

Child Research Comes of Age*

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Even a cursory glance at recent research in economics shows that in addition to the usual focus on education as a measure of human capital, researchers are focusing on a wide variety of other factors that will affect the earnings, health, and well-being of children when they become adults. Research on child abuse, child labor, child care, child support, child health, youth employment, intergenerational relationships, and social programs affecting children has all become relatively commonplace. This observation suggests that research on “Families and Children” (to use the name of the new program at the National Bureau of Economic Research) is finally coming of age.

The first two sections of this paper discuss some theoretical and empirical motivations for the upswing of interest in this topic. The next two sections give examples of work that has been done, or perhaps could be done, using existing Canadian data sets. Empirical research is by its nature data driven, so the last section offers some observations about the data and concludes that the best way for Canadian governments to increase the volume of high-quality research on families and children would be to increase researchers' access to data. This paper is not intended as a survey, though many specific papers will be cited as examples.

Theoretical Motivations for Research on Children

There is increasing evidence that models of the household in which everyone has the same preferences (Samuelson, 1956) or in which a household dictator makes all the decisions (Becker, 1991) are not accurate descriptions of life within the household.

McElroy (1990) suggested that if negotiations between household members were

unimportant, than outside factors that influenced bargaining power within the household (“distribution factors”) would also be unimportant. Studies by Thomas (1990, 1994), Schultz (1990), Lundberg et al. (1997), Gray (1998), Ward-Batts (2000), Chiappori et al. 2002, and Rangel (2003) all suggest that on the contrary, these factors do matter. See also the surveys in Haddad et al. (1997) and Behrman (1997).

These studies have spurred efforts to develop a more accurate model of life within the household, which could then be used to assess the likely impact of a diverse array of policies including those affecting divorce law, child support, common-law relationships, child and spousal abuse, and so on. Some rely on bargaining models (c.f. Manser and Brown, 1980; McElroy and Horney, 1981; Lundberg and Pollak, 1993, and Konrad and Lommerud, 2000), while others assume that in repeated interactions, an efficient outcome will be obtained (Chiappori, 1988, 1992).

Browning and Chiappori (1998) show using Canadian Family Expenditure Survey (FAMEX) data that such a “collective model” generates testable restrictions on behavior that are not rejected by the data. They note some advantages of FAMEX for such studies, such as the fact that since it is an annual survey there are few zeros, and that provincial tax rates generate price variability across provinces which is key to identifying the model.

This large body of work implies that policies which impact men and women differently within the household are likely to have differing implications for children if men and women have different preferences regarding child goods and/or child outcomes. Moreover, it shows that we cannot always assume that parents will act in the

best interests of their children (though they are likely to accord these interests some weight in their decision making processes). Hence, if we are interested in the effects of policies on children, we need to look directly at the effects of policies on children, rather than looking at them only as members of families. Shelley Phipps highlighted this point in her 1999 Innis lecture (Phipps, 1999).

A second motivation for research on children comes from increasing interest in children themselves as economic actors, who can through their behavior, shed light on some of the most basic assumptions of economic theory. One can ask, for example, whether people seem to be innate utility maximizers, or whether such behavior is learned. Some of the most interesting work along this line has been conducted by William Harbaugh and his collaborators, who conduct economic experiments using children as subjects.

For example, Harbaugh, Krause, and Berry (2001) investigates “GARP for kids”; that is, they look at whether even young children choose between bundles of goods in a way that is consistent with the generalized axiom of revealed preference. Children choose between bundles of juice boxes and bags of potato chips. The authors show that even in 7-year-olds, there are fewer transitivity violations than if they were choosing randomly. By age 11, children make no more violations than college students.

On the other hand, Harbaugh, Krause, and Vesterlund (2002), compare the way that adults and children assign probability weights to events. They find that young children systematically underweight low probability events and overweight high

probability ones. As age increases, the weights gradually move closer to the objective values. By age 35, choices over gambles involving gains are, on average, very close to what theory predicts, although for losses, they find anomalous behavior even in adults, as the loss aversion theory of Kahneman and Tversky (1979) predicts.

