



The Influence of Parental Income on Children's Outcomes

Susan E. Mayer

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About the Author

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Foreword

In 1999, the Social Policy Agency was granted funding from the Departmental Contestable Research Pool administered by the Ministry for Research, Science and Technology for a three-year work programme it proposed under the title “Family Dynamics/Family Effectiveness”. The proposal was for a co-ordinated programme of work aimed at increasing understanding of factors – at the individual level, the family level and the environmental level – that contribute to good outcomes for children.

Over the course of the funding tri-ennium – from 1999/00 to 2001/02 – the Agency and its successor organisations established a range of studies, including commissioned work from selected leading international scholars. The focus of this work has been on sources of influence on child outcomes, with an emphasis on family-level factors, including the economic circumstances of families, family structure, parenting practices, and so on. The results of this work are being published by the Ministry of Social Development in a new research series entitled *Raising Children in New Zealand*.

The present report – commissioned from Susan E. Mayer of the University of Chicago – represents the first publication in this series. The report examines the effect of parental income on a range of child outcomes, including cognitive development, educational attainment, health, socio-emotional functioning and behaviour, teenage childbearing and economic outcomes in adulthood, based on a review of research studies on these topics. The report focuses on the findings of research that has aimed to isolate the effect of parental income, net of all other influences, on child outcomes.

The report largely draws on published studies based on analysis of longitudinal data sets, since only data of this type are able to be used to examine the sources of influence on children’s outcomes, as these emerge over time. Because there is only a small body of New Zealand work of this nature, the report largely relies on papers published in the US, Canada and the UK, although reference is made to a small number of New Zealand and Australian studies. Despite this reliance on overseas evidence, the findings are of substantial relevance to New Zealand, since Professor Mayer’s focus is on discerning consistent patterns of effects on broad domains of children’s outcomes. The broad outlines of these findings are likely to be relatively invariant across cultures – although there may be variations at a more detailed level. The study will provide a good basis for establishing locally based research to investigate the particular ways in which parental income exerts its effects on children’s outcomes in New Zealand.

By focusing on the net effect of family income – independent of the influence of other factors – the report permits an assessment of the extent to which gains in family income are likely to lead to improvement in child outcomes. Thus it focuses on an issue of considerable importance to public policy in the field of income support. As well as strengthening the knowledge base for policy work on families and children, it is anticipated that the report will also make a valuable contribution to the public debate about the importance of family income on the life chances of children.



Overview

It is well established that parental income is positively associated with virtually every dimension of child well-being that social scientists measure. This report advances beyond simple analyses of the correlation between parental income and children's outcomes, by separating out the effect of parental income on children's outcomes, net of other influences such as family structure and parental education.

The report opens with an examination of theoretical perspectives that hypothesise why parental income might affect children's outcomes. It discusses a range of methodological issues that confront researchers in this field. It documents the findings of a range of research on the effect of parental income on six broad areas of child outcomes: cognitive test scores; socio-emotional functioning, mental health and behavioural problems; physical health; teenage childbearing; educational attainment; and future economic status. It considers whether the source of parental income matters for child outcomes, whether the effect of parental income might vary according to the age of the child, and whether the effect of parental income depends on the child's gender or race. The report concludes with a discussion of policy insights that might be gleaned from the research literature in this field.

Parental income is positively associated with all outcomes covered in the review. When family background variables are controlled, however, the estimated size of the effect of parental income reduces, and the residual effects are generally small to modest on most outcomes. The size of the effect of income differs across different outcomes: it appears to have its largest effect on cognitive test scores and educational attainment. For some outcomes, such as health, there is too little research to draw strong conclusions about the effect of income. The effect of income is larger when incomes are measured over a longer period – that is to say, extended durations on low income have stronger adverse effects on children than short periods on low income. There is some evidence that the effect of income is larger for low-income than for high-income children.

No general conclusions can be drawn about whether parental income is more important at different stages of childhood; however, there is some evidence to suggest that income is more important in early childhood for schooling outcomes. There is little evidence to suggest that income has differential effects on children of different gender or race. Welfare income is found to be negatively associated with a range of children's outcomes; however, this seems to be due not to welfare receipt per se but to parental characteristics that make some parents more prone to be on welfare than others. Finally, it is noted that most of the research has been done in the US and there is insufficient evidence to draw any conclusions about whether the effect of parental income varies across countries.

Although parental income generally has only a small to modest effect on any particular outcome, it contributes to many aspects of children's well-being. This means that income gains have the potential to make a significant cumulative difference to the lives of children.



1



Introduction



It is well established that parental income is positively associated with a wide range of children's outcomes.¹ This report advances beyond simple analyses of the connection between parental income and children's outcomes by focusing on research that attempts to separate the effect of income from the effect of other potentially confounding variables. In the report, I review research that provides estimates of the effect of parental income on a range of children's outcomes to try to determine the magnitude of such effects.

The review covers research on children's cognitive test scores, behaviour problems, socio-emotional functioning, mental health, physical health, educational attainment, teenage childbearing, and labour market success in early adulthood.

The report does not review all the research that tries to estimate the effect of family income on these outcomes. Volumes of research all document the same thing – parental income is positively correlated with every dimension of child well-being that social scientists have measured. This is true in every country and every part of countries for which we have data. There is no doubt that on average the life chances of poor children are worse than the life chances of more affluent children. The relevant question for policy makers, and for this report, is why we observe this relationship. This report will therefore not review research that simply documents the correlation between parental income and children's outcomes. Instead it will focus on research that tries to explain the relationship by separating the effect of parental income from the effect of family background factors that affect both parental income and children's outcomes.

The report builds on previous reviews of research on the effect of parental income on children's outcomes (Hill and Sandfort 1995, McLoyd 1998, Haveman and Wolfe 1995, Nechyba et al. 1999). These reviews differ from this report both in the scope of the outcomes they consider and in the extent to which the research is critically evaluated. This report also builds on my own earlier work in

What Money Can't Buy (1997). It extends the literature review in that book to include more recent research and to include additional child outcomes.

In the next section of the report I present the major theories that have been advanced about the correlation between parental income and children's outcomes. Section 3 reviews some common methodological problems with which research on the effect of parental income must grapple.

Section 4 summarises the research on the net effect of family income on children's outcomes after the effect of other possible confounding factors has been controlled. It yields the following conclusions:

- **Cognitive Test Scores**
Doubling parental income would on average increase children's cognitive test scores by no more than 10 percent of a standard deviation.
- **Socio-emotional Functioning, Mental Health and Behavioural Problems**
A standard deviation increase in parental income would on average decrease internalising symptoms, externalising symptoms and behaviour problems by 5 to 10 percent of a standard deviation at most.
- **Health**
Parental income has a very small overall effect on children's birth weight, nutritional status and other measures of health in existing research. However, the research on these outcomes is often not of high quality and for many outcomes I could find only one or two studies.

¹ Throughout this report I use the terms parental income, family income, and household income interchangeably to mean the total income of the family. In most studies this includes the cash income from all sources including earnings, government transfers, and other sources received by either parent or any other related adult in the household. When studies use a different income concept, I note it.



- **Teenage Births**

Little research focuses on this outcome. Existing research provides inconsistent estimates of the size of the effect of parental income on teenage childbearing.

- **Educational Attainment**

Estimates of the average effect of a 10 percent increase in parental income on years of schooling range between .024 and .104 years.

- **Future Economic Status**

Existing research leaves considerable uncertainty about the size of the effect of parental income on children's future economic success. A best guess is that raising parental income by 10 percent would probably on average increase sons' wages in young adulthood by no more than 2 percent and perhaps less.

- **Effects for Low-income Children**

Most of this research is based on models that use a linear specification of the income–outcome relationship. Such estimates represent average effects across the entire income range. If the true form of the relationship is non-linear, these estimates could under-state the benefit from raising the income of poor families.

In Section 5, I review research that tries to determine whether the effect of parental income depends on a child's age and Section 6 asks whether the effect of parental income depends on the child's gender or race. The currently available research does not provide strong evidence that the effect of parental income differs by these characteristics of children.

Section 7 turns to the question of whether the effect of parental income depends on its source. The research suggests that income from welfare is associated with poorer child outcomes than income from either child support or parental work, and that

among single-parent families income from child support is associated with better child outcomes than income from either work or welfare. However, these differences appear to result largely from parental characteristics associated with receipt of different kinds of income.

The final section presents conclusions from the research and the implications of these conclusions for income transfer policies. In the rich countries studied in the research reviewed here, two main conclusions emerge. First, the effect of parental income is positive for all children's outcomes. Secondly, the average effect of parental income over the whole income distribution is generally quite

small in studies that control for family background characteristics. The effect of income may be greater for low-income than for high-income children, but research that tries to estimate whether the effect of parental income differs depending on families' income level is equivocal.

In this report I try to provide point estimates from the research. But I also sometimes refer to effects as

“small” or “large”. By small I mean

that a standard deviation change in parental income leads to a change of less than .10 of a standard deviation in the outcome. I refer to this effect as small because a standard deviation increase in income, which is usually equivalent to almost doubling income, is a very large increase by standards of both economic growth and economic transfers. In the US, even rapid economic growth does not result in the real value of mean income doubling in a generation, and no policy change involving increases in income transfer programmes has ever come close to doubling the income of even the most destitute families. Thus when such a large change in income leads to such a modest change in outcomes, the effect is small in the sense that most viable policies to raise average income would have a very small effect on children's outcomes. If the effect

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of income is greater for low-income than for high-income children, policies that increase the income of very low-income families could improve their children's outcomes at a cost that is politically feasible. Unfortunately, as I note below, most research estimates the effect of family income on children's outcomes using linear models, so it sheds no light on the potential cost-effectiveness of income-targeted policies.

In the countries that are the focus of the research reviewed in this report, families are only one source of investment in children's well-being. All these countries have important public policies to reduce the disparity in rich and poor children's chances of success. Because of this it is perhaps not too surprising that the average effect of parental income on any one outcome is not larger. However, because the effect of income is positive for a very large number of outcomes, the cumulative effect of parental income on the life chances of children may be substantial.

2



Background



Mrs Jones has two children and a husband. They just get by on the money Mr Jones earns working odd jobs and government aid that provides food and health insurance for the family. Mrs Smith also has two children and a husband. They live comfortably on Mr Smith's salary from the law firm where he works. The Jones family is much poorer than the Smith family. Almost everyone thinks, and research confirms, that the Smith children are more likely to succeed than the Jones children.

Poor children are more likely to impose costs on society by consuming more health dollars, more education resources, and more government economic aid. Because their chances of success are lower, they are also more likely to grow up to be poor themselves, thus perpetuating poverty into the next generation. Ending this “cycle of poverty” is therefore important to policy makers with an interest in efficiency and cost savings. Ending the cycle of poverty is also important to those who place a high value on social justice. Most people in rich democracies now believe that children's fortunes should not be determined by their parents' class position or ability to purchase the goods and services that their children need to succeed. But to know how to end the cycle of poverty and promote equal opportunity, we need to know why the Jones children are less likely to succeed than the Smith children. What is it that parents like Mr and Mrs Smith provide to their children that parents like Mr and Mrs Jones often cannot or do not provide?

Before turning to the major theories about why parental income might affect children's outcomes, it is useful to consider what people might mean when they say that parental income affects children's outcomes. They could mean any one of at least three things. The first is that poor children do worse than rich children. A considerable amount of research tries simply to determine the correlation between parents' income and children's outcomes. This research ignores potential causal mechanisms. Nonetheless, it can be important in highlighting changes over time and differences across countries in the relationship between parental income and children's outcomes.

The second thing that people might mean by the effect of parental income is that parental income has a causal influence on children's outcomes. If this were true it would follow that raising parental income while doing nothing else for families would improve children's

outcomes. When people take this view, they often have in mind a mental experiment in which only family income changes: for example, what would happen if we could drop money on families from aeroplanes? Such an airdrop would arguably neither change the conditions that led families to have the income that they do, nor provide any incentives for families to change their behaviour in any particular way. But most people do not get their income through random airdrops of cash. Instead, people's income depends on their skills, their work efforts and other factors. These factors can also affect children's outcomes. Research that estimates the correlation between parental income and children's outcomes cannot tell us anything about the causal relationship between parental income and children's outcomes because such estimates do not control for all such parental characteristics. A considerable amount of research controls for some family background characteristics. But only a few studies actually try to hold constant all relevant family characteristics. These studies come closest to estimating the causal effect of income.

The third thing that people might mean by the effect of parental income is the effect of particular policies implemented to raise the income of poor families. Some research estimates the effect of specific income transfer policies, such as a change in welfare benefit levels or other programme parameters, on children's outcomes. Because all realistic methods of increasing income have behavioural consequences that go along with the change in income, this is usually not a useful approach to understanding the effect of parental income on children's outcomes even though it is obviously a good way to find out about the effect of the specific policy change.

Several theories have been advanced to explain why we observe a correlation between parental income

and children's outcomes. But none provides a prediction about the size of the effect of parental income and almost no empirical research tries to test a particular theory of the effect of parental income or to discriminate between these competing theories.

Investment Theory

The investment theory dominates economics (Becker 1981, Becker and Tomes 1986). In this theory the relationship between parents' and children's economic success is the result of biological and other endowments that parents pass on to their children, combined with what parents invest in their children. Endowments include both genetic endowments such as a child's sex and race, as well as "cultural" endowments such as the value parents place on their children's education. Parents invest both time and money in their children's "human capital", especially by investing in their education, but also by purchasing health, good neighbours, and other "inputs" that improve children's future well-being. How much parents invest in their children is determined by their ability to finance investments (which is influenced by their income and their access to capital). The return on investments in children may depend on children's biological endowments, so these may also influence the amount parents are willing to invest. Parents' own values and norms may also influence their willingness to invest in their children. Thus one might expect some variation in how much families with the same income spend on their children. Unfortunately, we have little empirical evidence on the point.

According to the investment model, if the Jones children and the Smith children have the same endowments and their parents have the same values and norms, the former are less likely than the latter to succeed because Mr and Mrs Jones cannot afford to buy things that their children need, such as food and medical care, and things that could help their children get ahead, such as computers, music lessons, and trips

to interesting and educational places. Children whose basic material needs are not met have a hard time acquiring the skills that help them succeed, and children whose parents cannot buy them the "extras" are at a competitive disadvantage.

"Good Parent" Theory

In contrast to the investment theory, "good parent" theories hold that low income hurts children not because poor families have less money to invest in their children, but because low income reduces parents' ability to be "good" parents. There are at least two versions of the "good parent" theory: the parental stress version and the role model version. The "parental stress" version, which dominates psychology, holds that poverty is stressful and that stress diminishes parents' ability to be supportive, consistent, and involved with their children. Poor parenting, in turn, hurts the social and emotional development of children, which limits their educational and social opportunities. This theory implies that the Smith children will fare better than the Jones children because Mr and Mrs Smith experience less stress than Mr and Mrs Jones and consequently they are able to be "better" parents.

The "transactional" theory of child development is an elaboration of the stress theory. Transactional theories hold that children's characteristics – such as their cognitive ability, temperament, and health – shape their responses to the environment, and that these responses in turn transform the environment (Parker et al. 1988). Poverty affects parents' interactions with their children, which in turn affect the children's responses to the parents and others. The children's responses then further affect the parents' responses. Psychologists often use the example of a child born prematurely to a poor single mother to describe the transactional theory. The premature birth and the prospect of rearing a child alone with little money depress the mother. Because of the child's immaturity, he or she is often passive. The child's passivity makes the mother feel inadequate, which deepens her depression. Because she is depressed, the

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mother is unresponsive to the child. The child gets little stimulation from the environment, and eventually quits seeking it. This further deepens the mother's feelings of inadequacy. By the time the child is two or three years old, she or he is behind in language and cognitive development (Parker et al. 1988). But no one factor in this scenario is the sole "cause" of the developmental delay. The child's prematurity, the mother's depression, and the family's poverty all play a role.

The notion that several "risk factors" together affect children's outcomes has become popular partly as a result of the transactional theory. Thus many studies count poverty as one risk factor among others. In almost all of this research, the risk factors are postulated as operating in an additive way, even though the transactional theory implies a recursive model in which the child's family background and environment influence the child's development, which in turn affects the family and environment. No research that I have found actually tries to obtain estimates for a transactional model of the effect of parental income, partly because such models are difficult to estimate and appropriate data are seldom available.²

The "role model" version of the "good parent" theory also emphasises parents' interactions with their children, but it does not necessarily imply that poor parents are stressed. Instead, it usually holds that low-income parents develop values, norms, and behaviours that are "dysfunctional" for success in the dominant culture. This could be because the parents are unusually stressed, because the deviant values help reduce stress, or for reasons that have little to do with stress.

