion to level 5 emotion, while the remaining five attributes are still at level 1. The complementarity interaction among attributes implies that the disutility associated with State C is less than the sum of the disutilities associated with States A and B.

8. The Quality of Well Being scale is a multi-attribute system based on mobility, physical activity, social activity, and symptom or problem complex. The Sickness Impact Profile was designed to assess morbidity and covers twelve dimensions of health status. There have been two majro versions of the EuroQol system, one with six attributes and one with five attributes, that are similar but not identical to those in the HUI2 system.

Table 1

Independent Variables: Definitions and Descriptive Statistics

Total Sample	1317
Low Income 1982 Family income ≤ Statistics Canada Low Income Cutoff [a]	200 (15%)
1986 Family income ≤ Statistics Canada Low Income Cutoff	170 (13%)
Average of 1982 income and 1986 income ≤ Statistics Canada Low Income Cutoff	172 (13%)
Both 1982 and 1986 Family income ≤ Statistics Canada Low Income Cutoff	89 (7%)
Lone Mother Child lives with a lone mother (as opposed to two-parents) in 1983.	103 (8%)
Child lives with a lone mother in 1987	118 (9%)
Child lives with a lone mother in either 1983 or 1987.	152 (12%)
Child lives with a lone mother in both 1983 and 1987.	69 (5%)
Mother's Education Mother's Education is Less than Secondary	106 (8%)
Mother's Education is Secondary	805 (61%)
Mother's Education is More than Secondary	406 (31%)
Mother's Age Mother was Age 34 or less in 1983.	587 (45%)
Child's Age Child was Age 4-7 (as opposed to 8-12) in 1983	580 (44%)
Sex Child is Male	668 (51%)
Low Birth-weight Child was less than 5.5 pounds at birth.	84 (6%)

[a] Based on 1969 Survey of Family Expenditures

Table 2

Health Utilities Index Mark 2 (HUI2)

Attribute	Level	Description[1]	b[2]
Sensation	1	Ability to see, hear and speak normally for age.	1.00
	2	Requires equipment to see or hear or speak.	0.95
	3	Sees, hears, or speaks with limitations even with equipment.	0.86
	4	Blind, deaf or mute.	0.61
Mobility	1	Able to walk, bend, lift, jump, and run normally for age.	1.00
	2	Walks, bends, lifts, jumps, or runs with some limitations but does not require help.	0.97
	3	Requires mechanical equipment (such as canes, crutches, braces or wheelchair) to walk or get around independently.	0.84
	4	Requires the help of another person to walk or get around and requires mechanical equipment as well.	0.73
	5	Unable to control or use arms and legs.	0.58
Emotion	1	Generally happy and free from worry.	1.00
	2	Occasionally fretful, angry, irritable, anxious, depressed or suffering night terrors.	0.93
	3	Often fretful, angry, irritable, anxious, depressed or night terrors.	0.81
	4	Almost always fretful, angry, irritable, anxious, depressed.	0.70
	5	Extremely fretful, angry, irritable or depressed usually requiring hospitalization or psychiatric institutional care.	0.53
Cognition	1	Learns and remembers school work normally for age.	1.00
	2	Learns and remembers school work more slowly than classmates as judged by parents and/or teachers.	0.95
	3	Learns and remembers very slowly and usually requires special educational assistance.	0.88
	4	Unable to learn and remember.	0.65
Self Care	1	Eats, bathes, dresses, and uses the toilet normally for age.	1.00
	2	Eats, bathes, dresses, or uses the toilet independently with difficulty.	0.97
	3	Requires mechanical equipment to eat, bathe, dress, or use the toilet independently.	0.91
	4	Requires the help of another person to eat, bathe, dress or use toilet.	0.80
Pain	1	Free of pain and discomfort.	1.00
	2	Occasional pain. Discomfort relieved by non-prescription drugs or self-control activity without disruption of normal activities.	0.97
	3	Frequent pain. Discomfort relieved by oral medicines with occasional disruption of normal activities.	0.85
	4	Frequent pain; frequent disruption of normal activities, discomfort requires prescription narcotics for relief.	0.64
	5	Severe pain. Pain not relieved by drugs and constantly disrupts normal activities.	0.38
Fertility	1	Able to have children with a fertile spouse.	1.00
	2	Difficulty having children with a fertile spouse.	0.97
	3	Unable to have children with a fertile spouse.	0.88

Formula U*=1.06 (B1*b2*b3*b4*b5*b6*b7)-0.06[2]
Where U* Is the Utility of the Health State on a Utility Scale of 0.00 (Dead) to 1.00 (Healthy)

[1]Source: Torrance Et. Al. 1996, P. 706.
[2]Source: Torrance Et. Al. 1996, P. 716.