These two examples suggest that revealed preference theory may describe behavior that is more-or-less innate, while the way that people evaluate probabilities is learned, and subject to much error even among adults. The existing research only scratches the surface of what could be done. For example, there has been little consideration of the role of culture, or institutions in the formation of economic behavior.

2. Empirical Motivations for Research on Children

a) Program Evaluation

Social policies affecting children are often “sold” as investments in children. This terminology implies that the investment in question ought to have a payoff greater than its cost. And indeed advocates often tell us that various interventions will “pay for themselves” by reducing outlays on special education, health care, or the criminal justice system. One danger with this strategy for promoting social programs is that it may engender backlash if evidence of positive payoffs is not forthcoming.

Current controversy over the U.S. Head Start program provides an illustration of this problem. Head Start began in 1964 as part of the “War on Poverty”. It is a program for disadvantaged three to five year olds which aims to put them on an equal footing

with more advantaged children by the time that they start school. The program has grown over time to the point that it now serves about 60% of poor children in the target age range.

However, critics now contend that there is little evidence that the program produces long-term benefits for children. One reason for this lack of evidence is that virtually no evaluations of the long-term effects of Head Start have been conducted (though some evaluations of more expensive model programs suggest that such programs can have positive impacts—see Currie (2000) for an overview of existing evidence). Thus, while it is correct to state that there is little evidence of positive long-term effects, it would be incorrect to infer from this statement that the program had been proven to be ineffective.

Recently, Garces et al. (2002) have conducted an evaluation of the longer term effects of Head Start using data from the Panel Study of Income Dynamics (PSID). They asked that special questions on past Head Start attendance be added to the 1995 child supplement to the PSID. These questions enabled them to identify young adults in their 20s who had participated in Head Start as children, and to compare them to their own siblings who had not participated. They find positive longer-term effects of Head Start: Among the white children, Head Start participation was associated with increases in educational attainment, while among the African-Americans, Head Start participation reduced the probability that the young adult had ever been booked or charged with a crime.

While there are potential errors involved in relying on such retrospective

reports, their analysis indicates that participation rates derived from the PSID match well with those from administrative sources, which suggests that future evaluations of the longer-term effects of child programs could be based on similar methods. Such evaluations are essential if we are to shed light on the “investment” paradigm.

Thoughtful people will recognize that programs for children may be worthwhile even if they do not generate long-term “payoffs”: Gains in the present happiness and well-being of children are not without value. My argument is simply that claims that programs have particular effects will eventually generate calls for the magnitude of these effects to be evaluated empirically.

In recent years, Canadian federal and provincial governments have developed a variety of early intervention programs. The federal government introduced Aboriginal Head Start (AHS) in the mid-1990s, under the auspices of Health Canada. The AHS program was extended to reserve First Nations groups in 1999. AHS appears to be very similar to the American Head Start program in terms of key aspects such as local control, a half-day program, parental involvement, and an emphasis on meeting a wide range of children’s needs. There are six program components including: language and culture, education and school readiness, parental involvement, health promotion, nutrition, and social support.

In 2000, 3,126 children participated at 114 sites, representing seven percent of the target population. Thirty-six percent of participants lived with a single mother, and 18 percent had special needs (Aboriginal Head Start, 2001). While the federal government collects information from the programs about what they are doing, no

evaluation of the effects of the program on children has been attempted, although the program's literature indicates that a "National AHS Impact Evaluation" is in development. Given economists' comparative advantage in program evaluation, it would be a good thing if Canadian economists were to be involved in this effort.

The federal government also introduced the Community Action Program for Children (CAPC) in the mid 1990s. This initiative is actually more of a funding stream than a program. CAPC provides long-term funding to community groups that deliver programs intended to improve the health and development of at-risk children 0 to 6. Categories of at-risk children to be given special consideration include First Nations and Metis children; children of immigrants; children of lone parents; and children in remote communities. There are currently 464 projects operating in 3,035 communities in Canada at an annual cost of about to government of \$60 million. A further \$10 million is donated, and 8,781 volunteers donate their time. The CPAC umbrella encompasses a wide range of programs from home visiting and family resource centers to street-level programs for substance abusing mothers.