Role model theories raise a question about the extent to which the values, attitudes and behaviours of parents are a response to poverty rather than a cause of poverty. Imagine that some parents fall on hard times because of bad luck. As a response to unemployment and a poor living standard, they become alienated from middle-class norms. Their

children in turn adopt their parents' dysfunctional behaviours. As a result, the children's own chances of success decline. In this example the parents' behaviour is a response to their poverty rather than a cause of their poverty. If parents' values, attitudes and behaviour change fairly rapidly in response to higher income, income transfers could change parent-child interactions and hence child outcomes. On the other hand, poverty among parents could be caused by dysfunctional behaviours such as tardiness, laziness, and sloth, with origins unrelated to their poverty. If children model their behaviour on their parents they too will develop behaviours that are dysfunctional for escaping poverty. When parents' income is a reflection of behaviours not caused by poverty, increasing their income would be unlikely to change their children's outcomes in the short run. Nor would providing parents with other means for investing in their children's human capital. Instead, parents' values, attitudes, and behaviour must change. This would pose a much greater challenge for policy makers than changing the incomes of families. I know of no research that examines the direction of the causal link between adults' income and their values, attitudes, and behaviours.

In principle these theoretical perspectives about how parental income might influence children's outcomes are empirically separable. The investment model suggests that as parental income rises, parents purchase more child-specific goods and services and that these in turn improve child outcomes. These goods and services might include computers, better schools, private lessons, travel, and higher quality housing in better neighbourhoods. Research shows that as income increases, families live in larger homes that are in better repair and are in better neighbourhoods. They spend more on food and on eating in restaurants. They own more automobiles and other consumer durables (Mayer and Jencks 1993, Mayer 1997). But improving living conditions does not appear to have a large effect on children's outcomes (Mayer 1997).

² To estimate a transactional model requires a recursive model, which in turn requires longitudinal data with many cases and repeated measures of the appropriate variables.



The parental stress model implies that when parental income increases, parental stress declines and parenting skills improve. Unfortunately, few studies provide empirical evidence on this point. Much of the research on this issue uses small and unrepresentative samples. For example, some studies include only economically disadvantaged families or clinically depressed or mentally ill parents. Social scientists do not agree on how to define or measure stress or distress.³ Nor is it clear whether parental stress is a result of low income, a cause of low income, or a result of other factors such as marital dissolution and unemployment that cause both stress and low income.

The role model hypothesis suggests that parents' values and expectations change as their income increases and that these in turn improve children's outcomes.

The few studies that provide empirical estimates suggest that economic status has little effect on women's sense of efficacy or future orientation (Corcoran et al. 1985), locus of control (Brooks-Gunn et al. 1993), or depression (Pearlin et al. 1981). Studies also show that parental stress has a modest effect on children's outcomes. If parental income has a modest effect on parental stress, and parental stress has a modest effect on children's outcomes, the net result will be that income has a tiny effect on children's outcomes through its effect on parental stress. For example, Glen Elder and his colleagues (1985) show that the correlation between family income and fathers' depression was $-.15$, and the correlation between fathers' depression and children's school performance (a composite of grade point average and getting along with teachers) was $-.18$. At most, therefore, increasing parental income by a standard deviation might reduce a father's depression enough to improve a child's school performance by $(-.15)(-.18) = .027$ standard deviations. The effect through mothers' depression was equally small. Thus if income has an effect on children's school

performance, it is not mainly through parents' depression. Thus the parental stress hypothesis, while intuitively appealing, is not currently supported by strong empirical evidence.

The role model hypothesis suggests that parents' values and expectations change as their income increases and that these in turn improve children's outcomes. As I have noted, I know of no research that tries to separate the effect of parental income on values and expectations from the effect of values and expectations on parental income.

Relative Income

Imagine now that the Smith and Jones families have exactly the same income. But the Smith family lives in a community that is much wealthier than the community where the Jones family lives.

Assuming that the families are alike in all other ways and that where the families live was entirely determined by "luck", whose children are likelier to succeed?

Some social scientists and policy makers argue that the Jones children are likely to fare better than the Smith children because they live in a less affluent community. They argue that the absolute level of parental income is less important to children's outcomes than how disadvantaged children are relative to the local community or wider society (Townsend 1987). According to this argument, relative deprivation prevents people from fully participating in the social life of the community. For example, children may feel relatively deprived when they cannot have the same material possessions as other children in their school or neighbourhood. Not having the "right" clothing may not be a serious form of deprivation as long as the clothing is suitable for the climate, but it may make a child feel so uncomfortable or alienated that she does not participate in school activities. Relative deprivation may also make parents feel

³ McLoyd's (1990) review of the literature, for example, includes studies that variously consider parental aggression, frustration, depression, anxiety, hostility, dissatisfaction with oneself, and somatic complaints. Pearlin et al. (1981) conclude that stress can, at best, "be recognized as a generic term that subsumes a variety of manifestations" (p. 341).



stressed or alienated and therefore reduce their interest in encouraging their children to succeed.

Relative deprivation theory assumes that children or parents mainly compare themselves to others who are better off, while largely ignoring those who are worse off. If parents all compare themselves to the richest people in society, for example, they will feel poorer whenever the rich get richer. Their hopes and expectations for their children may then decline and their parenting skills may worsen.⁴ Note, however, that children or their parents may also compare themselves to the poorest people in their community rather than the richest. In this case, inequality will make most people feel relatively advantaged. People could also mostly compare themselves to some real or imagined community average. In this case inequality will make the rich feel richer and the poor feel poorer.

Other social scientists argue that the Smith children would be more likely than the Jones children to succeed because living in an affluent community provides

important benefits to children. Affluent neighbours may provide good role models, and affluent communities may have higher quality schools and other amenities. How a poor child living in an affluent community fares depends on how important the negative effects of relative deprivation are compared to any positive effects of having affluent neighbours. The fact that most families seem to want to live in more affluent rather than less affluent communities suggests that the benefits of such communities probably out-weigh their liabilities, at least from the point of view of the parents.

While the idea that relative rather than absolute deprivation hurts children's outcomes is common, there is very little empirical research on the effect of relative income or inequality on children's outcomes. I have found no research that explicitly assesses the effect of relative deprivation on children's outcomes. Consequently, this report focuses on the effect of parents' absolute level of income, not their income relative to the community or national mean.

⁴ Merton and Kitt (1950) introduced the idea of reference groups in their analysis of Stouffer's (1949) *American Soldier*. They proposed that individuals' aspirations are determined by the group to whom they compare themselves. Unfortunately, there is not a consensus about which group is the most important reference group. Thus it is not clear whether a neighbourhood, a city, a state or province, or the nation as a whole is the most relevant geographical unit for assessing the importance of inequality or relative deprivation. In fact, it is not even clear that geographic area is a relevant basis for reference groups.

3



**Methodological issues
in estimating the effect
of parental income**



In this section I discuss methodological issues common to all research on the effect of parental income. Research that uses a high-quality measure of parental income averaged over several years, that controls exogenous factors likely to affect both parental income and children's outcomes, and that uses representative samples yields better estimates of the effect of parental income on children's outcomes than research that does not do these things.

3a Income versus Other Measures of Economic or Social Status

While social scientists have long been interested in the effect of family background on children's outcomes, they have often been more interested in the effect of social rank, social class, or socioeconomic status (SES) than in the effect of family income. SES is usually a composite of parents' education, occupation and income, although some measures of SES include only two of these three dimensions. SES was never intended to be a proxy for income. Because education and occupation tend to exert effects on children independent of the effects of income, the effect of SES is not likely to be the same as the effect of income.⁵ Nor is the effect of parental occupation likely to be the same as the effect of parental income. I generally do not include studies of the effect of either SES or occupation on children's outcomes.

Most research on the effect of parental income on children's outcomes is motivated by an interest in whether living in a low-income family hurts children's life chances. Because of this motivation many studies estimate the effect of living in poverty on children's outcomes. In the US this generally means having an income below the official US poverty threshold. In Canada it often means having an income below the official Canadian Low-Income Cut-Off (LICO). In this report I do not include studies that simply compare children whose families are poor to children whose families are not poor. Researchers who compare poor

to non-poor children seldom report the income differential between the groups. This can make the results quite misleading. For example, a study using data from the British National Child Development Study (BNCDS) (Hobcraft and Kiernan, 1999) shows that when several family background characteristics are controlled, poor teenage girls are 56 percent more likely than girls whose families were not poor to have a baby.⁶ Researchers often interpret this to mean that if the poor teenagers had not been poor, their chance of having a baby would equal that of the non-poor girls. In fact this result tells us that if the *average* income of poor girls were raised to the average income of non-poor girls (and all else were equal), the teenage childbearing rates would be the same for all girls. In the US the mean income of non-poor families is four or five times the mean income of poor families (depending on the data set and adjustment for family size). Assuming that the difference is the same in Britain, taken at face value, these results suggest that it would take a huge income transfer for poor girls to have the same teenage childbearing rate as non-poor girls.

I include studies that estimate the effect of the poverty ratio on children's outcomes. The poverty ratio (or the income-to-needs ratio, as it is sometimes called) is a family's income divided by the appropriate poverty threshold for the family. Families with a poverty ratio of less than 1 are classified as poor. The official US poverty rate is a multiple of a food budget established by the US Department of Agriculture in the 1960s. The threshold is adjusted

⁵ See Coleman and Rainwater (1978).

⁶ This study does not actually measure poverty. A family is counted as "clearly poor" if it reported that it was in "financial difficulty" (or if the Health Visitor responsible for the interview reported this) for most of the five years of the survey. The authors do not report the income associated with this measure of "poverty" and the concept no doubt measures more than simply low income.



annually for price changes.⁷ This poverty measure is rather arbitrary, and it has been seriously criticised on numerous grounds.⁸ Currently the main adjustments to income in the official US poverty measure are for the age of family members and the size of the family. The adjustments for age are quite small, but the adjustments for size are large. For example, when families of three or more double in size, their income must increase by 85 percent to keep their poverty ratio constant. When researchers estimate the effect of poverty on children's outcomes, the estimate combines the effect of family size and the effect of family income. This would not be a big problem except that family size has large effects on some outcomes and small effects on others (Mayer 1997). Substituting the poverty ratio for parental income will exaggerate the importance of income for some outcomes, because the estimate will be inflated by the inclusion of the family size effect. In other cases the opposite will happen. For example, family size has a much greater effect on children's cognitive test scores (Smith et al. 1997, Peters and Mullis 1997) than on children's future wages, independent of the effect of family income (Peters and Mullis 1997). Thus the effect of income on test scores but not future wages is inflated when one uses the poverty ratio as a proxy for income.

The Canadian LICO is adjusted for family size and urbanisation of the area of residence.⁹ Thus estimates of the effect of being below the Canadian LICO combine the effect of income, family size, and urbanity. For example, in a Canadian study, Dooley et al. (1998) found that living in a family whose income

was below the LICO had a very small and statistically insignificant effect on children's hyperactivity, conduct disorder, emotional disorder, repeating a grade in school, poor school performance, and frequent social problems. The authors controlled for parents' marital status, mother's education, mother's age, age of the child, and the number of children in the family. When the authors estimated the same model but substituted having income below \$20,000 rather than below the LICO, the effect was large and statistically significant for all outcomes except hyperactivity. For the effect of income to be greater than the effect of the LICO, the effect of urbanity must be positive (since the authors have already controlled for family size). This could happen if, for example, living in a rural area hurts children's mental health despite the lower living costs involved.

In principle, families with a poverty ratio of 2 have twice the income of families whose poverty ratio is 1. Families whose poverty ratio is 3 have three times the income of families whose poverty ratio is 1.¹⁰ Thus the interpretation of the coefficient for a continuous measure of the poverty ratio is fairly straightforward. However, many studies substitute dummy variables for intervals of the poverty ratio, such as less than 1, between 1 and 2, and so on. In the US the mean income of families whose poverty ratio is between one and two times the poverty line is about half the mean income of families whose income is between two and three times the poverty line. But because of the way income is distributed in the US, the mean income of families whose poverty ratio is less than 1 is less than half the mean income of families whose

7 A 1955 survey of urban Americans showed that, on average, families spent about a third of their income on food. Meanwhile, at the US Department of Agriculture researchers had established several food budgets. These budgets allowed families to receive a nutritiously adequate diet at different levels of expenditure. One of these, the "emergency food budget", specified the amount of money that a family needed to spend to have a diet that would be nutritious in the short run. It required that all meals be eaten at home with no waste, and gave conscientious attention to the nutritional value of the food. It was about 80 percent of the "low-cost" plan, which was the plan that a low-income family could use over the long run. The official poverty thresholds were established by multiplying the emergency food budget by 3, making adjustments for the age and sex of family members and for whether the family lived in a rural area. Adjustments for rural location and for the sex of family members were later dropped.

8 See Citro and Michael (1995), Mayer and Jencks (1989), and Ruggles (1990) for a critique of the poverty thresholds and other criticisms of the official poverty measure.

9 To calculate the Low-Income Cut-Off, Statistics Canada first calculates the percentage of gross income spent by the average Canadian family on food, shelter, and clothing and then identifies the income levels at which Canadian families spend 20 percent more of their gross income on food, shelter and clothing. These amounts are adjusted upward for families living in large urban centers. They are adjusted for family size but not age of family members.

10 Families whose poverty ratio is 2 have 100 percent more income than families whose poverty ratio is 1. But families whose poverty ratio is 3 have only 50 percent more income than families whose poverty ratio is 2, and families whose poverty ratio is 4 have only 33 percent more income than families whose poverty ratio is 2. Thus an increase in the poverty ratio can be interpreted as the effect of a constant absolute increase in income, but not as the effect of a constant proportional increase in income.



poverty ratio is between one and two times the poverty line. This makes the results of studies that use categories of the poverty ratio more difficult to interpret. The same argument applies to studies that consider the effect of intervals of income, such as less than \$10,000, \$10,000 to \$20,000, and so on.

Many studies use a measure of economic status that is not based on income. Such studies are not useful in elucidating the question this report addresses. Research using data from the BNCDS often estimates the effect of families being in “financial difficulty” on children’s outcomes (c.f. Gregg and Machin 2000, Hobcraft and Kiernan 1999, Hobcraft 1998). In the early waves of this survey, the Health Visitor who conducted the interview evaluated financial difficulty. In later waves parents themselves were asked, “Have you been seriously troubled by financial hardship in the last 12 months?” Parents who said yes were counted as having financial difficulty. In yet later waves information was collected on whether children received free school meals, and some studies count this as indicating financial difficulties.

In neither the UK nor the US is having financial difficulties synonymous with low income. Although no doubt all children who receive free school meals live in families with low incomes (this being a requirement of the programme), it is probably not true that all low-income children receive free school meals. In addition, some families experience “financial difficulties” when their income declines due to unemployment or when a family member becomes ill or disabled, even though they continue to have a middle-class income. On the other hand, families whose income has been low for a long time often adjust to their income and therefore report no “financial difficulties.” Financial difficulties are a function of current income, prior income, and the efficiency with which families spend the money they have. One study (Gauthier 1999) found that in Britain more than 40 percent of children experiencing a set of material and social deprivations were *not* among the poorest quarter of the income distribution. Studies in the US draw similar conclusions (Mayer and Jencks 1993, Mayer and Jencks 1989).

Psychologists and sociologists sometimes estimate the effect of “economic strain” on children’s

outcomes (Conger and Elder 1994, Conger et al. 1992, Elder et al. 1985). This concept is usually meant to capture the subjective experience of low income and is therefore considered a mediator of the effect of income on children’s outcomes rather than a proxy for income itself. A common measure of economic strain is a count of how many of the following five conditions apply to the family: having difficulty affording food, clothing, medical care, and furniture and having difficulty paying bills (Pearlin et al. 1981). Financial strain is not synonymous with low income for the same reasons that having financial difficulties is not synonymous with low income.

The results from studies that estimate the effect of “financial difficulties” or “economic strain” are nearly impossible to interpret in the context of the effect of income on children’s well-being. I generally do not include such studies in this report.