Table 3

Percentage of Children With No Health Problems (Level 1 in Table 2) By Family Status and Poverty Status

Type of Family	Total	Two-Parent	Lone-Mother	Non-Low Income	Low Average Income
No Health Problems in 1983	56%	58%	40%*	57%	49%*
No Health Problems in 1987	48%	49%	37%*	49%	38%*
No Health Problems in 1983 and 1987	33%	34%	26%*	34%	26%*
No Emotional Problems in 1983	70%	71%	66%*	71%	67%
No Emotional Problems in 1987	66%	68%	54%*	68%	54%*
No Emotional Problems in 1983 and 1987	53%	55%	40%*	55%	41%*
No Cognitive Problems in 1983	92%	92%	85%*	93%	84%*
No Cognitive Problems in 1987	91%	92%	86%*	92%	83%*
No Cognitive Problems in 1983 and 1987	87%	88%	78%*	88%	75%*

* difference between two-parent and lone-mother or between non-poor and poor is significant at the 5% level. Sample size = 1,317.

Table 4

Distribution of HUI2 Utility Score by Family Status and Poverty Status

Type of Family	Two-Parent	Lone-Mother	Non-Low Income	Low Average Income	Total
Mean Utility Score in 1983	0.94	0.90*	0.94	0.92*	0.94
20th Percentile in 1983	0.93	0.80*	0.93	0.83*	0.90
10th Percentile in 1983	0.80	0.75*	0.80	0.76*	0.80
Mean Utility Score in 1987	0.93	0.88*	0.93	0.88*	0.92
20th Percentile in 1987	0.85	0.80*	0.85	0.79*	0.81
10th Percentile in 1987	0.80	0.68*	0.80	0.71*	0.78
Mean of the Average Score**	0.94	0.90*	0.94	0.90*	0.93
20th Percentile - Average Score	0.90	0.83*	0.89	0.82*	0.88
10th Percentile - Average Score	0.84	0.71*	0.84	0.72*	0.82

* significantly different at the 5% level. Sample size = 1,317
**Average refers to the mean of the individual's scores for 1983 and 1987.

Table 5

Logit Estimates for Probability of No Health Problems

	1983			1987			Both 1983 and 1987		
	Coef	p value	Marg effect	Coef	p value	Marg effect	Coef	p value	Marg effect
Lone Mother (Ever) [a]	-0.37	.07	-0.09	-0.35	.11	-0.09	-0.20	.38	-0.04
Low Average Income [b]	-0.11	.61	-0.03	-0.23	.30	-0.06	-0.17	.47	-0.04
Mother's Education < High School	-0.34	.17	-0.08	-0.40	.13	-0.10	-0.55	.06	-0.11
Mother's Education > High School	0.20	.14	0.05	0.05	.72	0.01	0.14	.34	0.03
Mother Age > 34	0.37	.01	0.08	0.20	.12	0.05	0.42	.00	0.10
Male	-0.10	.40	-0.02	0.13	.24	0.03	0.10	.40	0.02
Age 8-12	-0.40	.00	-0.10	-0.43	.00	-0.11	-0.48	.00	-0.10
Low Birth-weight	-0.30	.21	-0.07	-0.14	.56	-0.04	-0.26	.33	-0.05
Constant	0.37	.01	0.59	0.05	.69	0.51	-0.67	.00	0.34
Pseudo R2	0.02			0.02			0.02		
From Logits With Cross-Sectional Measures Only									
	Coef	p value	Marg effect	Coef	p value	Marg effect			
Lone Mother (current)	-0.62	.01	-0.15	-0.30	.22	-0.07			
Low Current Income	-0.03	.87	-0.01	0.12	.60	0.03			
Logits With Cross-Sectional Measure of Family Status and Low Average Income									
Lone Mother (current)	-0.60	.01	-0.15	-0.12	.50	-0.02			
Low Average Income [b]	-0.07	.74	-0.02	-0.31	.14	-0.08			

Sample size = 1317. The omitted category is girls, age 4-11, non-low birth-weight, from a non-poor, two-parent family, with a mother who is age <35 and has a secondary education. Standard errors are estimated using White's (1980) method which takes account of sibling status.

[a] Child lives with a lone mother in either 1983 or 1987.

[b] Average of 1982 income and 1986 income ≤ LICO.