The National Strategy on Community Safety and Crime Prevention's Crime Prevention Investment Fund is another umbrella organization funded by the federal government which provides funds for early intervention initiatives designed to prevent crime. Originally funded at a level of approximately \$32 million annually in 1998, the program received an additional \$145 million to be spent over four years in 2001. Since 1998, it has funded 2,600 projects in 600 communities. Examples of initiatives the fund has supported include a program in Ottawa-Carleton aimed at 6 to 12 year olds and run

by the regional police youth center, and the expansion of a provincial initiative in Prince Edward Island called “Building on Success: Best Start Program”, a program that provides universal early screening through in-home visits by public health nurses, and follow-up through home visiting for families with difficulties.

The Quebec government has adopted a different model, focusing on the provision of universal child care services, rather than services targeted only to children considered to be “at risk”. Between 1997 and 2000, the government phased in a program of \$5 per day child care for all 0-4 year olds for whom a space was available, and greatly expanded the number of spaces available in subsidized non-profit centers. In addition to the usual minimum regulations on child care quality, the government created a core educational program to improve the developmental quality of preschool care (Tougas, 2001).

However, in 2001, 85,000 children were on waiting lists for these services, and there were some criticisms of the quality of services available. The Charest government has proposed controversial changes to the system, including increases in user fees, particularly for well-off parents, and permission for private child-care centers to enter the market (Child Care Canada, 2003). While the Quebec initiative represents a large-scale natural experiment, it does not yet appear to have been the subject of academic research about its impacts that could inform the policy debate.

As these examples make clear, Canadian governments have taken research promoting early intervention to heart, but have not adopted a particular model. The wide variety of programs being funded, and possible future changes to those programs,

offer challenges for research, but also offer an opportunity in the sense that it may be possible to say which kinds of programs are most effective.

b) Data Availability

A third motivation for the recent upswing in research on children might be termed the “Mount Everest” response: We are now more inclined to study children because the data is there!

New developments in the data available in Canada are particularly noteworthy. The National Longitudinal Survey of Children and Youth (NLSCY), a Canadian national longitudinal data set which has surveyed children ages 0-11 and their families beginning in 1994. Follow up surveys have been conducted biannually.

The NLSCY collects detailed information on the health and demographics of the child which is similar in many ways to the information collected about the children born to women surveyed in the U.S. National Longitudinal Survey of Youth (NLSY). However, in several respects, the data collected in the NLSCY goes beyond what is available in the NLSY, allowing a more in depth analysis of certain issues such as mental health.

The NLSCY has already been exploited to do a great deal of research documenting the relationship between income and health (c.f. Dooley and Stewart (2002)); determinants of children’s schooling attainment (c.f. Curtis and Phipps (2000); Dooley, Curtis, Lipman, and Feeny (1998)); children’s mental health (Dooley, Curtis, Lipman and Feeny (1998); the effects of lone motherhood (Lipman, Dooley, and Offord

(1996) and Lipman, Dooley, Boyle, and Offord, forthcoming) and to compare children's outcomes, and their relationship to socioeconomic status across countries (Phipps, 2002; 2004).

The relationship between socioeconomic status and health is one of the most robust and well documented findings in social science. However, the reasons for the relationship are less clear since plausible causal mechanisms run in both directions. Anne Case, Darren Lubotsky, and Christina Paxson (2002) look at children in order to find the “origins of the gradient”, since the health of children may be assumed to have relatively little impact on their own socioeconomic status. They show that the well-known cross-sectional relationship between SES and health exists in childhood and is more pronounced among older than among younger children. Since poor health in childhood is likely to affect adult well-being directly through its effects on health, and indirectly through its effects on other forms of human capital accumulation, it is important to try to address the causes of SES-related gradients in health status among children.

However, in a cross-section it is not possible to distinguish between two different possible mechanisms underlying a steepening gradient. On the one hand, it is possible that low-SES children are less able to respond to a given health shock, so that the negative effects of health shocks persist and accumulate over time. This model would imply that low-SES children are in need of better medical care, or better access to care, so that they can respond to health shocks in the same way as higher- SES children.