Several studies estimate the effect of parental job loss on emotional distress, behavioural problems, and academic adjustment among children in two-parent families in rural Iowa (Conger and Elder 1994), on school adjustment among adolescent girls in white two-parent families (Flanagan and Eccles 1993), and on emotional distress among black urban adolescents in female-headed families (McLoyd et al. 1994). This research builds on the work of Elder (1974), who examined the effects of the Great Depression in the US on family dynamics and children’s well-being. It is important to understand the effects of job loss on children’s well-being. But it is a mistake to assume that these effects are entirely or even mainly the result of income loss. When parents lose their jobs, many things change besides their income. Parents who lose their jobs may become depressed or angry because of the loss. Even if unemployment benefits completely replace the lost income, the anger and depression may remain. Parents who lose their jobs also have more time to spend with their children. This seems sometimes to lead to more punitive disciplinary practices and more child abuse (Waldfogel and Paxson 1999). Replacing the lost income may not change the disciplinary practices or abuse. I do not review studies of the effect of job loss on children’s outcomes because they do not separate the effect of income from the effect of these other factors.



3b Permanent versus Short-term Income

Almost all research that looks at the issue finds that a long period of low income has a greater effect on children's outcomes than a short period of low income. This is another way of saying that a family's permanent income is more important than its short-term income. A single year of income is often a poor proxy for parents' long-term economic status because families can smooth consumption over short periods of low income by either borrowing, using savings, or calling on family, friends, charity, or public services to smooth their living standards.

Again imagine the Smith family and the Jones family. Over a ten-year period both families' total income equals \$100,000 and averages \$10,000 per year. The Jones family receives \$10,000

every year, but the Smith family receives \$10,000 in some years, \$5,000 in others and \$15,000 in yet others, totalling \$100,000 over 10 years. When the Smith's income is \$15,000 they save \$5,000, and when it is \$5,000 they spend \$5,000 of their savings.¹¹ If we measure income in only one year, we will record \$10,000 for the

Jones family and anywhere from \$5,000 to \$15,000 for the Smith family. But in each year both families spend \$10,000, so we will have mis-measured the true economic well-being of the Smith family. If we count the Smith family as having \$5,000 and the Jones family as having \$10,000, then find that the children's outcomes are identical, we will conclude that income has no effect on children's well-being. This is why measurement error of this sort generally causes downwardly biased estimates of the effect of income.

Table 1 shows the results from three studies that estimate the effect of income measured over various

lengths of time on three measures of children's cognitive test scores and one measure of children's behavioural problems. The measures of cognitive skill are the Peabody Individual Achievement Tests for mathematics (PIAT-math) and reading recognition (PIAT-reading), and the Peabody Picture Vocabulary Test (PPVT). The measure of behavioural problems is the Behavioral Problems Index (BPI). These and other outcome measures for children are described in the Appendix. The Appendix also describes the major data sets used in the studies summarised in this report and provides information for converting nominal to constant US dollars.

In Table 1 Blau's (1999) results indicate that increasing income by \$10,000 (1979 dollars) in a single year increases children's PIAT-math scores by

.059 standard deviations. However, increasing average income over several years (between two and seven years) by the same amount increases the PIAT-math score by .142 standard deviations. Mayer (1997) and Korenman et al. (1995) also find that income averaged over several years has a greater effect than income measured in one year.

Solon (1992) and Zimmerman (1992) showed that increasing the length of

time over which parental income is measured from one year to several years almost doubles the correlation between parents' income and children's earnings or income in the US. Corak and Heisz (1999) find that in Canada increasing the length of time over which fathers' incomes are measured from one year to five years increases the correlation between fathers' and sons' earnings by between 15 and 30 percent (depending on the age of the son). Estimates using one year of data on fathers' income under-state the correlation between fathers' and sons' income by between 30 and 60 percent compared to estimates using five years of data.

Almost all research that looks at the issue finds that a long period of low income has a greater effect on children's outcomes than a short period of low income.

¹¹ In this context savings can take many forms, including the accumulation of durable goods. So a family might buy a car in a prosperous year and put off buying new clothes in a lean year.

**Table 1**

Estimated Effect of Parental Income on Children's Cognitive Skills and Behaviour Problems, by Length of Time Income is Measured				
Measure and Study	PIAT – Math	PIAT - Read	BPI	PPVT
Percent of a Standard Deviation				
Blau (1999) effect of an additional \$10,000:				
Income last year	.059	.069	-.085	.070
Long-term income	.142	.145	-.182	.145
Mayer (1997) effect of doubling income:				
Income last year	.063	.089	-.058	.044
Income previous five years	.096	.161	-.138	.115
Change in Percentile Score				
Korenman et al. (1995) effect of income-to-needs ratio of 1.0 to 1.85 compared to > 3.0:				
Income last year	-1.8	-3.6	6.5	-5.9
Income previous 13 years	-4.0	-4.8	5.6	-7.2

Notes and Sources: Blau (1999) controls for mother's race, AFQT score, location of her birth, education of her parents, household structure of her family when she was age 14, child's age and sex, and the year of the assessment. PPVT is for children aged three and older. BPI is for children aged four and older. PIAT scores are for children aged five and older. Estimates are from Table 1.

Mayer (1997) controls for age and race of child, household size, mother's age at child's birth, AFQT score and education. All scores are for children five to seven years old. Estimates are from Table 4.2

Korenman et al. (1995) control for child's race and sex, whether first born, born with low birth weight and whether born premature, number of siblings and age at assessment, mother's age at birth, education, AFQT score, and whether mother smoked, drank alcohol or used cocaine during pregnancy. Age groups for assessments are the same as for Blau. Estimates are from Table 5.

Of course, many readers may think this is obvious – if family income increases by \$10,000 in one year, the family has \$10,000 more to spend. If income increases by \$10,000 for five years, the family has an additional \$50,000 to spend. This is yet another way of saying that increases in permanent income are more important than increases in a single year of income.

Several papers estimate the effect on children's outcomes of variations in time spent on low income or in poverty. For example, several chapters in Duncan and Brooks-Gunn (1997) estimate models that include dummy variables for the family having been poor for various lengths of time. These studies do not tell us much about the effect of parental income because a family that is poor for several years can have a higher mean income than a family that is poor for fewer years. This can happen if, for example, the income of the former is just below the poverty line, while the income

of the latter is some distance below the poverty line. In addition there is a lot of heterogeneity in family income among families who have been poor for the same number of years. Such studies could be useful if the poverty threshold corresponded to a point in the income distribution below which families were much more deprived. But no such break-point has been found. Thus the measure of time in poverty is at best a crude measure of long-term income. Nonetheless, these studies always find that children who have been poor for several years fare worse than children who were poor in only one year.

Although permanent income has a greater effect on children's outcomes than short-term income, fluctuations in family income could hurt children's outcomes even if permanent income stays the same. For example, if the Smith family did not anticipate the drop in income from \$10,000 to \$5,000, the decline



could cause stress or anxiety and could even cause the family to make changes that are disruptive to children, such as moving to a new home. Unfortunately, most research on income fluctuations fails to separate the effect of fluctuations in income from the effect of permanent income. A family whose income declines has a lower permanent income than a family with the same previous income whose income does not decline. (See Mayer 1997 for a discussion of this issue.)

3C Estimating the Causal Effect of Parental Income

Sometimes when people talk about the effect of parental income, they mean the effect of parental income and all its correlates. Others mean the effect of income per se. This is an especially important distinction for policy makers. Increasing the income of low-income families is relatively straightforward, in the bureaucratic if not the political sense. Finding policies to change the correlates of income is likely to be much more difficult.

Returning to the original example of the Jones and the Smith families, recall that the Jones family gets by on the money Mr Jones earns working odd jobs and government aid that provides food and health insurance for their children. The Smith family lives comfortably on Mr Smith's salary from the law firm where he works. The income of the two families differs, but so does the education of the parents. Mr Smith earned a law degree. Mr Jones quit when he completed compulsory schooling. Any difference that we observe in the children's outcomes could be due to the difference in their family's income or the difference in their parents' schooling or a combination of the two.

To estimate the causal effect of parental income a researcher must control for all the factors that both affect parental income and are correlated with children's outcomes. These are referred to as *exogenous* variables. In the above example, parental education is exogenous because it affects parents' income and is correlated with children's outcomes. Thus researchers would have to control for parental education to separate its effect from the effect of income. But they would also have to control for all other relevant exogenous variables. Unfortunately, one cannot possibly do this because no data set includes measures of all such variables. Indeed we do not even know what they are.

In their haste to control for exogenous variables, researchers often control for some *endogenous* variables. Endogenous variables are affected by parental income. For example, material living standards and neighbourhood characteristics are endogenous because they are mostly the result of parental income. Endogenous variables are the pathways through which income exerts its effects. Thus the estimated effect of income declines as more endogenous variables are controlled. When researchers control for neighbourhood characteristics, this reduces the estimated effect of income because some of the effect of income will be attributed to neighbourhood composition.

To estimate the total effect of income one should control only for exogenous characteristics of parents and children. Parental age, education, and race clearly affect their current income but are not affected by it. However, it is not always obvious what is exogenous and what is endogenous with respect to income. Two examples of frequently controlled but ambiguous measures will make the point. The first is a family's score on the Home Observation for Measurement of the Environment (HOME) inventory. The HOME inventory includes measures of children's possessions (e.g. number of books, a tape recorder or CD player) and activities (e.g. how often a child goes on an outing or visits a museum). These are likely to be a consequence rather than a cause of parental income. The inventory also includes interviewers' interpretation of whether a child's home is safe, "dark and perceptually monotonous", "minimally cluttered", and "reasonably clean". Cheap apartments are presumably more likely than expensive apartments to be unsafe, dark, and monotonous. They are also likely to be small and therefore cluttered. Thus these too are likely to be a consequence rather than a cause of parental income. The HOME inventory also includes measures of discipline and other parenting practices. It is difficult to know whether these result from parents' income or are indicators of a parental characteristic (such as depression or anxiety) that affects both income and parenting practices. All in all, the HOME score is probably more endogenous than exogenous, so controlling for it would downwardly bias estimates of the total effect of income. But some elements of the HOME score may be exogenous, too. The HOME score accounts for 18 to 40 percent



(depending on the sample and the outcome) of the effect of income on children's outcomes.¹²

A second example of a frequently controlled measure that could be partly endogenous and partly exogenous is parental mental health. The "Good Parent" model holds that parental income affects children's outcomes by affecting parents' level of stress and hence their parenting behaviours. According to this model, parents' mental health is endogenous – a pathway through which income affects children's outcomes. Many studies find an association between parents' mental health and their children's outcomes. Some studies find an association between poverty and parents' mental health (McLeod and Shanahan 1993, McLeod et al. 1994). But parents' mental health could be a cause of parents' poverty, not the result of their poverty (Miech et al. 1999, Mayer 1997).

Because it is impossible to directly control for all relevant exogenous factors, a growing number of studies have developed other ways to control for unobserved or unmeasured exogenous factors. Most of these techniques rely in one way or another on changes in parental income. For example, one common technique for controlling for relevant unobserved variables is to compare the outcomes for siblings raised when their parents' income differed. The rationale for sibling comparisons is that important exogenous characteristics of parents, such as perhaps their parenting skill and temperament, do not change over time so they affect all siblings equally. Estimates that compare siblings hold constant invariant family background characteristics. Such a model is referred to as a "sibling fixed-effect" model. But of course, parental income generally changes for a reason, and the things that cause income to change could also affect children's outcomes. For example, a change in family income may be the result of the mother

working more or fewer hours in the labour market or a change in parents' marital status. Both are likely to affect children's life chances directly.

These same problems apply to models that use data from longitudinal studies to estimate the effect of a change in family income on children's outcomes. Such models are sometimes called "child fixed-effect" models

because they hold constant invariant characteristics of children and families. Researchers also sometimes make use of "grandparent fixed-effect" models. Such models compare outcomes for the children of sisters. The logic of these models is that because sisters come from the same family background and are thus exposed to the same family influences, they are likely to have similar parenting styles and other

characteristics. When we compare outcomes for their children (who are cousins), these common factors are held constant.

These various forms of fixed-effect models are subject to several criticisms and most of the potential problems would lead to a downward bias in the estimated effect of income. If income changes slowly or by only a small amount, measured changes in income can be mostly error. Put another way, a measure of change in income contains more error than a measure of average income. Mis-measurement of the change in income would downwardly bias its estimated effect. Fortunately all the studies that I review that rely on income changes use measures of income averaged over several years, reducing this potential source of error.

A second potential problem with fixed-effect models is that unless the process yielding a change in income is modelled, the fixed-effect estimate can be biased. For example, imagine that a child's cognitive test score depends on his parents' income and an error term. In a fixed-effect model a change in the child's test score results from a change in parental income and a change

Because it is impossible to directly control for all relevant exogenous factors, a growing number of studies have developed other ways to control for unobserved or unmeasured exogenous factors.

¹² See Rowe and Rodgers (1997) for a discussion of genetic variation in the HOME score. They argue that 40 percent of the variation in HOME scores is due to genetic differences among parents.



in the error term. Parents' income depends on whether the mother works, which also affects her child's test scores. The mother goes to work. This increases test scores due to the increase in family income but lowers test scores due to the mother's absence. If one does not model the change in the mother's work status, the estimated effect of income will be downwardly biased.

No one has found a completely convincing way to control for all unobserved exogenous characteristics that can affect children's outcomes. But as we will see, studies that control for many exogenous family background factors almost always find smaller effects than studies that control for fewer such factors. This alone suggests that studies that omit relevant exogenous factors probably over-state the effect of family income on children's outcomes. Studies that use techniques to control for unobserved exogenous factors usually find even smaller effects than studies that control for lots of measures of family background. This too suggests that omitted variables lead to upward biases of the effect of income. However, these estimates could also be too low because of the errors I have described.

3d Functional Form of the Relationship

If the effect of income on children's outcomes is linear, each additional dollar of parental income improves children's outcomes by the same amount, regardless of how much money the family starts with. This means that a \$1,000 increase in the income of the poor will improve their children's well-being by the same amount as a \$1,000 decrease in the income of the rich will hurt their children's well-being. Thus a costless income transfer from the rich to the poor would produce no change in children's mean well-being. It would simply transfer well-being from the rich to the poor. Furthermore, if there were costs associated with such a transfer, income transfers from the rich to the poor could diminish mean child well-being by reducing the aggregate amount of resources spent on children.

Most people think that an extra \$1,000 helps a family with \$10,000 a year more than it helps a family with \$100,000 a year. That is, they believe that the

mathematical function relating income to children's outcomes is non-linear. If the true "functional form" of the income–outcome relationship is non-linear such that poor children gain more from an additional \$1,000 than rich children gain from the same amount, then, holding constant average income, a more equal distribution of parental income would improve the average well-being of children. Furthermore, if the effect of income on children's outcomes is non-linear, income transfers may increase well-being much more in low-income than in high-income countries. Thus it is very important to understand the functional form of the relationship between parental income and children's outcomes.

Precisely estimating the functional form of the income–outcome relationship, however, requires a very large sample, and few studies actually do it. Mayer (1997) found that several non-linear specifications of income explained a somewhat greater amount of the variance in two measures of children's cognitive test scores and in a measure of behavioural problems. Non-linear specifications also explained slightly more of the variance in children's years of schooling and adult males' hourly wages and earnings. However, Mayer's data were never adequate to distinguish among different nonlinear forms, and the differences between linear and non-linear specifications were always small.

Using a linear function Duncan et al. (1998) estimate that in the Panel Study of Income Dynamics (PSID) a \$10,000 (in 1993 dollars) increase in family income is associated with an additional .14 years of schooling. However, when they use a spline function, they find that this same income increase is associated with an additional 1.3 years of schooling for children whose average family income is less than \$20,000 and only .13 years for children whose family income is greater than \$20,000.¹³ Of course, \$10,000 represents a much larger *percentage* increase for families whose income is less than \$20,000 than for families whose income is greater than \$20,000. This is why a logarithmic function generally provides a fairly good fit.

Two studies estimate the effect of income and income squared on children's PPVT scores. One (Hill and O'Neill 1994) uses US data from the Children of the National

¹³ Spline functions are piecewise polynomial functions defined by a set of discrete points. They can be used as a device for approximating the shape of a curvilinear function without having to specify ahead of time the mathematical form of the function.