Table 6

Logit Estimates for Probability of No Emotional Health Problems

	1983			1987			Both 1983 and 1987		
	Coef	p value	Marg effect	Coef	p value	Marg effect	Coef	p value	Marg effect
Lone Mother (Ever) [a]	-0.38	.09	-0.09	-0.36	.09	-0.08	-0.33	.11	-0.08
Low Average Income[b]	-0.12	.59	-0.03	-0.33	.10	-0.08	-0.36	.08	-0.09
Mother's Education < High School	-0.22	.41	-0.05	-0.54	.02	-0.13	-0.43	.07	-0.11
Mother's Education > High School	0.29	.08	0.06	0.21	.16	0.04	0.26	.06	0.06
Mother Age > 34	0.57	.00	0.11	0.24	.08	0.05	0.41	.00	0.10
Male	0.03	.75	0.01	0.03	.81	0.01	0.06	.60	0.01
Age 8-12	-0.28	.03	-0.07	-0.17	.16	-0.04	-0.25	.03	-0.06
Low Birth-weight	-0.24	.34	-0.06	-0.07	.78	-0.02	-0.15	.51	-0.04
Constant	0.72	.00	0.67	0.70	.00	0.67	0.06	.67	0.51
Pseudo R2	.03			.02			.03		
From Logits With Cross-Sectional Measures Only									
	Coef	p value	Marg effect	Coef	p value	Marg effect			
Lone Mother (current)	-0.58	.03	-0.14	-0.45	.06	-0.11			
Low Current Income	0.10	.67	0.02	0.08	.72	0.02			
Logits With Cross-Sectional Measure of Family Status and Low Average Income									
Lone Mother (current)	-0.48	.07	-0.12	-0.26	.26	-0.06			
Low Average Income[b]	-0.12	.60	-0.03	-0.38	.06	-0.09			

Sample size = 1317. The omitted category is girls, age 4-11, non-low birth-weight, from a non-poor, two-parent family, with a mother who is age <35 and has a secondary education. The standard errors are estimated using White's (1980) method which takes account of sibling status.

[a] Child lives with a lone mother in either 1983 or 1987.

[b] Average of 1982 income and 1986 income ≤ LICO.

Table 7

Logit Estimates for Probability of No Cognitive Problems

	1983			1987			Both 1983 and 1987		
	Coef	p value	Marg effect	Coef	p value	Marg effect	Coef	p value	Marg effect
Lone Mother (Ever) [a]	-0.50	.20	-0.02	-0.28	.35	-0.02	-0.40	.16	-0.04
Low Average Income[b]	-0.72	.05	-0.03	-0.70	.01	-0.05	-0.68	.01	-0.07
Mother's Education < High School	-0.60	.09	-0.02	-0.41	.26	-0.03	-0.35	.28	-0.03
Mother's Education > High School	0.27	.33	0.01	0.19	.43	0.01	-0.24	.26	0.02
Mother Age > 34	0.21	.39	0.01	0.20	.33	0.01	0.26	.17	0.02
Male	-0.83	.00	-0.04	-0.78	.00	-0.06	-0.71	.00	-0.07
Age 8-12	-0.74	.00	-0.03	0.11	.62	0.01	-0.18	.32	-0.02
Low Birth-weight	-0.21	.58	-0.01	0.08	.84	0.01	-0.34	.26	-0.03
Constant	3.5	.00	0.97	2.74	.00	0.94	2.40	.00	0.92
Pseudo R2	.07			.04			.04		
From Logits With Cross-Sectional Measures Only									
	Coef	p value	Marg effect	Coef	p value	Marg effect			
Lone Mother (current)	-0.29	.53	-0.01	-0.28	.41	-0.02			
Low Current Income	-0.74	.02	-0.03	0.35	.24	-0.03			
Logits With Cross-Sectional Measure of Family Status and Low Average Income									
Lone Mother (current)	-0.32	.52	-0.01	-0.12	.70	-0.01			
Low Average Income[b]	-0.81	.02	-0.04	-0.77	.00	-0.05			

Sample size = 1317. The omitted category is girls, age 4-11, non-low birth-weight, from a non-poor, two-parent family, with a mother who is age <35 and has a secondary education. The standard errors are estimated using White's (1980) method which takes account of sibling status.

[a] Child lives with a lone mother in either 1983 or 1987.

[b] Average of 1982 income and 1986 income ≤ LICO.