On the other hand, it is possible that low-SES children respond to health shocks in a way that is similar to high-SES children, but are just subject to more shocks. This model implies that SES-related gradients can be reduced by addressing the reasons why low-SES children are more likely to be subject to health shocks. For example, low-income children are more likely to have accidents, and to suffer from nutrition-related disorders such as diabetes. This distinction is important for policy because it implies that it may be productive to spend social resources on measures designed to reduce the arrival rate of health shocks as well as continuing to improve children's access to palliative medical care.

The available U.S. panel data did not support an analysis of these issues. Currie and Stabile (2003) examine these hypotheses using the NLSCY panel. They confirm that the results of Case et al. hold using a sample of Canadian children, despite the existence of universal health insurance coverage for doctor and hospital services in Canada. They also find that the gradient steepens in cross-section, and that this result is robust to controls for cohort effects.

However, they find little evidence that the long-term effects of health shocks on future health are different for high-SES and low-SES children. Instead, they show that the cross-sectional relationship between health, family income (or maternal education), and age arises primarily because low income children are more likely to be subject to health shocks. These findings suggest that improving access to health care alone is unlikely to eliminate the relationship between income and health—public health measures which address the reasons why poor children receive more insults to their

health may also be necessary.

3. The Importance of Harnessing Existing Data Sources

While rich panel data such as the NLSCY is an invaluable resource, there are many questions which could be addressed through the creative use of other existing data. Administrative data is a generally under-utilized resource, although several recent Canadian studies illustrate its potential usefulness. Corak and Heisz (1998) and Corak (2001) both use tax data linked between parents and children. Both papers illustrate the light that can be brought to bear on questions of long-standing interest, using new data.

Corak and Heisz (1999), examine the degree of intergenerational income mobility in Canada using income tax information on approximately 400,000 father-son pairs, in which the son was born between 1963 and 1966. As they note, most of the previous literature on this subject is based on the linear regression model, and a central problem is that while the concept of interest is the permanent income of father and of son (or mother and daughter!), income is often measured only at a point in time. Moreover, the available samples (drawn largely from the PSID) may be subject to selection bias which reduces the amount of variance in earnings in the data. As Solon (1989) points out, both of these biases will tend to understate the extent of intergenerational income mobility in the data. Hence, while older studies yielded a consensus estimate of .2 (see Becker and Tomes, 1986), studies that attempt to correct for these biases estimate correlations that are often closer to .4 (c.f. Behrman and Taubman (1990); Lillard and Reville (1997); Mulligan (1997); and Solon (1992)).

Use of income tax data offers a way to address the difficulties with the existing literature. First, given the lengthy time span of the data, it is possible to derive a relatively accurate estimate of permanent income. Second, anyone who ever worked can be included, so that people who have withdrawn from the labor market at a point in time due, for example, to ill health, can still be included in the study. Third, the large sample sizes enables Corak and Heisz to use non-parametric methods in order to explore non-linearities in intergenerational transmission of economic status. They find that while the average intergenerational earnings elasticity is about .2, (which is slightly greater than the degree of income mobility), the elasticity is close to 0 at the bottom of the income distribution and close to .8 at the top. Large sample sizes are a great advantage of many administrative data sets, which offsets some disadvantages such as relatively limited information about factors that are not of interest to the administrators collecting the data.

Corak (2001) uses the same data to examine the long-term effects of parental loss on children. Using the tax data, he can identify children who lost a parent due to death and children who lost a parent due to divorce. He first compares the effect of losing a parent through death, to the effect of losing a parent through divorce. The large sample size is particularly helpful here, since the death of a parent is a rare event. The former effect is taken as a measure of the impact of an exogenous parental loss. Hence, by comparing the former to the latter effect, it is possible to determine how much of the estimated effect of divorce is due to the loss of the parent per se, and how much of it is due to other endogenous factors that may in fact have precipitated the divorce (and

which might continue after the divorce as well). The conclusion is that a great deal of the estimated effect of divorce is due to these endogenous factors rather than parental loss, which confirms Cherlin et al.'s (1991) finding for the U.S. and the U.K. that much of the "effect" of divorce on children is visible before the divorce actually takes place.