Longitudinal Survey of Youth (CNLSY) and one uses Canadian data (Lefebvre and Merrigan 1998). Both find that the effect of the squared term is negative and statistically significant, indicating that an increase in parental income has a smaller effect on PPVT scores for affluent than for poor children.

Dearing, McCartney and Taylor (2001) estimate the effect of a change in a family's poverty ratio on three-year-old children's cognitive, language and behavioural outcomes using a sample of 1,364 children born to mothers in several large cities in the US.¹⁴ They estimate a model that includes the family's poverty ratio when the child was one month old, the average monthly change in the poverty ratio between the time the child was aged one and 36 months, a dummy variable equal to 1 if the family was never poor during the 36 months (and -1 if the family was ever poor), and an interaction between the family's never being poor and the monthly change in the poverty ratio. They control for the child's gender and ethnicity, and the mother's education and marital status. They also control for the child's birth weight, which could be endogenous. In this model the coefficient on the change in the poverty ratio was greater for children who were poor at some time during the 36 months than for children who were never poor.¹⁵ When children from poor families experienced increases in income-to-needs that were at least one standard deviation above the mean change for poor families, they displayed outcomes similar to their non-poor peers. However, this model has limitations that draw this conclusion into question.¹⁶ The authors control for few family background characteristics and they do not model the

causes of the change in income. Mothers who experience a large increase in income presumably differ in many ways from mothers who have little income increase. They may be especially industrious and well adjusted or they may have especially good childcare options that both allow them to go to work and help their children succeed. As I discussed above, to attribute the change in children's behaviour to the change in income, we would have to control for the things that cause the income change. Nonetheless, this paper like others suggests that income effects may be greater for low-income than for high-income children.

The research does not always show that poor children benefit more than rich children from the same absolute increase in their parents' income. Duncan et al. (1998) find little evidence that the effect of income on unwed childbearing is non-linear. Corak and Heisz (1999) use non-parametric methods to estimate the functional form of the relationship between fathers' earnings and incomes and sons' earnings and incomes during adulthood. They use data from Canadian tax records, so the sample is very large and they are able to average both fathers' income and sons' income over several years. They show that in Canada the relationship between fathers' earnings or income and sons' earnings or income is roughly S-shaped. Among low-income families fathers' income has almost no effect on sons' earnings or income. The correlation then rises before flattening out again for high-income fathers. The correlation between fathers' and sons' earnings rises to about .40 and the correlation between fathers' and sons' income rises to about .80.

- 14 To be eligible for inclusion in the study children had to be born to healthy English-speaking mothers older than 18 years who were not planning to move within a year and who currently lived in a neighbourhood considered safe for visits. The child had to have been a singleton birth.
- 15 The authors report that when they control a measure of cognitive development at age 15 months (the Bayley Mental Development Index), the effect of the change in the poverty ratio on school readiness and receptive and expressive language measured at 36 months did not change. Because they measure the change in the poverty ratio over all 36 months and because the test of cognitive development at 15 months is not the same as the measures of language development, this is not a true change model. Setting aside the problem of different measures, these results suggest that among poor children a change in the poverty ratio between one and 36 months of age effects a change in "cognitive development" between the ages of 15 and 36 months. If a change in the poverty ratio has a causal effect on the change in development, one would expect controlling "cognitive development" at age 15 months to reduce the effect of the change on development at 36 months because half the change would have already taken place by then. The authors do not report their results in sufficient detail to see if this is what happens.
- 16 The main limitation is that whether the family was ever poor is a function of the initial poverty status and the change in poverty status. This leads to a technical problem known as under-identification, one implication of which is that the coefficient on the interaction term is difficult to interpret. The authors also estimate separate models of the effect of change for the poor and non-poor, which avoids the identification problem. In this model the effect of change in the family's poverty ratio is greater for the group that was poor at some time during the 36 months. The authors do not report whether the difference between the coefficients is statistically significant, but the effects for the non-poor are close to or within the 95 percent confidence interval for the poor group.



Thus the effect of fathers' income and earnings is greater in high- rather than low-income families.¹⁷

Not only do few studies try to estimate the precise functional form of the income–outcome relationship, but most studies simply estimate the effect of income using a linear specification. Some studies use non-linear specifications without actually testing what the best mathematical income–outcome function is. For example, almost all the economics research on the intergenerational transmission of economic status estimates the effect of the logarithm of parental income on children's economic outcomes. However, such studies are of little use in determining whether raising family income would help low-income children more than high-income children because estimating a non-linear relationship does not mean that the true relationship is non-linear.

Many studies include a series of “dummy” variables for the family's poverty ratio. A dummy variable is one that is coded either zero or 1. Such a model might include a variable equal to 1 for families whose poverty ratio is less than 1 and zero otherwise, another variable equal to 1 for families whose income is between 1 and 2 times the poverty ratio and zero otherwise, and so on.¹⁸ From this one can tell if, for example, the effect of having income less than the poverty line is different from the effect of having income between two and three times the poverty line. Many authors imply that if the effect of a poverty ratio of less than 1 is greater than the effect of a poverty ratio between 1 and 2, the effect of income is non-linear. But this is not necessarily true. Imagine that the mean income of three poverty ratio groups is as follows: less than 1 = \$5,000, 1 to 2 = \$20,000, and

2 to 3 = \$30,000. The difference in mean income for families with a poverty ratio of less than 1 and families with a poverty ratio of between 1 and 2 is \$15,000. The difference in mean income for families with a poverty ratio of between 1 and 2 and families with a poverty ratio of between 2 and 3 is only \$10,000. Even if the effect of income is completely linear, the effect of going from a poverty ratio of less than 1 to a poverty ratio of

between 1 and 2 will be greater than the effect of going from a poverty ratio of between 1 and 2 to a poverty ratio of between 2 and 3. Because researchers seldom report the mean income for poverty ratio categories, it is difficult to interpret the difference in the coefficients reported in such studies as a measure of non-linearity. In addition, to have confidence in the difference between these

effects, one would have to formally test whether the coefficients for the different poverty levels were significantly different from one another. But researchers seldom do this.

Although understanding the functional form of the relationship between income and children's outcomes is crucial for understanding the potential benefits from income redistribution, the research on this topic is limited. All of the studies of children's cognitive test scores that have tried to determine the functional form of income find that it is likely to be non-linear. But there is little evidence on other outcomes, and the existing evidence is mixed.

3e Representative Samples

This report mainly relies on studies that use nationally representative samples, or at least samples that are not clearly unrepresentative. Results based on very small or

All of the studies of children's cognitive test scores that have tried to determine the functional form of income find that it is likely to be non-linear.

¹⁷ Corak and Heisz (1999) argue that this pattern is consistent with a particular kind of credit constraint in which children in low-income families are likely to be low-ability so their parents, expecting a low return, do not invest much in their children's human capital; while rich parents whose children are more likely to be high-ability can invest as much as they wish. In-between parents cannot invest as much as they want given their child's ability. As Grawe (2004) points out, many forms of non-linear relationship between parents' income and children's outcomes can be interpreted as implying credit constraint. He also argues that there is little evidence of credit constraint in the US or Canada. Although provocative, Grawe's argument is complex and beyond the limits of the discussion on the income–outcome functional form in this report.

¹⁸ Almost all the chapters in Duncan and Brooks-Gunn (1997) use this model as a test of non-linearity.



specialised samples may not be generalisable to children as a whole and they provide little information about the potential effect of income transfers.

Researchers who are interested in poor children sometimes study only poor children. These studies may be misleading. If the effect of income were the same for rich and poor children, estimates for low-income children would hold for high-income children. But if the effect of income is not the same for rich and poor children, estimates based on low-income children cannot be generalised to high-income children. If one wants to know the effect of increasing the income of low-income families, focusing on such families might provide the right estimate. However, such studies cannot tell us how much reducing the income of the middle class in order to transfer money to the poor would hurt middle-class children.

Very low- and very high-income families tend to be under-represented in large national surveys.¹⁹ Under-representation of low-income families is even greater in longitudinal surveys such as the PSID because low-income families tend to drop out of such surveys at a higher rate than higher-income families (Beckett et al. 1988, Duncan and Hill 1989, Haveman and Wolfe 1994). Of course it is hard to know how much under-represented the very rich and very poor are in these surveys so it is hard to know how much bias this problem is likely to introduce. It is probably safe to say that the under-representation of families at the tails of

the income distribution has at most a modest effect on the estimated *average* effects of income in this report. But under-representation of the very poor could have a greater effect on estimates of the effect of parental income on very poor children. Thus the small body of research that has tried to estimate the functional form of the income–outcome relationship may produce biased estimates. But it is not clear what direction the bias is likely to take. Under-sampling very poor children could produce downwardly biased estimates of the effect of parental income if additional income has an especially large positive effect on such children. However, if the very poorest parents are the most likely to suffer from other hardships, such as mental or physical illness that impede their ability to be effective parents or to spend their resources efficiently, additional income might have a smaller causal effect on their children than on children in families of somewhat higher income. This would introduce upward bias in the estimated effect of parental income. Data from large national longitudinal surveys may not be adequate for assessing the effect of income in the bottom 3 to 5 percent of the income distribution.

Samples that over-represent poor families in the US inevitably also over-represent racial and ethnic minorities. If the effect of income differs by race or ethnicity (an issue I address below), this could also be a problem.

¹⁹ Homeless children are especially likely to be omitted from large national surveys. Many people argue that additional income would surely be especially helpful to such children, so omitting them introduces downward error in estimates of the effect of income. However, the number of homeless children in the United States is very small, almost certainly less than .5 percent of all children, and few homeless children actually live on the street (Jencks 1994). Finally, for the same reasons as given in the text, omitting such children could introduce upward or downward bias in the estimates.

4



How much does
parental income affect
children's outcomes?



Parental income is positively correlated with virtually every dimension of child well-being that social scientists measure, and this is true in every country for which we have data. The children of rich parents are healthier, better behaved, happier and better educated during their childhood and wealthier when they have grown up than are children from poor families.

But the correlation coefficient between parental income and children's outcomes never approaches 1, and in studies that control for relevant exogenous parental characteristics the effect of parental income declines. In this section I discuss research on the effect of parental income on children's cognitive test scores, socio-emotional functioning, mental health, behaviour problems, health, teenage childbearing, educational attainment, and economic well-being in early adulthood.

4a Cognitive Test Scores

Research consistently finds that low parental income is associated with lower scores among children on tests of cognitive ability. Most social scientists agree that cognitive test scores are a function of a child's genetic aptitude for learning and environmental factors that affect both the child's opportunity to learn and his or her motivation to learn. However, social scientists do not agree on the relative importance of these factors. Nor do they agree about why family income is correlated with children's test scores. Many researchers argue that the correlation between parental income and children's test scores is the result of low-income parents' inability to afford as stimulating an environment for their children as more affluent parents. Others argue that low income causes parents to feel depressed, anxious, or alienated, which decreases their ability to provide the stimulation and support conducive to improving cognitive skills. Others argue that the relationship is due to a common genetic factor that causes parents to have low ability and hence low income and causes their children to have low test scores.²⁰ But genetically shared aptitude is only one of several factors that

could cause both low income among parents and low test scores among their children. For example, parents who are in poor health may find it both hard to earn a lot of money and hard to provide an environment that raises their children's test scores.

The studies I discuss in this section usually use test scores that are normed on population samples to have a mean of 100 and a standard deviation of 15. This does not imply that the mean score for the samples used in these studies is 100 or that the standard deviation is 15. Some of these tests were normed many years ago and average test scores have risen over time. In addition, not all samples are completely representative. However, unless I note otherwise, the reader can assume that the mean is approximately 100 and the standard deviation is approximately 15.

Estimating the effect of parents' income on children's cognitive skills without controlling for parents' cognitive skills is likely to over-state the importance of parents' income, because part of the apparent effect of income will be due to shared genetic factors. Because there is no agreement about how large the genetic component of cognitive ability is, the size of the bias is unknown. However, as we will see, studies that control for parental cognitive skills always find that the effect of parental income on children's cognitive test scores is quite small. This suggests that omitting parental skills (and unmeasured correlates of their skills) is an important source of bias.

Studies in the U S that control for some family background characteristics – such as mother's education and family structure, but not parents' cognitive skills – find that on average increasing parents' poverty ratio by 1 generally raises children's

²⁰ See Rowe and Rodgers (1997) and Plomin and Petrill (1997) for recent discussions of the relationship between genetics, family background, and children's cognitive test scores.



test scores by about a fifth to a quarter of a standard deviation (around 2.5 to 4.5 points, depending on the assessment and the age at which children were tested).²¹ Smith et al. (1997) is representative of such studies. It uses data from both the Infant Health and Development Program (IHDP) and the 1986 CNLSY. They estimate that across all poverty ratios increasing the poverty ratio by 1 is associated with a 3.7 point (.20 standard deviations) increase in three- and four-year-olds' PPVT scores. The same increase in income is associated with a 3.1 point (.25 standard deviations) increase in five- and six-year-olds' PIAT-math scores, and a 3.4 point (.29 standard deviations) increase in five- and six-year-olds' PIAT-read scores. The effects are slightly smaller for older children. The effects of income were the same or greater in the IHDP data. However, neither of these samples is representative of US children. The IHDP is a sample of low birth-weight babies and hence over-samples low income and minority children. The 1986 CNLSY over-samples children born to young mothers. In addition, these estimates control only for the child's race, birth weight and sex, mothers' education and parents' marital status.

Lefebvre and Merrigan (1998) use data from the Canadian National Longitudinal Survey of Children and Youth Cycle 1 to assess the effect of family income on children's PPVT scores. They control for the mother's age at the birth of her first child, parents' education, immigrant status, whether the family received welfare, province of residence, whether the child lives in a low-income neighbourhood, child's age, gender, number of siblings and birth order. Lefebvre and Merrigan (1998) find that on average a \$20,000 (Canadian) increase in income (39 percent of the mean income) increases PPVT scores by only about one point.²² They also

include income squared, which has a negative and statistically significant effect on PPVT scores, indicating that the increase in test scores for a given increase in income is smaller for affluent than for poor families.

In studies that control for mothers' cognitive skills the effect of family income is smaller. For example, Brooks-Gunn et al. (1996) also use IHDP data to estimate the effect of the parents' poverty ratio averaged over three years on five-year-olds' scores on the Wechsler Preschool and Primary Scale of Intelligence. They find that on average increasing a family's poverty ratio by 1 is associated with a 4.3 point increase in children's IQ scores when they control for neighbourhood income, and the child's gender, race, birth weight, and health at birth. When they control for mothers' verbal ability, education, age and marital status the effect drops to 2.9 points. When they control for the HOME score, the effect drops to 2.0 points. However, as noted above, the HOME score and neighbourhood income are likely to be partly endogenous.²³

The results of four studies predicting children's cognitive test scores from the CNLSY and controlling for mothers' scores on the Armed Forces Qualification Test (AFQT) (a test of cognitive skills described in the Appendix) are shown in Table 2. Two studies, Korenman et al. (1995) and Blau (1999), estimate models that do and do not control for mothers' AFQT scores. In both studies the effect of parental income declines by a large amount when a control is used for mothers' AFQT scores.

All four studies show that even after controlling for mothers' AFQT scores, increasing parental income raises children's test scores.²⁴ The size of the effect depends on the model and the particular sample.

21 Duncan et al. (1994), Smith et al. (1997), Brooks-Gunn et al. (1993).

22 This estimate is probably smaller than Smith et al. (1997), although these papers do not provide enough information to accurately compare the results. In Smith et al., going from a poverty ratio of 1 to a poverty ratio of 2, which is equivalent to doubling income, raises PPVT scores by 3.7 points; and in Lefebvre and Merrigan (1998) an increase from half the mean to mean income raises PPVT scores by about 1.5 points.

23 In a suggestive study Scarr and Weinberg (1978) find that increasing family income increases the IQ score of parents' biological but not adopted adolescents. Controlling parents' IQ reduces the effect of parental income on biological but not adoptive children's IQ, which is negligible in any case. These findings suggest that, in its effect on children's IQ, parental income may be a proxy for parental genes. However, the sample in this study was small and parents' income was measured in only one year. The effect of income was not statistically significant even for biological children. In addition, the socioeconomic status of the families in this study was unusually high. If the effect of income is strongest near the bottom of the income distribution, and is greater for income measured over several years, this study will under-state the effect of income.