Table 8

Tobit Estimates of HUI2 Utility Score

	1983			1987			Average of 1983 and 1987		
	Coef	p value	Marg effect	Coef	p value	Marg effect	Coef	p value	Marg effect
Lone Mother (Ever) [a]	-0.04	.02	-0.02	-0.05	.01	-0.02	-0.03	.01	-0.02
Low Average Income [b]	-0.03	.08	-0.01	-0.04	.01	-0.02	-0.03	.00	-0.02
Mother's Education < High School	-0.04	.07	-0.02	-0.04	.04	-0.02	-0.03	.01	-0.02
Mother's Education > High School	0.02	.08	0.01	0.002	.86	0.001	0.01	.30	0.005
Mother Age > 34	0.04	.00	0.01	0.03	.03	0.01	0.02	.00	0.01
Male	-0.02	.05	-0.01	-0.01	.50	-0.004	-0.01	.09	-0.01
Age 8-12	-0.04	.00	-0.02	-0.03	.01	-0.02	-0.02	.00	-0.02
Low Birth-weight	-0.02	.32	-0.01	-0.02	.47	-0.01	-0.01	.33	-0.01
Constant	1.05	.00	0.95	1.0	.00	0.93	0.97	.00	0.94
Pseudo R2	.09			.08			.14		
From Tobits With Cross-Sectional Measures Only									
	Coef	p value	Marg effect	Coef	p value	Marg effect			
Lone Mother (current)	-0.06	.00	-0.03	-0.06	.01	-0.03			
Low Current Income	-0.01	.45	-0.01	-0.01	.74	-0.003			
Tobits With Cross-Sectional Measure of Family Status and Low Average Income									
Lone Mother (current)	-0.06	.02	-0.03	-0.04	.06	-0.02			
Low Average Income [b]	-0.03	.08	-0.01	-0.05	.01	-0.02			

Sample size = 1317. The omitted category is girls, age 4-11, non-low birth-weight, from a non-poor, two-parent family, with a mother who is age <35 and has a secondary education.

[a] Child lives with a lone mother in either 1983 or 1987.

[b] Average of 1982 income and 1986 income ≤ LICO.

Table 9

Quantile Regression (20th Percentile) - HUI2 Utility Score

	1983		1987		Average of 1983 and 1987	
	Coef	p value	Coef	p value	Coef	p value
Lone Mother (Ever) [a]	-0.03	.29	-0.06	.00	-0.04	.16
Low Average Income [b]	-0.07	.01	-0.07	.00	-0.04	.03
Mom's Ed< High School	-0.06	.11	-0.04	.09	-0.03	.06
Mom's Ed> High School	0.002	.86	0.00	.99	0.001	.87
Mother's Age > 34	0.02	.21	0.05	.03	0.03	.00
Male	-0.03	.01	-0.07	.00	-0.03	.00
Age 8-12	-0.02	.11	-0.01	.68	-0.02	.00
Low Birth-weight	0.002	.93	-0.02	.44	0.00	.99
Constant	0.92	.00	0.88	.00	0.90	.00
Pseudo R2	.04		.05		.05	
From Regressions With Cross-Sectional Measures Only						
Lone Mother (current)	-0.08	.05	-0.07	.01		
Low Current Income	0.01	.89	-0.01	.37		
Regressions With Cross-Sectional Measure of Family Status and Low Average Income						
Lone Mother (current)	-0.05	.11	-0.06	.02		
Low Average Income [b]	-0.06	.09	-0.06	.00		

Sample size = 1317. The omitted category is girls, age 4-11, non-low birth-weight, from a non-poor, two-parent family, with a mother who is age <35 and has a secondary education. A bootstrapping procedure was used to calculate the standard errors.

[a] Child lives with a lone mother in either 1983 or 1987.

[b] Average of 1982 income and 1986 income ≤ LICO.

CILN Working Papers (downloadable)

wp43 **John Flemming John Micklewright**
Income Distribution, Economic Systems and Transition

wp42 **John Micklewright Kitty Stewart**
Is Child Welfare Converging in the European Union?

wp41 **W Bentley Macleod**
A Note on the Optimality of Bonus Pay

wp40 **Xin Meng Robert G Gregory**
Impact of Interupted Education on Earnings:
The Educational Cost of the Chinese Cultural Revolution

wp39 **Miles Corak**
Death and Divorce: The Long Term Consequences of Parental Loss on Adolescents

wp38 **Lori Curtis Martin Dooley**
Child Health and Family Socioeconomic Status in the Canadian National Longitudinal Survey of Children and Youth

wp37 **Heather Antecol**
An Examination of Cross-Country Differences in the Gender Gap in Labor Force Participation Rates

wp36 **W. Craig Riddell**
Canadian Labour Market Performance in International Perspective: Presidential Address to the Canadian Economics Association

wp35 **Shelley Phipps**
Economics and Well-Being of Canadian Children

wp34 **W. Craig Riddell**
Measuring Unemployment and Structural Unemployment

wp33 **Susan Johnson**
Automatic Certification or Mandatory Representation Votes? How the choice of union recognition procedure affects union certification success.