Corak then goes on to use 1986 changes in Canadian divorce laws as an instrument for the probability of divorce, in order to correct for this endogeneity. His findings suggest that divorce per se has relatively little impact on the future earnings of children, though the children of divorce are both more likely to delay marriage themselves, and more likely to suffer the breakdown of a marriage when they do marry. These effects in turn make them more likely to use social assistance.

Oreopoulos (2003) provides a third example of the possible uses of a long panel of tax data. In his work on the long-run consequences of living in a poor neighborhood, he looks at the employment, earnings, and welfare use of adults who lived in public housing projects in Toronto as children. He argues that children were approximately randomly assigned to different projects, depending on what was available when their family reached the top of the waiting list, and he shows that the different projects were in neighborhoods of quite differing quality in terms of things like average earnings in the area and crime rates. This research design enables him to deal with the *bete noir* of research on the effects of neighborhoods, which is that people generally choose their neighborhoods so that any estimated "effect" might reflect the factors that led them to choose a particular neighborhood rather than the effect of the neighborhood itself.

His findings are striking: the variations in the neighborhoods these children

were “exposed” to appear to have had no effect at all on the measured outcomes.

Oreopoulos goes on to compare the outcomes of siblings with those of close neighbors, following Solon, Page, and Duncan (2000). These comparisons suggest that family background is a much more important determinant of child outcomes than residential location. Hence, the study points to the importance of programs that deal with family problems, rather than those that focus on providing better neighborhoods for poor children.

4. Possible Uses of Vital Statistics Data

Of course, one of the main problems with tax data is that it is not often readily available. While Statistics Canada is to be commended for making the data available to researchers willing to travel to Ottawa, this may not be possible for everyone. Thus, the question arises of whether there are other under-exploited sources of large-scale administrative data that might be more readily available.

This section gives several examples of the use of Vital Statistics data from my own research. Vital Statistics data are limited in terms of the number of variables available. For example, in the U.S. they do not have information about household income. And while death certificates have information about the occupation of adults, they have no such information for children making it difficult to tell what sort of household that children who died came from. On the other hand, a very great advantage of Vital Statistics data is that they are comprehensive. That is, one generally has the whole universe of births and deaths, and the large sample sizes make it practical to

impute some of the missing data by, for example, using zip code-level information about average income, or by matching in data from other sources.

In Canada, the Vital Statistics data has been used by Hanratty (1996) who looked at the effect of introducing national health insurance in Canada on infant mortality and the incidence of low birth weight (birth weight less than 2500 grams, a leading indicator of infant health). Her work takes advantage of the fact that Canada implemented national health insurance gradually, following federal legislation in 1957 that offered federal matching funds to provinces that implemented a universal hospital insurance program. By 1961, all provinces had such a program, and between 1962 and 1971 most provinces implemented health insurance programs similar to those in place today. Using county-level data from 1960 to 1975, Hanratty shows that infant mortality rates fell four percent after the introduction of national health insurance. Using a sample of all births between 1960 and 1974, she also finds that the incidence of low birth weight decreased by an average of 1.3 percent in the population as a whole, but by 8.9 percent among single parents.

Currie and Gruber (1996) use aggregate U.S. Vital Statistics data to examine a similar question—they examine the effect of extensions of U.S. public health insurance for poor women and children that took place in the 1980s and early 1990s. Here, the key problem is that given the means-testing of American programs, areas with declining economies may experience increases in eligibility for public insurance. One would expect increases in eligibility of this kind to be associated with deteriorations rather than improvements in infant health. In order to isolate the effects of increases in

program generosity, we instrumented the actual fraction of women eligible for public insurance coverage of their pregnancies and deliveries with the fraction of women who would have been eligible had only the rules changed.

While increases in the generosity of the program are estimated to have improved infant health even in Ordinary Least Squares regressions, the instrumental variables estimates are much larger. Our estimates suggest that the 30 percentage point increase in eligibility over the period led to an 8.5 percent decline in infant mortality rates. However, in contrast to the Canadian case, these increases in public health insurance had little effect on the incidence of low birth weight.