24 Comparisons of the size of effects are complicated by the fact that some scores are in percentile points and others are in standardised points. As a rule of thumb, a percentile point is on average about .04 standard deviations. In addition, the standard deviations for the test vary across the samples and are not reported by all authors.



Table 2

Summary of the Effect of an Increase in Parental Income on Children's Cognitive Test Scores Controlling for Mother's AFQT Score Using CNLSY			
Study	PPVT	PIAT – Math	PIAT – Read
Hill and O'Neill (1994)			
Effect of doubling income on percentile scores¹			
Basic Controls plus Mother's AFQT Score:			
\$5,000 to \$10,000	1.8	NA	NA
\$10,000 to \$20,000	3.1	NA	NA
Korenman et al. (1995)			
Effect of doubling poverty ratio on percentile scores²			
Basic Controls:			
.7 – 1.4 poverty ratio	8.1	8.6	8.7
1.4 – 2.8 poverty ratio	8.1	7.1	7.3
Basic Controls plus Mother's AFQT Score:			
.7 – 1.4 poverty ratio	2.7	4.0	3.9
1.4 – 2.8 poverty ratio	3.3	2.9	3.1
Blau (1999)			
Effect of a \$10,000 increase in permanent income (1979\$) on standardised scores³			
Basic Controls	5.6	3.3	4.0
Basic Controls plus Mother's AFQT Score	3.1	1.6	2.0
Controls for Unobserved Heterogeneity:			
Child fixed-effect (current family income)	-.042	-.142	.222
Grandparent fixed-effect	4.3	1.7	2.3
Mayer (1997)			
Effect of doubling income on standardised scores⁴			
Basic Controls plus Mother's AFQT Score	1.9	1.2	2.0
Controls for Unobserved Heterogeneity:			
Time 2 income	2.2	1.5	.007
"Other" income	1.3	-.053	1.4

Notes

- 1 Data are from 1986 and 1988 CNLSY. The average age of the child at the time of the test was five years. Controls for child's race and age, number of siblings, mother's marital status, mother's AFQT score and self-esteem score, grandparents' characteristics and urbanisation. Uses two-stage estimation model to correct for the young ages of mothers in the sample.
- 2 Data are from 1986, 1988, and 1990 CNLSY. Uses first test available. This is usually at age three to five for the PPVT and at age five for the PIAT tests. Controls for age, sex, birth order, and race of child, number of siblings, mother's marital status, education, and age.
- 3 Data are from 1986, 1988, 1990, and 1992 CNLSY. Controls for mother's education, AFQT score and child's age, gender and survey year. Estimates for the child fixed-effect model are based on annual not permanent income, which partly accounts for the fact that they are so small.
- 4 Data are from 1986, 1988, 1990, and 1992 CNLSY. Children are aged five to seven. Income in the model is logged. Controls for child's age and race, mother's education, and household size.



Mayer's sample is somewhat older and presumably somewhat more representative of US children than the other samples because she includes more recent cohorts of CNLSY respondents. Korenman et al. (1995) produce the largest estimates using models with basic controls only. Theirs is also the only study to use the poverty ratio rather than income. Although they control for number of siblings, part of the effect of the poverty ratio may be due to the effect of family size not captured by number of siblings.

Two studies, Mayer (1997) and Blau (1999), try to control for unobserved characteristics of parents that could affect both their income and their children's test scores. Blau (1999) uses three fixed-effect models (and one random-effect model) to control for unobserved heterogeneity. These models include a grandparent fixed-effect model in which he compares outcomes for children whose mothers are sisters, a sibling fixed-effect model in which he compares children of the same mother, and a child fixed-effect model. Table 2 shows the grandparent and child fixed-effect models. The average effect of family income on test scores is close to zero in the child fixed-effect model. But the estimates in the grandparent fixed-effect models are not always smaller than the conventional estimates controlling for mothers' AFQT scores.

Mayer (1997) also uses a variety of techniques to control for unobserved heterogeneity. As in Blau, controlling for observed exogenous background characteristics reduces the effect of family income on children's outcomes. Also as in Blau, models that control for unobserved heterogeneity usually but not always produce smaller estimated effects of parental income on cognitive test scores.

Note that Blau's and Mayer's estimates are not strictly comparable. Mayer estimates the effect of the logarithm of family income averaged over five years, while Blau estimates a linear specification of income averaged over the child's entire life. Mayer uses data from the 1986, 1988, 1990, and 1992 CNLSY, while Blau uses data for the first three of these years. Mayer also estimates the effect of income on test scores of somewhat older children. Nonetheless, the conclusion is similar in both studies, namely that to increase test scores by a point or two would require a very large change in income, something of the order of doubling permanent income.

This conclusion seems to hold in New Zealand as well. Barker and Maloney (2000) use data from the Christchurch Health and Development Study (CHDS) to estimate the effect of several family background characteristics on changes in children's Burt Word Reading Test scores between the ages of six and 13. They estimate child fixed-effect models and control for several important time-varying factors including mother's work status and marital status, as well as factors that do not generally vary over time including parents' education, number of siblings, mother's score on an emotional responsiveness scale, years the child attended preschool, and whether the family got welfare benefits. They average income when the children were eight to 13 years old (converted to constant 1996 dollars using the Consumer Price Index). Children whose average family income was between NZ\$20,000 and \$29,000 had average scores that were .231 standard deviations below the average score. Children whose family income was about double this amount (between NZ\$40,000 and \$59,000) had average scores that were about .090 standard deviations above the average score. Thus doubling income in this range was associated with about a .320 standard deviation difference in test scores. With the controls listed above a NZ\$10,000 increase in family income increased test scores by around 1.3 points or less than .10 standard deviations. Barker and Maloney estimate many variations on child fixed-effect models to address a range of different assumptions about the causes of increases in test scores. In all models that control for the age of the child, the effect of family income on test scores over time is positive, small, and statistically insignificant.

Peters and Mullis (1997) estimate the effect of family income on adolescent AFQT scores using data from the National Longitudinal Survey of Labor Market Experience of Youth. Over the entire income range, each additional \$10,000 (1992 dollars, about 42 percent of a standard deviation) of income averaged over three years was associated with an additional 1.5 points on the AFQT. The authors do not provide means for the whole sample, but the mean AFQT score for whites was 46.0 with a standard deviation of 25.6. Thus, although statistically significant the effect of income on adolescent AFQT scores is very small. Children whose family income was below the



poverty line scored only 2.8 points lower than children whose family income was between one and two times the poverty line. Because the mean income of families below the poverty line is approximately half the income of families whose income is between one and two times the poverty line, this suggests that doubling income even at the low end of the income distribution increases the AFQT score by only about 2.8 points. Peters and Mullis control for a variety of exogenous characteristics of families, including mothers' education, fathers' education, household composition, family size, whether the family lived in a rural area or a central city, the child's race and gender, and parents' immigrant status. They also control for reading resources in the home, which may be endogenous.

Low parental income has been consistently shown to be associated with lower scores of children's cognitive ability. However, some of this effect is likely to be due to other factors that give rise to both low incomes among parents and low test scores among their children. Genetic inheritance is one such factor. Studies that control for parental cognitive skills show that the effect of parental income on children's cognitive test scores is quite small. On average, doubling family income would probably increase children's cognitive test scores by a couple of points, or somewhere in the neighbourhood of 10 percent of a standard deviation. The effects are likely to be larger for low-income children: the two studies that test for non-linearities in the effect of parental income on PPVT scores both

show that the effects are greater for low-income children (Hill and O'Neill 1994, Lefebvre and Merrigan 1998).

4b

Socio-emotional Functioning, Mental Health and Behaviour Problems

Low parental income has been consistently shown to be associated with lower scores of children's cognitive ability. However, some of this effect is likely to be due to other factors that give rise to both low incomes among parents and low test scores among their children. Genetic inheritance is one such factor.

An association between mental health and adult income or socioeconomic status is well documented in the US (Kessler 1982, Kessler et al. 1994). Social scientists are divided on whether this means that low income leads to worse mental health or whether poor mental health leads to low income.²⁵ There is much less research on the effect of parental income on children's mental health. Most of the existing research is

correlational (e.g. Lipman et al. 1994), many of the studies use clinical or unrepresentative samples,²⁶ and many are 20 or 30 years old. In this section I highlight newer studies that use representative data and try to control for exogenous family background factors.

The correlation between parental income and children's mental health can be quite large. Lipman and his colleagues define psychiatric disorders as the number of symptoms of conduct disorder, hyperactivity, and emotional disorder displayed in the last six months. They define social impairment by parents' evaluation of how well their child got along with his teachers, family, and peers. Among four- to 11-year-olds in the 1983 wave of the Canadian Child

²⁵ See Miech et al. (1999) and Dohrenwend et al. (1992) for reviews of much of this research.

²⁶ For example, Bolger et al. (1995) use data from a longitudinal study of children in Charlottesville, Virginia, from 1986 to 1989. They classify children depending on whether they received free school lunches over part, all or none of the study period. This sample is not representative of even the Charlottesville area because over half the sample was dropped because of incomplete data. Pagani et al. (1997) used data on French-speaking kindergarten children from the province of Québec in Canada to estimate the effect of the ratio of family income to the Canadian Low-Income Cut-Off averaged over ages eight to 12 on fighting, hyperactivity and anxiety.



Health Study, the odds of a very low-income child (less than \$10,000 in 1983 Canadian dollars) having a psychiatric disorder was more than twice that of a higher-income child (Lipman et al. 1994).²⁷ The chance of a social impairment for four- to 16-year-old children whose family income was less than \$10,000 was 9.4 percent compared to 6.3 percent for children whose family income was \$10,000 to \$14,000. The chances were lower for more affluent children (Lipman et al. 1994). However in the 1987 wave of the same data set, the prevalence of psychiatric disorder did not differ by children's family income. Social disorders remained more common among children whose parents were poor. When Lipman and Offord (1997) control for even a small set of background factors (child's birth weight and sex, mother's marital status and education), families' average income and average poverty ratio both had a very small and statistically insignificant effect on both outcomes.

Lefebvre and Merrigan (1998) use data from the Canadian National Longitudinal Survey of Children and Youth Cycle 1 to assess the effect of family income on measures of children's hyperactivity, emotional disorder, conduct disorder, indirect aggression, and pro-social behaviour. They find that parental income had a small but statistically significant effect on all outcomes. A \$20,000 (Canadian) increase in income (39 percent of mean income or about .45 standard deviations) reduced a child's score on the hyperactivity scale (coded 0 to 16) by .8 points and on the emotional disorder-anxiety scale (coded the same way) by .4 points. The effect of income was smaller on the other measures of socio-emotional functioning.

Hauser and Sweeney (1997) use data from the Wisconsin Longitudinal Study (WIS) to estimate the effect of family income measured during adolescence on the probability that people were depressed when they reached their early 50s. The WIS is a sample of one-third of the graduates of public and private high schools in Wisconsin in 1957. It is broadly

representative of white middle-aged Americans who have completed high school. Thus this sample is more advantaged than a random sample. The parental income measure is adjusted gross income as reported on tax forms averaged over the years 1957–1960. Hauser and Sweeney estimate a variety of models that control for various background characteristics, including the respondents' sex, number of siblings, parents' education, marital status, occupational status, and mental ability score. In none of these models was the effect of the poverty ratio or parents' average income on adult depression large or statistically significant (although it was always negative).

Several studies estimate the effect of parental income on children's "internalising" symptoms and "externalising" symptoms. Internalising symptoms are signs of maladjustment that are manifested inwardly. These include dependence, unhappiness and anxiety. Externalising symptoms are signs of maladjustment that are directed at others. These include disruptive behaviour, social problems, and aggressiveness.

McLeod and Shanahan (1993, 1996) contrast the effect of current poverty with the effect of long-term poverty and the effect of changes in poverty status on children's externalising and internalising symptoms. Lifetime poverty presumably measures the accumulated deficits experienced by a child due to low permanent income, while current poverty (with a control for the length of poverty) reflects contemporaneous stress or material deprivations. Using the 1986 CNLSY, McLeod and Shanahan (1993) find that for a four- to eight-year-old child the bivariate correlation between current poverty status and internalising symptoms is around .13, and the correlation between current poverty status and externalising symptoms is about .14. The percentage of years of life spent in poverty correlates .15 with internalising symptoms and .12 with externalising

27 Some of the difference between poor and affluent children's reported mental health may be due to differences in diagnosis and referral. Low-income children may be diagnosed more often with psychosocial conditions so that they can be placed in special education classes and receive other services that more affluent parents might be able to provide on their own.



symptoms.²⁸ In general they find that after controlling for current poverty status, long-term poverty was associated with internalising symptoms, but not externalising symptoms. A one standard deviation increase in the percentage of years the child spent in poverty was associated with a .11 standard deviation increase in internalising symptoms. On the other hand, holding years in poverty constant, current poverty was associated with a .16 standard deviation increase in externalising behaviour and a decrease in internalising behaviour. But neither of these effects was statistically significant.²⁹ The authors control for the child's race and mothers' age, education, and marital status. Thus there are many potentially important omitted variables.³⁰

Hanson et al. (1997) use data from the first wave of the National Survey of Families and Households (NSFH) to predict the effect of parental income measured in a single year on low externalising behaviour (how often the child lost his or her temper, bullied other children or was mean to others), low internalising behaviour (how often the child was fearful, anxious, unhappy, or sad), sociability (how well the child got along with others), and initiative (how often the child was willing to try new things, kept busy, and was cheerful and happy). They control for the child's race, ethnicity, sex and age, parents' age and education, metropolitan status, region in which the family lived, and family structure. A \$10,000 (in 1992 dollars) increase in income was associated with a .015 standard deviation improvement in externalising behaviour, .016 standard deviation improvement in internalising behaviour, .025 standard deviation improvement in sociability, and .024 standard deviation improvement in initiative. Because \$10,000 was around a third of a standard deviation of mean income in 1992, a standard deviation increase in income was associated with a .045 standard deviation

improvement in externalising and internalising behaviour and a .075 standard deviation improvement in sociability and initiative. This study measures only one year of parental income, so these results are probably downwardly biased. However, these models also omit many potentially relevant exogenous family background characteristics, which could cause an upward bias.

The Behavior Problems Index (BPI) is a common measure of social behaviour problems among children. It was developed for children aged four to 17. It includes 28 items reported by mothers. The higher the score, the more behaviour problems the child demonstrates.

Blau (1999), using CNLSY data, finds that with no controls an increase of \$10,000 (1979 dollars) averaged over several years reduces the BPI score by .21 standard deviations. This is reduced to .16 standard deviations when controls for the mother's AFQT score and other factors are added. When Blau estimates a child fixed-effects model, the effect is reduced to .008 standard deviations. However, the effect of parental income is large and statistically significant in several other models intended to control for unobserved heterogeneity. For example, in a grandparent fixed-effects model, a \$10,000 increase in income resulted in a .34 standard deviation reduction in the BPI.

Korenman et al. (1995) also use CNLSY data. They estimate that with controls for the child's age, number of siblings, race, gender and whether the child was first born, children whose parents' poverty ratio is between .5 and 1.0 score 13.3 percentile points more on the BPI than children whose parents' income is at least three times the poverty line. Controlling for mothers' AFQT scores reduces this difference to 7.1

28 Using the Dunedin Multidisciplinary Health and Development Study, Miech et al. (1999) find that for 15-year-olds, a single year of parental income correlates -.07 with a measure of anxiety, .03 with depression, -.11 with conduct disorder and -.08 with attention deficit disorder. All correlations are statistically significant except the correlation between parental income and depression. The correlations would probably have been higher had parental income been averaged over several years.

29 McLeod and Shanahan (1996) find that both current poverty and poverty persistence significantly predict "anti-social behaviour" measured using a modification of the Achenbach Behavioral Problems Checklist. Neither measure of poverty predicts children's depression. This paper uses CNLSY data from 1986, 1988, and 1990. It is mainly concerned with predicting the trajectories of children's outcomes, so these estimates are from a latent growth curve model, making them somewhat difficult to interpret.

30 Axinn et al. (1997) is the only study that I could find that estimates the effect of parental income on psychological well-being in young adulthood. However, their estimates are based on a sample of white mothers in the Detroit area who were selected so that there were approximately equal numbers of mothers who had given birth in 1961 to a first, second, third, or fourth child. In this unrepresentative sample, parental income averaged over several years had a small and statistically insignificant effect on the self-esteem of children who had reached their mid-20s.



percentile points. However, the income of families whose poverty ratio is .5 to 1.0 is less than a fifth of the average income of families whose poverty ratio is greater than 3, so these results suggest that doubling income would produce a relatively small improvement in children's behaviour.