wp32 **James Andreoni Eleanor Brown Isaac C. Rischall**
Charitable Giving by Married Couples: Who Decides and Why Does it Matter?

wp31 **Herb Schuetze Peter Kuhn**

Self-Employment Dynamics and Self-Employment Trends: A Study of Canadian Men and Women, 1982-1995

wp30 **Isaac C. Rischall**
The Effect of High School Effort on Future Earnings

wp29 **Isaac C. Rischall**
The Roles of Education, Skill and Parental Income in Determining Wages

wp28 **Isaac C. Rischall**
The Value of a Fresh Start: Earnings Persistence and the Migration of Single Mothers

wp27 **Martin Browning Tom Crossley**
Shocks, Stocks and Socks: Consumption Smoothing and the Replacement of Durables During an Unemployment Spell

wp26 **Heather Antecol Kelly Bedard**
Against All Odds: The Surprising Labor Market Success of Young Mexican Women

wp25 **Heather Antecol**
Why is there Inter-Ethnic Variation in the Gender Wage Gap? The Role of "Cultural" Factors

wp24 **Martin Browning Tom Crossley**
Unemployment Insurance Benefit Levels and Consumption Changes

wp23 **Heather Antecol Peter Kuhn**
Employment Equity Programs and the Job Search Outcomes of Men and Women: Actual and Perceived Effects

wp22 **Thomas F. Crossley**
Firms and Wages: Evidence from Displaced Workers

wp21 **Jennifer Stewart Martin Dooley**
The Duration of Spells on Welfare and Off-welfare among Lone Mothers in Ontario

wp20 **Peter Kuhn Arthur Sweetman**
Vulnerable Seniors: Unions, Tenure and Wages Following Permanent Job Loss

wp19 **Kelly Bedard**
Human Capital Versus Signaling Models: University Access and High School Drop-outs

wp18 **Peter Kuhn Arthur Sweetman**
Assimilation and Economic Success in an Aboriginal Population: Evidence from Canada

wp17 **Martin D. Dooley**
The Evolution of Welfare Participation Among Canadian Lone Mothers From 1973 - 1991

wp16 **Lori Curtis Martin D. Dooley Ellen L. Lipman David H. Feeny**
The Role of Permanent Income and Family Structure in the Determination of Child Health in the Ontario Child Health Study

wp15 **LaDonna A. Pavetti**
A New Social Contract: Moving to a Work-Based Assistance System

wp14 **Gary Burtless**

The Job Prospects of U.S. Welfare Recipients: Lousier Pay but Bigger Earnings Supplements

wp13 **J.B. Burbidge L. Magee A.L. Robb**
Cohort, Year and Age Effects in Canadian Wage Data

wp12 **Martyn Andrews Alan Harrison**
Testing for Efficient Contracts in Unionized Labour Markets

wp11 **Herb J. Schuetze**
Taxes, Economic Conditions And Recent Trends in Male Self-Employment: A Canada-U.S. Comparison

wp10 **Peter Kuhn**
Canada and the "OECD Hypothesis": Does Labour Market Inflexibility Explain Canada's High Level of Unemployment?

wp9 **Stephen R. G. Jones W. Craig Riddell**
The Measurement Of Unemployment: An Empirical Approach

wp8 **Pierre Lefebvre Philip Merrigan Martin Dooley**
Lone Female Headship and Welfare Policy in Canada

wp7 **Heather Antecol Peter Kuhn**
Gender as an Impediment to Labor Market Success: Why do Young Women Report Greater Harm?

wp6 **John Myles Paul Pierson**
Friedman's Revenge: The Reform of "Liberal" Welfare States In Canada and the United States

wp5 **Jeff Borland**
Earnings Inequality in Australia: Changes and Causes

wp4 **Jeff Borland**
Union Effects and Earnings Dispersion in Australia, 1986-1994

wp3 **Robert Gregory Boyd Hunter**
The Macro Economy and the Growth of Income and Employment Inequality in Australian Cities

wp2 **Peter Kuhn**
Labour Market Polarization: Canada in International Perspective

wp1 **Peter Kuhn A. Leslie Robb**
Shifting Skill Demand and the Canada-US Unemployment Gap: Evidence from Prime-Age Men

Last updated March 27, 2000