Further investigation of data on health insurance coverage from the Current Population Surveys, and of data on Medicaid expenditures suggests the reason why this means-tested program did not achieve better results: It appears that many of the newly eligible were unaware of their benefits, which meant that women did not sign up for coverage of their pregnancies. However, hospitals had an incentive to help women enroll in Medicaid when they arrived to deliver, since otherwise the hospital would face the possibility of providing uncompensated care. Thus, many women became enrolled only at the time of delivery, with the result that insurance coverage could only affect care at the time of delivery and afterwards.

Currie and Gruber (2001) uses the individual-level Vital Statistics data to investigate the type of care received by the Medicaid mothers. We argue that the Medicaid expansions reduced the probability that teen mothers and unmarried mothers with less than high school were uninsured. This would be predicted to increase the

amount of medical care that they received, and indeed, we find that such women were more likely to have received ultrasounds, induction and stimulation of labor, and cesarean sections as a result of the expansions of Medicaid coverage. On the other hand, some married, college educated mothers may have dropped private health insurance coverage in order to take up the less generous coverage available from Medicaid. One would expect this to result in lowered utilization of services, which is what we find.

Note that there should be no presumption that more of such services as Cesarean section, induction of labor, and fetal monitoring are beneficial to women or infants. While some Cesareans are necessary, others may be scheduled more for the convenience or profit of the doctors than for the health of the mother or child. It would be interesting to know if variations in the way doctors and hospitals are reimbursed in the Canadian system have a similar impact on the type of services women receive.

As discussed above, there is a gradient in health status among children by SES in Canada, just as there is in the U.S. Although much of this probably reflects factors outside the purview of the medical system, some of it may also reflect differences in the utilization of medical care. For example, Roos and Mustard (1997) find that in Winnipeg, poor people are more likely to be hospitalized and also more likely to see general practitioners, which may suggest greater health needs. However, they are not more likely to see specialists or to have surgery, which, if they actually need such care more, suggests that even a system with universal health insurance does not do a good job equalizing access to care. Hence, it is important to understand non-financial

barriers to care that people of low SES may face.

Currie and Grogger (2002) examine the take up of Medicaid benefits by pregnant women in the U.S. In the U.S., receipt of welfare benefits conferred automatic eligibility in this program. We show that with the reduction of the welfare roles over the 1990s, many women lost health insurance coverage of their pregnancies, even though they remained income-eligible for such coverage. It appears that the hassle involved in signing up for the program was enough to deter many eligibles. This result highlights the potential importance of non-price barriers to care, even in places like Canada which have universal insurance.

Aizer and Currie (forthcoming) use individual-level birth certificate data from 1989 to 2000 in California to investigate the effect of neighborhoods on women's use of publicly funded prenatal care. As discussed above in the context of the Oreopoulos paper, social scientists have long been interested in whether neighborhoods have any causal effect on behavior. Bertrand, Luttmer and Mullainathan (2000) show that a women's propensity to use welfare increases with the number of coethnics in the area, if those coethnics have a high propensity to use welfare nationally. Similarly, Borjas and Hilton (1996) find that new immigrants tend to use the same types of welfare programs as earlier immigrants from the same group. These findings suggests that coethnics on welfare may transmit information about eligibility for the program, or application procedures, and hence raise utilization rates among others in their group.

Aizer and Currie test this hypothesis by looking at "network effects" where networks are defined using women of the same ethnicity in the five-digit zip code. We

show that a woman's behavior is more strongly correlated with the recent behavior of other women in her racial or ethnic group and zip code than with the recent behavior of women of other ethnicities in the same area. However, as Manski (2000) highlights, these correlations could reflect an *endogenous effect* where the propensity of an individual to behave in a particular way is causally influenced by the behavior of other members of the group; an *exogenous effect* where the individual's behavior is influenced by an exogenous characteristic that defines group membership; or a *correlated effect* where individuals from the same group tend to behave the same way because they have similar individual characteristics, or face similar constraints.

In this panel of repeated cross-sections of Vital Statistics data, it is straightforward to control for the direct effects of the exogenous variables used to define group membership by including indicators for race, ethnicity, and zip code in our model. The inclusion of zip code fixed effects also allows us to control for many fixed variables that might cause correlated effects, such as the nature of health care and transportation facilities in the area. This is a distinct advantage over the cross-section of Census data used by Bertrand et al.