Mayer (1997), using the 1986, 1988, 1990 and 1992 CNLSY data, finds that the poorest fifth of children score about three points (.23 standard deviations) higher on the BPI than children in the middle fifth of the income distribution. With controls for the child's sex and race, household size, and the mother's age, education and AFQT score, doubling parental income was associated with a 1.96 point decline in the BPI. Using techniques to control for unobserved heterogeneity, the effect was a decline of about one point.

These studies suggest that, on average over the whole income distribution, the effect of parental income on measures of socio-emotional functioning and behaviour problems is relatively small.³¹ In most studies the effect of parental income on socio-emotional functioning is small and statistically insignificant after controlling for a few exogenous measures of family background. Most (but not all) estimates suggest that it would require doubling parental income to reduce behaviour problems by even a 10th of a standard deviation. These effects could, however, be larger for low-income children.³²

4C Health

In virtually all countries, children of low-income parents have poorer health than children of more affluent parents. Parental income can be related to children's health because it affects the quality and quantity of health care that children get. It can also affect children's nutrition, the safety of their living environment, and their health practices, such as whether they smoke, drink alcohol, or use drugs.³³ Although a relatively large number of studies try to estimate the effect of socioeconomic status on children's health (c.f. Feinstein 1993, Marmot et al. 1987), surprisingly few studies estimate the effect of parental income on children's health, and those that do often use weak measures of income (Newacheck 1994) or unrepresentative samples. This is partly because surveys that include extensive information on income often do not ask about child health, and surveys that focus on child health include weak measures of parental income.

In the US, which does not have publicly supported universal health insurance, a few studies estimate the effect of parental income on whether children have health insurance coverage. I do not review these studies because health insurance coverage is not a child outcome, and it is only moderately related to children's health and whether children receive medical care.³⁴ Increasing health insurance coverage alone does not eliminate disparities in health between rich and

31 Hanson et al. (1997) use the NSFH data to estimate the effect of a year of parental income on whether the child had "school behaviour problems". A child was counted as having school behaviour problems if the parent had been asked to meet with the teacher or principal because of the child's behaviour, the child had been expelled or suspended from school during the last year, or the child had dropped out of school. Because schools respond differently to the same objective behaviour, this measure captures both child behaviour and the propensity of the school to act on it. Because it includes whether a child has dropped out, it also may measure an outcome that is unrelated to disruptive or harmful behaviour. Thus it is unclear what this concept taps. Raising the poverty ratio by 1 is associated with an increase of .036 in the probability that a child will have no school behaviour problems.

32 I originally proposed to include studies of the effect of parental income on children's criminal and delinquent behaviour. Several studies show that low-income children are more likely than high-income children to be chronically delinquent (Tracy et al. 1990, Werner and Smith 1992, Offord et al. 1991). But I could find no study that estimates the effect of parental income on children's delinquency or crime with family background controls. Crime records in the US include no information on the income of the perpetrator. Survey-based information is also beset with difficulties. Children are not likely to accurately report their own criminal or delinquent behaviour on surveys. Some will exaggerate and others will try to hide their involvement. Parents are likely to know only about crimes for which their children were caught and are unlikely to report even that accurately. Some studies estimate the effect of neighbourhood or community income on neighbourhood crime rates, and several estimate the effect of economic inequality at the national level on crime rates (Blau and Blau 1982, Messner 1982, Messner and Tardiff 1986, Rosenfeld 1986, LaFree and Drass 1996). But because these studies focus on crime rates, they do not separate crimes committed by adults from crimes committed by youth.

33 Several studies in the US use neighbourhood income level as a proxy for family income and estimate its effect on child health outcomes (e.g. Gould and LeRoy 1988, Collins and David 1990). This is generally not a good strategy. First, the correlation between family income and neighbourhood income is not especially high. Secondly, families select neighbourhoods so the same characteristics that cause families to choose a neighbourhood with particular attributes may also affect their children's health. Finally, if neighbourhoods affect health outcomes other than through their correlation with family income, these estimates will be biased. Hence I do not include these studies in this review.

34 Some evidence suggests that Medicaid expansions in the US resulted in a significant decline in infant mortality among the poor (Currie and Gruber 1996b). The decline in infant deaths did not arise because of more or better prenatal care, but was due to increased use of medical care at the time of the birth, especially technology for high-risk pregnancies and low birth-weight babies.



poor children within the US, and disparities in health appear to be as large in countries with universal health insurance as in the US (Adler et al. 1993).³⁵ In fact in the US, as access to health care services for poor children increased during the 1970s and 1980s, the measures of health reported on national surveys appeared to deteriorate for poor children (Mayer and Jencks 1993). This was probably because greater access to physicians and other health providers resulted in more chronic and acute health conditions being diagnosed. Consequently, in national surveys parents were more likely to report that their children had these conditions.

Infant Outcomes

Starfield et al. (1991) used data on 4,836 children born between 1979 and 1988 to mothers who were participants in the National Longitudinal Survey of Labor Market Experience. With controls for the mother's age, education, marital status, parity and whether she smokes, poverty measured in the year the child was born, when the mother was a teenager, and in both years all had only a very small and statistically insignificant effect on whether a black child had a low birth weight (less than 2,500 grams). However, the odds of an infant having a low birth weight were 80 percent greater for white infants born to mothers who were poor when the pregnancy began compared to white infants born to mothers who were not poor at that time. If a white woman was poor both during her own adolescence and in the year her pregnancy began, her chance of having a low birth-weight child was 14.1 percent compared to 4.4 percent for women who were not poor at either time. Unfortunately, this study leaves open the possibility of many omitted variables, and because it does not provide details of the mean incomes of families by their poverty status it is impossible to determine the size of the effect of parental income.³⁶

Like others, Meara (2001) shows that children of low-income mothers weigh less at birth, are born after fewer weeks of gestation, and die more often than children of more affluent mothers. She uses data from the 1988 National Maternal and Infant Health Survey to explain the link between parents' income and the child's birth weight. Controlling only for mothers' education and household size, doubling the income of parents reduces the chances of a low birth weight by .0062 for white children and .0037 for black children. On average 5 percent of white children and 12 percent of black children are born with low birth weight. Thus doubling income reduces the chances of low birth weight by about $.0062/.05 = 12$ percent of the mean for white children and $.0037/.12 = 3$ percent of the mean for black children. The larger effect for white infants is consistent with the result of Starfield et al. (1991) described above. Adding controls for access to health care and maternal health status reduces this effect to .0044 for white mothers and .0019 for black mothers. Adding controls for the mother's health habits during the pregnancy (including whether she smoked, used crack cocaine, had prenatal care in the first trimester, took vitamins, drank alcohol and gained appropriate weight), the effect declines to .0026 for white mothers and .0005 for black mothers. Since access to health care and some health habits may be at least partly endogenous with respect to income, these estimates could be downwardly biased.³⁷

Rosenzweig and Wolpin (1991) examine the effect of the maternal "health endowment" and other factors on infant birth weight and gestation. They estimate sibling fixed-effect models in which they consider all time-invariant factors associated with mothers to be the maternal "health endowment." Thus factors such as the mother's chronic health conditions, invariant health behaviours, education and cognitive skills are all part of this health endowment. In their model, the health endowment explains 90 percent of the variance in birth

35 Currie and Thomas (1995) using CNLSY data find that white children aged three to five who receive Medicaid are 13 percent more likely to have a routine checkup in a year than children with no insurance. But children with private insurance were no more likely than children with no insurance to have had a routine checkup. These results could mean that parents whose children are sicker are more likely to sign up for Medicaid than parents with the same income but healthy children.

36 One reason why the effect of family poverty may be so small for black infants is that the difference in mean income between poor and non-poor black families is much less than the difference in mean income between poor and non-poor white families.

37 Gortmaker (1979) also shows that, net of several maternal characteristics and the child's own birth weight and parity, children born to poor mothers were much more likely to die in the first year after birth. But this study uses a fairly crude measure of poverty and several of the controls are likely to be endogenous.

weight. Thus they conclude that other factors such as economic resources and maternal factors that change play only a small role in creating disparities in birth outcomes.

Morrison et al. (1989) estimate the effect of family income on several measures of birth outcomes for a sample of 8,556 mothers in Brisbane, Australia. Using income measured in five categories in a single year, they find that with no adjustments for other family background factors, children born to families whose income was less than Au\$5,200 were 38 percent more likely to be born prematurely than children born to parents whose income was \$20,800 or more. But this difference was not statistically significant. In fact the other income groups all had lower rates of pre-term births than the richest group. The difference between the lowest and highest income groups declined to 3 percent when controls were used for parity, parents' marital status, and mothers' weight-to-height index. After controlling for these background factors, the effect of income on the probability of a low birth weight and the probability of perinatal mortality was small and statistically insignificant. However, the lowest income children were nearly twice as likely as the most affluent children to be small for gestational age even after controlling for these factors. These effects may be under-stated because of the weak measure of income and because some of the control variables are arguably endogenous.

Nutritional Status

Korenman and Miller (1997) and Miller and Korenman (1994) estimate the effect of family income on the nutritional status of children aged five to seven years and aged zero to two years using the CNLSY. Nutritional status is measured as low height-for-age (stunting) and low weight-for-height (wasting). They also estimate the effect of income on obesity in children. They average family income over several years (the exact number depended on the age of the child) and control for mothers' race, schooling and marital status, and the

child's birth weight, sex and age. They find that an increase in the poverty ratio of 1 is associated with less than a 3 percent decline in the probability of stunting. The same income increase was associated with an even smaller and statistically insignificant decline in wasting and obesity.

Factors such as the mother's chronic health conditions, invariant health behaviours, education and cognitive skills are all part of the maternal "health endowment". In one study this health endowment explains 90 percent of the variance in birth weight.

Illness and Disability

Using data from the 1983 Ontario Child Health Study and no control variables, Cadman et al. (1986) found that four- to 16-year-old children whose family income (measured in one year) was below the Canadian LICO had higher rates of functional limitation and chronic illness than children whose family income was above the cut-off. Lipman and Offord (1997)

estimate the effect of parental income on children's chronic illnesses using the combined data from the Ontario Child Health Study (in 1983) and Follow-Up (in 1987). Chronic illness is defined as the number of illnesses (including functional limitations) lasting at least six months. When they averaged income over two years and controlled for even a small set of background factors (child's birth weight and sex, mothers' marital status and education), they found that income had a very small and statistically insignificant effect on children's chronic conditions.

Mortality

Using the WLS data Hauser and Sweeney (1997) estimate the effect of family income measured during adolescence on the probability that respondents had died by 1992 (when they were in their early 50s). Hauser and Sweeney estimate a variety of models that control for various background characteristics, including the respondents' sex, number of siblings, parents' education and marital status, fathers' and mothers' occupational status, and mental ability score. In none of these models was the effect of the poverty ratio or parents' average income on mortality large or statistically significant (although it was always negative). Hauser and Sweeney also estimate the effect of parental income in adolescence on whether respondents reported being in





fair or poor health in 1992. These results are for a subset of the sample who answered a mail-in survey on health. Neither the poverty ratio nor average income had a large or statistically significant effect on health status in 1992.

Relatively few studies estimate the effect of parental income on children's health outcomes. Those that do often have important weaknesses, including inadequate measures of income and estimation models that exclude important exogenous factors or that control for endogenous factors. Studies have not generally looked at the same outcome measures, so most results have not been replicated. Thus, although the evidence suggests that on average parental income is not likely to have a large effect on most measures of children's health, this conclusion is quite tentative.

4d Teenage Childbearing

Parental income can affect teenage childbearing by affecting a teenage girl's access to contraception and abortion. It may also affect the girl's choice of peers and her expectations for her future, both of which can affect the probability that she will give birth as a teenager.

Haveman et al. (1997) and Haveman and Wolfe (1994) find that parental income has hardly any effect on teenage out-of-wedlock childbearing. Haveman et al. (1997), using data from the PSID, estimate that a \$10,000 (1992 dollars, .375 standard deviation) increase in parental income averaged when the child was six to 15 years old reduces teenage girls' chances of having a baby out of wedlock by .009.³⁸ Since 14.3 percent of the girls in this sample had a teenage out-of-wedlock birth, this effect is very small. Haveman et al. control only for the child's race, mother's education, number of siblings, and family composition. Thus these estimates may omit important confounding factors.³⁹

Mayer (1997) also uses the PSID. Controlling for household size, child's race and parents' education and age, Mayer finds that doubling parental income reduces

a teenage girl's chances of having a baby by 16.4 percentage points. When Mayer uses various methods to control for unobserved heterogeneity, this effect drops to between 10 and 4 percentage points, depending on the technique. About 20 percent of teenage girls have a baby by the time they turn 20, so this is still a non-trivial effect. Mayer's estimate differs from the estimates of Haveman and his colleagues (1994, 1997) in several ways. Their estimates are for unwed teen births and for fewer years of the PSID. Consequently, their sample is much smaller (873 versus 2,121 for Mayer's sample). Mayer uses the logarithm of income while Haveman and colleagues use untransformed income.

Studies in Britain show that girls whose families have "economic difficulties" are more likely to become teenage mothers than girls whose families experience no such difficulties (Kiernan 1995 and 1997, Hobcraft 1998). I have already discussed the limitations of studies using measures of economic difficulty.

Research on the effect of income on teenage childbearing is relatively sparse and the results that have been reported are not consistent. This means that we are unable to draw any firm conclusions about the effect of family income on teen childbearing.

4e Educational Attainment

In the US the dominant explanation for how parental income affects educational attainment is that credit constraint prevents children from low-income families from being able to pay college tuition fees and other costs associated with going to college. College costs vary by quite a bit across the countries included in this review, but on average they are much higher in the US than in the other countries.

If parental income affects educational attainment because low-income parents cannot afford to pay their children's college costs, an increase in college tuition fees should reduce low-income children's college

³⁸ These estimates are from a probit model of 873 females in the PSID. Haveman et al. (1997) find that increasing the average income-to-needs ratio by 1 decreases the chances of an out-of-wedlock birth before age 20 by .0276 for girls who are average on all other characteristics in their model.

³⁹ All the studies in this section focus on teenage childbearing and not out-of-wedlock childbearing, although some of the studies are on teenage out-of-wedlock childbearing. Duncan et al. (1998) find no significant effect of parental income on daughters' chances of giving birth out of wedlock.



enrolment more than high-income children's enrolment. A number of studies have found greater price responsiveness among low-income students (Leslie and Brinkman 1987, Manski and Wise 1983, Radner and Miller 1970, Bishop 1977, Kohn et al. 1976). More recently, McPherson and Shapiro (1991) and Kane (1994 and 1995) also find greater impacts of tuition fee increases on the enrolment of low-income youth.⁴⁰ However, Ellwood and Kane (2000) and Cameron and Heckman (1999) find that estimates showing that tuition fee increases affect poor children more than rich children are not robust to reasonable changes in the estimation models. Thus even in the US, short-term credit constraint may not explain most of the difference in the college attendance rates of rich and poor children.

An alternative explanation is that parental income affects children's educational attainment by affecting the quality of primary and secondary schooling, thereby affecting students' achievement in these lower grades and hence their achievement in and expectations for post-secondary schooling.⁴¹ Parental income may also affect parents' expectations for their children. If parents think they cannot afford to send their children to college they may discourage these aspirations.

Years of Schooling

In the studies reviewed by Mayer (1997), a 10 percent increase in parental income was associated with between .024 and .104 additional years of schooling in the US.⁴² Mayer (1997) finds that a 10 percent increase in parental income is associated with an additional .055 years of schooling among all students, and an additional .029 years among students who graduated from high school.

This estimate controls for the students' race and sex, mothers' education and age, and family size. When Mayer uses several techniques to control for unobserved heterogeneity, the effect of doubling income is between .023 years and .049 years, depending on the estimation model. This leaves considerable uncertainty about the size of these effects. However, all estimates are in the range of previous research and are substantively important.

Parental income may also affect parents' expectations for their children. If parents think they cannot afford to send their children to college they may discourage these aspirations.

Subsequent research provides similar conclusions. For example, Peters and Mullis (1997), using the data and models described above, estimate that an additional \$10,000 (1992 dollars) in income is associated with an additional .20 years of schooling. The mean income for white parents was \$46,080. A 10 percent increase from the mean would therefore be associated with a .09 year increase in schooling, which is well within the range of previous research.

Duncan et al. (1998) estimate the effect of parental income averaged from the child's birth to age 15 years on the child's completed schooling for a sample of children from the PSID. They controlled for the child's race and sex, number of siblings, mothers' years of schooling and age at the child's birth, whether the child ever lived in the south, family structure, maternal employment, and residential mobility. They find that a \$10,000 (in 1993 dollars) increase in average parental income is associated with an additional .14 years of schooling. Mean parental income in this sample is \$44,900, so these results suggest that a 10 percent increase in income from the mean would increase schooling by .063 years, which is again consistent with earlier results.

Duncan et al. repeat similar analyses for a sample of 328 sibling pairs from the PSID. The sibling model also

40 Maani (1996) summarises some of the earlier estimates of the effect of college costs on post-compulsory schooling in the context of the increase in tuition costs in New Zealand.

41 In the US a substantial number of studies have tried to estimate the effect of school quality on children's test scores and future labour market success. In general these studies find positive but modest effects for measures of school quality such as per pupil expenditures, teacher-child ratio, and teacher qualifications. See Card and Krueger (1996) for a survey of much of this research.

42 To give a context for these estimates, in 1990 the median duration of schooling for blacks was 12.4 years compared to 12.7 years for whites.



controls for differences between the siblings in the mother's age at birth, family structure, mother's labour market hours of work, and number of residential moves. A \$10,000 difference in income between siblings resulted in an additional .20 years of schooling. Surprisingly, this is somewhat larger than the effect for the whole sample, though it is not clear whether the difference between the coefficients is statistically significant. The larger effect in the sibling model could be because families with more than one child differ from families with only one child or because unmeasured differences between the siblings bias the estimate. This highlights the potential limitations of sibling models.

Teachman et al. (1997) use data on 14- to 24-year-olds from the 1966 National Longitudinal Survey (NLS) of Young Men and the 1968 NLS of Young Women, and data from the NLS of Older Men who were aged 49 to 59 in 1967 and Mature Women who were aged 30 to 44 in 1968. All samples were followed over time. Because of overlaps in the samples, 1,594 children from the young adult samples had parents who were in the older samples. Thus for this group, data were available on both family background and children's outcomes. Children whose family income was between two and three times the poverty threshold when they were adolescents received .367 more years of schooling than children whose family income was between one and two times the poverty threshold. Thus doubling income in the lower half of the income distribution results in an increase in educational attainment of about a third of a year. This drops to nearly zero (and becomes statistically insignificant) after controlling for parents' education and marital status. Interestingly, it does not decline much more when a control for the respondent's own IQ score is used.

High School Graduation

Parental income influences educational attainment by affecting both high school graduation and years of post-secondary schooling. Teachman et al. (1997) find that increasing income from a poverty ratio of 1 to a poverty ratio of 2 increases children's odds of graduating from

high school by about 55 percent. This declines to 51 percent when a control for the child's IQ score is used. This estimate controls for mothers' and fathers' education, parents' marital status, and the child's race and sex.

This is a much larger estimate than is found in other studies.⁴³ For example, Haveman et al. (1997) using PSID data estimate that doubling the poverty ratio increases a teenager's chances of graduating by only about 3 percent. Put another way, they find that a \$10,000 (1992 dollars) increase in parental income averaged when the child was six to 15 years old increased the chances of graduating from high school by only .014 for a child who is average on all other variables in the model. Eighty-four percent of the children in this sample graduated from high school, so this is a relatively small effect. This model controls only for the child's race and sex, the mother's education, number of siblings and family composition, so it may omit important confounding factors.

When Mayer (1997) uses PSID data, averages parental income over several years and controls for household size, the child's race and age, and the mother's education and age, she finds that doubling parental income reduces the chances that a teenager will drop out of high school by 12.8 percent. Duncan et al. (1998) also use PSID data. They estimate the effect of parental income averaged from birth to age 15 years on high school graduation, controlling for the child's race and sex, number of siblings, the mother's years of schooling and age at the child's birth, whether the child ever lived in the south, family structure, maternal employment, and residential mobility. They find that doubling parental income increases children's chances of high school graduation by 13.5 percent. Thus Mayer's and Duncan et al.'s estimates are between Teachman et al. (1997) and Haveman et al. (1997). Duncan et al. find that a non-linear functional form provides a better fit than a linear functional form for the relationship between parental income and high school graduation. Duncan et al. also report that the

⁴³ Shaw (1982) found that when family income doubled from \$4,000 to \$8,000 (1967 dollars), the chances that a white teenage girl in an intact family with a mother who had graduated from high school would drop out of high school decreased from 13 percent to 8 percent. The same change resulted in a decrease from 30 percent to 19 percent for black girls. The declines were even greater for girls whose mothers had not graduated from high school. These are very large effects, but they are also from data collected in the late 1970s. Some evidence suggests that the effect of parental income on children's outcomes may have declined since then (Mayer and Lopoo 2001).



estimates are substantively the same when they omit potentially endogenous variables from the model (residential moves, family structure, and maternal employment). When Mayer uses techniques to control for unobserved family background characteristics, the effect of income declines to between 1.9 and 6.3 percent, depending on the technique. This suggests considerable upward bias in estimates that ignore unobserved heterogeneity.

Teachman et al.'s estimates may be larger than the others because they use much older data. As I discuss in the conclusion, there is some evidence that the effect of parental income has declined in the US.

Maani (2000) estimates the effect of parental income decile on children's chances of dropping out of school at age 16 using the CHDS. Because she estimates the effect of a family's income decile, she estimates the consequence of a child's relative position in the income distribution rather than the effect of his or her absolute level of family income. A family's income decile is calculated from income averaged over the years when a child was 11 to 14 years old. Maani controls for parents' education, number of siblings, whether the family lives in a rural area, the local unemployment rate, whether the family owns its own home, and the child's ethnicity. She also controls for several variables that are likely to be endogenous with respect to income, including whether a child has passed School Certificate, the average School Certificate Mark at age 15, the proportion of the child's Fifth Form class continuing on to the Sixth Form, and deviant peer associations at age 15. Maani found that the income decile of a child's family had a small and statistically insignificant effect on whether a child left school at age 16. It also had a small and statistically insignificant effect on whether a child was working, studying, or unemployed at age 16.⁴⁴

College Enrolment and Graduation

Students in the US can obtain post-secondary schooling in a variety of types of schools. Broadly these are divided into two-year and four-year institutions. Two-year colleges are generally much less expensive and less selective than four-year colleges. They serve

several purposes. First, they offer training for the trades and two-year training certificates. Secondly, they provide regular college courses for students who could not get into four-year colleges because of poor academic showing in high school. If these students do well in two-year college they can get admitted to more selective four-year colleges. Thirdly, they provide an inexpensive way for students to receive two years of academic training that can be transferred to more expensive four-year colleges. Two-year colleges are less expensive both because tuition fees are lower than in four-year colleges and because they are usually community-based, so students can live at home and continue to work while attending school.

Hauser and Sweeney (1997), using data from the WLS, find that when controls are used for the child's score on a test of mental ability and other family background factors, parental income has a small and statistically insignificant effect on completion of four years of college. But doubling the poverty ratio is associated with a .153 increase in the probability of attending any post-secondary schooling.

Ellwood and Kane (2000) estimate the effect of family income and other background characteristics on enrolment in four-year colleges using a cross-section of data from the National Education Longitudinal Study on students who were in the eighth grade in 1988 (and therefore expected to graduate from high school in 1992). With no controls, students in the richest quarter of the income distribution were 26 percent more likely than students in the poorest quarter to enrol in post-secondary schooling. Controlling for demographics, region, and tuition fees had little effect on the estimates. But when Ellwood and Kane control for the student's cognitive test scores, high school grades, and parents' education, the gap between the poorest and richest quartile declined to 9 percent. The difference in mean income between children in the lowest and highest income quartiles is very large. A more realistic comparison for policy purposes might be between the first and second quartile. Controlling for demographics, cognitive test scores, tuition fees and parents' education, children from families with income in the

44 Rice (1987) uses data from the 1976 British Family Expenditure Survey to estimate the effect of parental income on whether children go on to post-compulsory schooling. Parental income increases girls' but not boys' chances of staying in school. However, these data are now so old that the results might not hold in the UK today.



second quartile are 2 percent more likely to attend a four-year college than children from families in the poorest quartile. Some of the factors that Ellwood and Kane control for, such as students' high school grades, may be endogenous with respect to parental income and therefore downwardly bias the estimated effect of income. The income measure in these data is weak, which could also cause downward bias. The results were similar when they estimated similar models using the 1980 and 1982 High School and Beyond Survey (HS&B) data.⁴⁵

Because they estimate the effect of being in a particular income quartile, Ellwood and Kane estimate the consequence of a child's relative position in the income distribution rather than the effect of his or her absolute level of family income. Maani (2000) in the study described above using the CHDS also estimates the effect of relative economic position on children's chances of participating in tertiary education. Maani found that the probability that a child whose family income was in the poorest decile would attend university rather than work or attend a polytechnic was .218, compared to .411 for a child with the same measured characteristics whose family income was in the richest decile. This effect was statistically significant.

With the exception of Teachman et al. (1997), almost all research that controls for family background factors finds that on average increasing parental income by 10 percent increases schooling by between .02 and .10 years, with most estimates falling closer to .05 years. Two studies try to control for unobserved heterogeneity (Mayer 1997, Duncan et al. 1998), and neither finds that the estimated effect of income is much lower in these models. Estimates of the effect of parental income on high school graduation, college enrolment and college graduation are all relatively modest, which is consistent with the hypothesis that the effect of income on overall educational attainment is the sum of the effects on these different stages of schooling.

4f Future Economic Status

A large research literature has tried to estimate the degree of economic mobility between parents and their children. This research is generally motivated by an interest in economic opportunity. In a rigid caste society children's economic status would be identical to their parents' status: there would be no economic mobility. On the other hand, in a society in which neither parental endowments nor investments influenced children's outcomes, the correlation between parents' and children's economic status would be close to zero. Research on intergenerational mobility is generally not concerned with the causal effect of parental income on children's outcomes and is instead mainly interested in documenting the "dynastic effects", or the correlation between parents' and children's economic status. Thus it usually controls for few exogenous background factors. These correlations can probably be taken as upper-bound estimates of the causal effect of parental income on children's outcomes.

Previous research shows that the intergenerational correlation of economic status rises with the age at which children's economic status is measured, and is greater for family consumption or wealth than for earnings, wages, or schooling.⁴⁶ The correlation is also greater when parental income is measured over several years than when it is measured in only one year (Solon 1999), again emphasising the importance of long-term rather than short-term income.

However, estimates of intergenerational mobility vary a great deal. Solon (1999) shows that among 18 studies using PSID data and averaging parental income over several years, the elasticity of sons' earnings with respect to parental income varies from .13 to .53. Of these estimates, three were less than .30, five were between .30 and .40, eight were between .40 and .50 and two were above .50. These differences are partly due to differences in the age at which children's earnings were measured and differences in the measure of parental income. But still, the lack of consensus is striking.

⁴⁵ Parents of the high school class of 1992 were asked to report only total family income for 1991. In contrast, the parents of the 1980 sophomores and seniors were asked to report their income in 19 different income categories. In general, questionnaires asking multiple detailed questions regarding income yield higher and more reliable information on income than those that rely on a single question. Thus the family income data in the HS&B and the NELS are not strictly comparable.

⁴⁶ See Solon (1999) and Bowles and Gintis (2001) for a summary of conclusions from much of this research.



Many fewer studies look at the correlation between fathers' and daughters' economic status or at the correlation between the economic status of mothers and their children. Altonji and Dunn (2000), using various NLS data sets and averaging income over several years, find that the correlation between fathers' and sons' and fathers' and daughters' labour income is similar. For example, the correlation between fathers' and sons' earnings is .391, compared to .396 for fathers and daughters. The correlation between mothers' and sons' earnings is .300 compared to .237 for mothers and daughters. However, Altonji and Dunn do not try to estimate the causal effect of parental earnings or wages on their children's economic outcomes.

The research on intergenerational mobility serves as a cautionary tale about the sensitivity of estimates to the estimation technique.

Mulligan (1997) reviews research on differences in intergenerational mobility across countries. Table 3 shows that the estimates of intergenerational mobility are usually greater for Canada than for the US or for the UK. But in some cases the estimates for the US and Canada are very similar. The differences across countries could be the result of differences in the data, the estimation methods, or the true levels of mobility. Few studies try to compare countries using the same methods. When they try to estimate comparable models, Couch and Dunn (1997) find that the intergenerational persistence of earnings averaged over six years for fathers and sons was .13 in the US and .11 in Germany.⁴⁷ The research on intergenerational mobility serves as a cautionary tale about the sensitivity of estimates to the estimation technique. However, these correlations cannot be interpreted as the effect of parental economic status on children's economic outcomes. I now turn to studies that control for some potentially confounding exogenous characteristics and therefore provide better estimates of the effect of parental income.

Wages and Earnings

Studies that control for parental characteristics and measure parental income over five or fewer years show that a 10 percent increase in parental income increases children's earnings by 1.3 percent to 2 percent, with a median effect of 1.8 percent.⁴⁸ Behrman et al. (1980) produce a higher estimate of 6 percent, based on measures of parental income over a longer period. They find that a 10 percent increase in one year of parental income increases children's earnings during young adulthood by 1.6 percent. The same increase in parental income averaged over 10 years increases children's earnings averaged over the same number of years by 6 percent.

When studies control for other background characteristics but still measure parental income over several years, the estimated effect of income is lower. Peters and Mullis (1997) control for parental education, household composition, race and other factors. They estimate that a \$10,000 (1992 dollars) increase in average parental income increases the hourly wages of young adult men by about 2 percent. The authors do not provide descriptive statistics for the whole sample, but the mean family income is \$46,080 for whites in their sample. Thus \$10,000 is about 20 percent of mean income, suggesting that a 10 percent increase in mean income would result in an increase in white sons' wages of only about 1 percent. Increasing a family's poverty ratio by 1 resulted in a 3 percent rise in children's eventual wages. Hauser and Sweeney (1997), using WLS data with income averaged over three years and controlling for many background factors, get a very similar estimate. They find that increasing a family's poverty ratio by 1 increases children's wages in 1992 (when they were in their 50s) by between 2 and 3 percent, depending on the model.

⁴⁷ See Solon (1999) and Mulligan (1997) for summaries of this research. The Couch and Dunn (1997) estimates are much lower than almost all other estimates for Germany and the US. Nonetheless, this is one of the few studies that tries to use similar estimation methods across countries.

⁴⁸ See Hauser and Daymont (1977), Hill and Duncan (1987), Kiker and Condon (1981) and Peters (1992).



Table 3

A Comparison of Estimates of Intergenerational Mobility Across Countries			
Country Study	Data, Samples, Age at which Outcome is Measured	Estimation Method	Elasticity of Child's Outcome with Parent's Income
Canada			
Corak and Heisz (1999)	Canadian tax records. Father-sons, aged 28–31.	OLS with single year of father's income	TI: .121–.136 AE: .115–.143
Fortin and Lefebvre (1998)	1986, 1994 Canadian GSS and linked Census data. Father-sons, father-daughters, aged 17–19 years.	IV with occupation instrumenting income	AE: .191–.228
United Kingdom			
Atkinson (1981)	Rowntree Survey 1975–1978. Father-sons, aged greater than 25 years.	OLS	WE: .415–.428
Dearden et al. (1997)	NCDS (1991). Father-sons, father-daughters, aged 23–33 years.	OLS with single year of father's income	WE: .216 (sons) WE: .352 (daughters)
		IV with father's education and social class	WE: .581 (sons) WE: .669 (daughters)
United States			
Altonji and Dunn (1991)	NLSY (1965–1967). Father-sons, aged 29–39 years.	OLS averaging father's income and with age controls	AE: .180 HW: .262
		IV with later year income	AE: .218 HW: .282
Solon (1992)	PSID (1984). Father-sons, aged 25–33.	OLS with five-year average father's income	AE: .413
Mulligan (1997)	PSID 1967–71 (parent) and 1984–88 (child).	OLS with multi-year average father's income/wages	TI: .520 AE: .500

Notes: OLS = ordinary least squares, IV = instrumental variable
 AE = annual earnings, HW = hourly wage, WE = weekly earnings, TI = total family income.