We next turn to the important question of whether the network effects reflect shared information. Once a woman has had a publicly-funded delivery, she learns both about the existence of the public program (if she did not know already), and that she is eligible. Hence, one can gauge the importance of information by comparing estimated network effects among women delivering for the first time, to the estimated network effects among women who have already had a publicly funded delivery (note that

measuring whether the women had already had a publicly funded delivery requires linking birth certificates across years, which in turn requires access to the confidential version of the data with the mother's name and birth date.) We find in fact, that estimated network effects are remarkably similar in the two groups, which suggests that shared information about the public program is not driving them.

In contrast, the estimated network effects disappear when we include fixed effects for the hospital of delivery. This result suggests that it is possible that women appear to be influenced by the behavior of others in their group because all members of the group face similar responses from the institutions that serve them, rather than because they influence each other.

Currie and Moretti (2003) use the Vital Statistics data to examine the effect of maternal education on infant health. Over the past century, North American women have experienced tremendous increases in average educational attainment. Returns to education are generally quantified in terms of increases in wages. However, many studies report a correlation between maternal education and measures of child health. In fact, this robust relationship was one factor underlying the World Bank's drive over the past decade to promote maternal education in developing countries [World Bank 1993]. But the existing literature is limited in that it focuses on developing countries, emphasizes the effects of improvements in relatively low levels of education, and does not generally attempt to establish whether the effect of maternal education is causal.

If higher maternal education does indeed improve child health outcomes, even in rich countries, then conventional estimates of the returns to education which focus

only on wages may understate the social benefits. Moreover, to the extent that healthier children go on to be more productive and more highly educated adults themselves, there will be an important inter-generational spillover that analyses of wage effects alone will not capture. Almond and Chay (2003) make this point in the context of the American South: Using Vital Statistics natality data they find that improvements in infant health among the cohort of African Americans in the 1960s had long-term impacts on children born decades later.

Currie and Moretti (2003) examine the effect of maternal education on infant health at birth in the United States using data from individual birth certificates from the Vital Statistics Natality files for 1970 to 1999. The correlation between education, investments in health inputs, and health outcomes might reflect omitted factors such as family background or “forward looking behavior.” For example, women with high discount rates tend to have lower educational attainment (because they put less weight on future benefits of schooling) and may be less “careful” mothers. In an effort to isolate the causal effect of education, we use an instrumental variables strategy. We compiled a new data set on openings of all two and four year colleges between 1940 and 1996. We use this data about the availability of colleges at the county level as an instrument for maternal education. Our instrumental variables (IV) models control for many potentially unobserved confounding factors by including county-year-of-birth fixed effects, so that our estimates are identified by differences in the availability of educational services among different cohorts of women delivering in the same county and year.

One could argue that colleges tend to open in counties where residents' education is already increasing or is expected to increase, and therefore are not a cause but an effect of increasing education. Although we cannot completely rule out this possibility, we provide several pieces of evidence which suggest that college openings do in fact increase educational attainments. First, we find that maternal education and birth outcomes have no clear trend in the ten years before the opening of a college, but improve afterwards. Second, while the opening of a college in the mother's 17th year increases her educational attainment, openings in her 25th or later years do not. Third, the opening of four-year colleges increase four-year graduation rates, but do not affect the probability of having some college, while the opening of two-year colleges increases the probability of having some college but has a much smaller effect on four-year graduation rates. Fourth, when male-only colleges become coed, maternal education increases, but when female-only colleges become coed, we find no effect on women's education. Fifth, the opening of public colleges has a larger effect than the opening of private colleges, and college openings matter more in relatively "college poor" counties. Finally, we show that the first stage estimates obtained in the Vital Statistics data (in which we know mother's location only at the time of the birth) are similar to those obtained using data from the Census and from the National Longitudinal Survey of Youth (NLSY), data sets in which we know the actual location of women prior to college age.

We find that higher maternal education improves child outcomes, as measured by birth weight and gestational age. It also increases the probability that a new mother

is married, is associated with higher husband education, reduces parity, increases use of prenatal care, and reduces smoking, suggesting that these are all important pathways for the ultimate effect on health. Hence, our results add to a growing body of literature which suggests that estimates of the returns to education which focus only on increases in wages may significantly understate the total return.

The U.S. Vital Statistics data are also currently being used to examine the effects of pollution on infant health (c.f. Chay and Greenstone (2004), Currie and Neidell (2004)); the effects of introduction of the Food Stamp program on fertility and child health (Currie and Moretti, 2004) and the impact of Medicaid Managed Care on Medicaid enrollments, health care received by pregnant women and infants, and pregnancy outcomes (Aizer, Currie, and Moretti, 2004).

5. Other Data Developments

Clearly, research of the type described above depends on continued access to the relevant data. Here, the picture is often “two steps forward, one step back”. On the positive side of the ledger, the nine research data centers are a significant new initiative that should help to make Statistics Canada data more accessible to university researchers across the country. The center at the University of Toronto was instrumental in allowing my own research with Mark Stabile using the NLSCY to be conducted.

Some groups in Canada have also been active in pursuing mergers between administrative data sets. For example, Houle et al (1997) describe a linkage between

the 1986 Census, the 1986-1987 Health and Activity Limitation Survey, and the files of Manitoba Health. Without using names or addresses, they were able to achieve a match rate of 74 percent. Further checking with names and addresses indicated that the concordance rate was 95.5 percent. Although 74 percent may seem low, it is comparable to the response rates for many population surveys. This suggests that mergers of administrative data could be used to study many problems, without sacrificing privacy considerations. However, to date, these activities seem to have been conducted largely outside of Economics, and Economists appear to have limited access to such data.

The Canadian Self Sufficiency Project (SSP) offers a potentially very rich source of information about family functioning and child outcomes including schooling attainment. This experiment was conducted in New Brunswick and British Columbia and was designed to evaluate the effect of an earnings supplement (available up to three years) offered to single-parents on Income Assistance who found full-time jobs and left assistance. People eligible to receive the supplement were randomly selected from the caseload of those who had been on assistance at least a year, as were a group of controls.

Morris and Michalopoulos (2000) report that as of 36 months after the program began, the program had had no effects on children 3 to 5 years old; however, among children 6 to 11 years old, there were small positive effects on cognitive outcomes and schooling achievement. Children 12 to 18 at the time of the 36 month interview may have experienced small increases in delinquency and substance abuse but were

otherwise unaffected. Foley et al. (2002) report that as of six years after the initial random assignment, the program had improved schooling performance and cognitive test scores among elementary school children. The SSP data also has very rich information about child care. Unfortunately, no public use versions of this data exist, which may limit its usefulness.

The NLSCY does have a public use version (i.e. a version available outside of research data centers) but it has been emasculated, relative to, for example, the public use version of the U.S. NLSY. The masking of age, location (even urban vs. rural), and so on makes it extremely difficult to use the public use version for research. It will be interesting to see if the NLSCY is used as widely as the NLSY without the availability of a detailed, public-use version. Moreover, the ability to link the NLSCY with other geographic information (such as school district characteristics) appears to be extremely restricted even within the research data centers, which limits the types of questions that can be addressed. For example, it will not be possible to link the rich NLSCY data on child test scores with the characteristics of the schools they attend.

Important information has recently been lost from key surveys in Canada. For example, the Survey of Household Spending has cut questions regarding demographic information such as education, after tax income, occupation, and country of birth, making it virtually impossible to say anything about patterns of spending by socioeconomic status. And the Survey of Consumer Finances has been discontinued altogether.

If Canadian governments wish to promote research on important questions, the

single most important thing they can do is to lower the cost of such research by making data readily available to researchers. Compared to the funding of once-off studies using proprietary data, making data publicly available will almost always result in higher quality research at lower cost, given the peer review process and the possibility of replication.

6. Conclusions

Research on children and families is exciting from both a theoretical and empirical perspective, and has grown rapidly as a field. It may be an over-statement to say that it has “come of age”, but it certainly is well on its way. Researchers working in Canada, and/or with Canadian data have made important contributions to this growing area, but there is much more that can be done, particularly if improvements in data access continue.

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