Mayer (1997), using PSID data and controlling for the child's race and sex, household size and the mother's education and age, finds that doubling parental income averaged over several years increases male workers' hourly wage by \$1.80 (.269 standard deviations) and annual earnings by \$4,401 (.292 standard deviations).⁴⁹ Unfortunately there is no easy way to put these results in the same metric as the results from other studies of the effect of parental income on children's wages, because Mayer estimates a non-linear model and all the other studies estimate linear models. Going from a poverty ratio of 1 to a poverty ratio of 2 approximately doubles income. Peters and Mullis (1997) and Hauser and Sweeney (1997) both suggest that this would raise children's wages by 3 percent. But going from a poverty ratio of 2 to a poverty ratio of 3 only increases income by about a third, and Peters and Mullis's and Hauser and Sweeney's results suggest that such an increase would still raise wages by about 3 percent. In Mayer's models it takes the same proportional increase in income to get the same absolute increase in sons' wages.⁵⁰ Most of Mayer's techniques for controlling for unobserved exogenous family background characteristics reduce the effect of parental income on children's wages and earnings. However, across techniques the estimated effect of doubling parental income was between \$.42 and \$2.12 on hourly wages and between \$1,435 and \$5,205 on annual earnings. This leaves considerable uncertainty about the effect of parental income on sons' labour market earnings in early adulthood.

Children's Eventual Income

Corcoran and Adams (1997) use a sample of 2,898 children from the PSID who were aged five to 15 in 1968 and 25 to 35 in 1988 to estimate the effect of parental income on children's eventual poverty ratio. They find that a \$10,000 (1992 dollars) increase in parental income was associated with a .046 increase in the child's poverty ratio when they control for mothers'

education, parents' marital status, household heads' hours of labour market work, and children's race and sex.⁵¹ The authors do not provide means and standard deviations for their full sample. However, \$10,000 is about half a standard deviation for white parents' income and .046 is about 2 percent of a standard deviation for white parents' poverty ratio. So a standard deviation increase in parental income results in a .04 standard deviation increase in children's poverty ratio.

Shea (2000), using PSID data, finds that a 10 percent increase in a father's income increases his son's income by 2.2 percent, using controls for the father's education, occupation and race, whether the son lives in a city and whether the son lives in the south. However, Shea then compares sons whose fathers were members of unions to sons with the same observable characteristics whose fathers were not union members. Shea argues that men who belong to unions get higher wages than men with similar characteristics who do not belong to unions. If parental income influences children's income, children of union fathers will have higher non-union incomes than children whose fathers were not union members since this "union premium" is mostly due to luck. Shea finds that once he controls for fathers' union status, the effect of fathers' income on sons' non-union income drops to close to zero.

Studies of intergenerational economic mobility have largely been concerned with documenting the size of the correlation between fathers' and sons' earnings, and relatively few studies have attempted to provide causal explanations for the association. Among studies that do control for family background characteristics, there is considerable variation in the estimated effect of parental income on children's eventual economic status. A best guess might be that a 10 percent increase in parental income increases sons' income by no more than 2 percent, and perhaps less.

49 In Mayer's sample mean wages of children are \$11.56, and mean earnings are \$23,728 in 1992 dollars.

50 Clearly Mayer's estimated effect of parental income is much greater than those of either Peters and Mullis, or Hauser and Sweeney, for low-income children. Mayer's estimate (unadjusted for unobserved family background effects) suggests that going from a poverty ratio of 1 to a poverty ratio of 2 (approximately doubling income) increases wages by over 20 percent. However Mayer's estimates suggest that if parents' income increases from a poverty ratio of 4 to a poverty ratio of 5, sons' wages would increase by only about 5 percent. Mayer's unadjusted estimates control for fewer family background characteristics than the other two studies. Mayer's estimates adjusted for unobserved family background factors yield estimates that are both larger and smaller than these unadjusted estimates.

51 I assume that the dollar amounts in this paper are in 1992 constant dollars, although the authors do not explicitly report this.



48 Conclusions about the Effect of Income

From these studies we can conclude that parental income is likely to improve children's well-being both during childhood and in adulthood. Unfortunately, existing research makes it hard to draw strong conclusions about the size of the effect of parental income on most outcomes because of weaknesses in the research and because studies are done in ways that make comparing their results difficult. In general, the research allows us to draw the following conclusions, after controlling for the effect of other possible confounding factors.

- **Cognitive Test Scores**
At most, doubling income would on average increase children's cognitive test scores by a couple of points or somewhere in the neighbourhood of 10 percent of a standard deviation.
- **Socio-emotional Functioning, Mental Health and Behavioural Problems**
Estimates of the effect of parental income on these outcomes vary widely, partly because there is little consistency in how the outcomes are measured. However, this research suggests that on average a standard deviation increase in income would be likely to decrease internalising symptoms, externalising symptoms, and behaviour problems by 5 to 10 percent of a standard deviation at most.
- **Health**
The effect of parental income on children's birth outcomes, nutritional status and other measures of health is very small in all available studies. However, there is very little high-quality research on the effect of parental income on children's health, so one cannot put too much weight on this conclusion.
- **Teen Births**
There is little research on the effect of parental income on teenage births. The research that is available is inconclusive.
- **Educational Attainment**
All estimates of the average effect of a 10 percent increase in parental income on years of schooling are between .02 and .10 years.
- **Future Economic Status**
Studies from the intergenerational mobility literature, which do not control for many family background

characteristics but do average parental income over several years, find that a 10 percent increase in family income leads to an increase in sons' wages of as much as 6 percent. Studies that control for additional family background characteristics leave considerable uncertainty about the magnitude of the effect of parental income on children's eventual economic status. A best guess might be that on average over the whole income distribution a 10 percent rise in parents' income increases sons' wages, earnings, and income by no more than 2 percent, and perhaps less.

- **Functional Form of the Relationship**
Most of this research is based on a linear specification of the effect of income. If the true relationship between parental income and children's outcomes is non-linear, these estimates could under-state the effect of raising the income of poor families. However, the evidence on the mathematical form of the income–outcome relationship is inconclusive.
- **Cumulative Effects**
Although the average effect of parental income on any one outcome does not appear to be large, the accumulation of many small effects can result in a substantial overall effect of parental income on children's well-being.

Reviews of published research such as this might not provide a representative picture of the results that researchers have actually obtained. If the effect of parental income is relatively modest, researchers will sometimes get substantial significant effects, often get small statistically insignificant effects, and sometimes get small statistically insignificant effects with the “wrong” sign. But significant effects with the expected sign are more likely to be published than insignificant effects or effects with the wrong sign. Thus published papers are likely to be biased towards those with significant positive effects. Researchers themselves also tend to have preferences for particular findings, both because they know what is easiest to publish and because they have theoretical and political agendas to promote. Since social scientists who write about the effect of income often select this topic because they believe income is important, they may be inclined to believe results showing that income matters and discount results showing the opposite.

In the conclusion of the report I address the question of why the effect of parental income per se is not larger.

5



**Does the effect of
parental income depend
on the age of the child?**



Recently researchers have become interested in the possibility that parental income is more important for children at some ages than at others. It is possible that all family influences, including parental income, are stronger on young children because family life consumes more time and attention of young children than older children.

As children age they become exposed to many influences outside the home and these then play a larger role in influencing their behaviour. A related hypothesis predicting that parental income is more important for young children than for older children is that children have critical developmental periods. If family circumstances are unfavourable during those periods, children miss the opportunity to develop important skills and behaviours.

Two other hypotheses predict that family income during adolescence is more important than family income during earlier childhood. The first is that the things that adolescents need to succeed are more expensive than the things that young children need. The second is that adolescents are more aware of their economic standing than young children. If this is true, alienation and exclusion may be more likely to result from low income during adolescence than from low income during earlier childhood.

In summarising the chapters in *The Consequences of Growing Up Poor*, Duncan and Brooks-Gunn (1997) note that none of the chapters in which income was measured during adolescence demonstrated “large” effects of income. In contrast studies that measured income in early and middle childhood did produce both “large” and “small or moderate” effects. They take this as evidence that family income is more important in early childhood than in later childhood in shaping children’s ability and achievement. But the studies of young children’s outcomes are generally not comparable to studies of older children’s outcomes. For example, the study of young children’s cognitive test scores (Smith et al. 1997) differs in many

important ways from the study of adolescent cognitive test scores (Peters and Mullis 1997). And other studies of young children’s test scores that are more comparable to the study of adolescent test scores also find little effect of parental income. Comparing studies with such diverse methods, samples and outcomes does not provide strong evidence on the question of whether the timing of parental income matters.

Ideally, to compare the effect of income at different ages one would need data on the same children over different periods of their childhood. This requires very long-term longitudinal data. Probably the most often cited evidence that supports the claim that the effect of income is larger during early childhood is a study by Duncan et al. (1998) that uses PSID data. Table 4 shows the results from this study. It shows four different estimation models for three different outcomes: years of schooling, high school completion, and unwed childbearing. For each model it shows the estimated effect of parental income measured when the children were zero to five years old, six to 10 years old, and 11 to 15 years old. Numbers in bold are the largest estimate for each model and outcome.

Several things are evident from this table. The bold coefficients are not uniformly associated with any particular age band. Out of 12 models, the effect is largest for children aged zero to five years in six models. But the effect is largest for children aged 11 to 15 in four models. However, a pattern is more evident when the results are examined within outcome categories. Within the first two columns (which represent schooling outcomes), the effect is largest for children aged zero to five in six out of eight models.⁵²

52 And in one of the other two results, the effect size using a log model for the 0–5 age group (.54) is not much smaller than that for the 11–15 age group (.57).



Table 4

Effect of Parental Income at Different Ages for Three Outcomes			
Functional Form of Income and Age of Child	Years of Completed Schooling (OLS Regression)	High School Completion (Logistic Regression)	Non-Marital Birth (Cox Regression)
Linear effects			
0–5 years	.12 (.05)*	.38 (.13)*	-.16 (.14)
6–10 years	-.01 (.04)	-.07 (.10)	.06 (.13)
11–15 years	.05 (.02)	.06 (.08)	-.29 (.09)*
Log effects			
0–5 years	.54 (.18)*	1.07 (.35)*	-.37 (.31)
6–10 years	-.06 (.12)	-.18 (.40)	.20 (.36)
11–15 years	.57 (.14)*	.58 (.29)*	-.89 (.26)*
Spline function (effect for income < \$20,000)			
0–5 years	.81(.28)*	1.05 (.43)*	-.03 (.37)
6–10 years	.45 (.36)	.22 (.28)	-.21 (.45)
11–15 years	.32 (.27)	.42 (.24)	-.05 (.38)
Categorical effects \$15,000-24,999 (< \$15,000 omitted)			
0–5 years	.66 (.25)*	.56 (.36)	.10 (.32)
6–10 years	.16 (.30)	.80 (.44)	-.21 (.36)
11–15 years	.34 (.27)	.38 (.41)	.22 (.54)

* Statistically significant at the .05 level.

Source: Duncan et al. (1998), Table 4.



And within the last column (which represents non-marital childbearing), the effect is largest for children aged 11 to 15 in three out of four models. Even so, the results do depend to some degree on the model specification. Within each column, three of the four results are consistent, but one of the models is at variance with the other three results.

These results do not lead to a general conclusion about whether income is more important during early or late childhood. The age at which parental income is most important depends on the particular outcome under study and the way in which the model is specified. In particular, the results in Table 4 suggest that parental income during the early years of childhood may be more important for schooling outcomes, while parental income during adolescence may be more important for non-marital childbearing. However, on a wide range of other outcomes (including socio-emotional functioning, health and economic status in adulthood) there is presently little evidence about the importance of income at different stages of childhood. Parental income may be more or less important at different ages for child outcomes, but we will need more research to demonstrate this across the full range of child outcomes.

6



**Does parental income
matter more for some
children than others?**



Researchers have often tried to determine whether the effect of parental income differs for boys and girls and for children of different racial or ethnic backgrounds.

To test the hypothesis that income matters more for some children than for others, researchers usually use one of two techniques. The first is to estimate the effect of an interaction between family income and group membership; and the other is to estimate separate models for different groups. An interaction is measured by a variable that is the product of the parental income variable and a dummy variable indicating membership in a group. The interaction variable is included in a model that also includes parental income and the group membership dummy variable. The coefficient on the interaction term tells us whether the effect of income differs for the two groups.

Each estimation technique has strengths and weaknesses. The chief benefit of using an interaction term is that its interpretation is relatively straightforward and a test of the significance of any difference between the groups is readily available (it is the level of significance of the interaction coefficient). However, if the effects of relevant exogenous variables in the model also differ by group and these differences are not modelled, the estimate of the interaction effect can be biased. When researchers estimate separate models for members of different groups, we say that the model is “fully interacted” because the effect of all variables in the model can differ by group. Such a model avoids potential problems of bias due to misspecification, but it can also increase the standard errors. When separate models are estimated, researchers also need to do a formal test of the difference between the coefficients in the models to determine whether the difference is statistically significant. Researchers often do not report the results of such a test.

6a Gender

Boys and girls may react differently to environmental circumstances or they may require different amounts or kinds of goods and services, making parental income more important to one gender than the other. Table 5 summarises the research on gender differences in the effect of parental income. Of 30 tests of the hypothesis that the effect of income is different for males and females, 16 show that males benefit more than females from an increase in family income; five of these differences are statistically significant. Nine tests show that females benefit more than males, and one of these differences is significant. Five tests show no difference by sex. There is no apparent pattern across outcomes for these gender differences, and two of the five significantly larger effects for males are from the same study. Thus these results provide tentative but not strong evidence that boys may be more sensitive to parental income than girls. It is important to note that none of the studies in this table include methods for controlling for unobserved heterogeneity.

6b Race

Several studies also try to determine whether the effect of income differs by race. Table 6 summarises these studies. Of 19 estimates, nine show no difference or ambiguous differences across race groups. Five estimates are greater for whites, non-Māori, or non-black children, and two are significant. Two show greater effects for blacks and one is significant. One shows that the effect is smaller for Hispanics and “other” races compared to whites and blacks, and another shows that the effect is smaller for “other” races compared to blacks, whites, or Hispanics and this effect is statistically significant. Thus there is no strong pattern of differences in the effect of parental income by race or ethnicity.



Table 5

Estimates of Gender Differences in the Effect of Parental Income		
Outcome Study	Data, Estimation Method, Outcome	Result: Who Benefits More from Increase in Income?
Cognitive Skill		
Peters and Mullis (1997)	NLSLME, I, AFQT	male
Barker and Maloney (2000)	Burt Word Reading Test score, CHDS	female
Hauser and Sweeney (1997)	WLS, I, depressed in adulthood	female
Socio-emotional Functioning and Mental Health		
Hanson et al. (1997)	NSFH, I, low externalising	male*
	NSFH, I, low internalising	male*
	NSFH, I, sociability	female
	NSFH, I, initiative	male
Lipman and Offord (1997)	Canadian OCHS, OCHS-FU, I, psychiatric disorder	male
	Canadian OCHS, OCHS-FU, I, social impairment	female
Health		
Korenman and Miller (1997)	CNLSY, S, stunting	male*
	CNLSY, S, under-weight	male
	CNLSY, S, over-weight	no difference
Lipman and Offord (1997)	Canadian OCHS, OCHS-FU, I, chronic health problem	male
Hauser and Sweeney (1997)	WLS, I, fair or poor health in adulthood	male
	WLS, I, died by time aged early 50s	no difference
Education		
Boggess (1998)	PSID, S, HS grad	female
Teachman et al. (1997)	NLS, I, HS grad	no difference
Haveman et al. (1997)	PSID, I, HS grad	female
Peters and Mullis (1997)	NLSLME, I, years school	male*
Teachman et al. (1997)	NLS, I, years school	no difference
Maani (2000)	CHDS, S, school leaving at age 16	males
Hauser and Sweeney (1997)	WLS, I, post-secondary schooling	female
	WLS, I, college completion	male
Rice (1987)	British Family Expenditure Survey, S, years school	female*
Labour Market Outcomes and Income		
Peters and Mullis (1997)	NLSLME, I, hourly wage	male
Corak and Heisz (1998)	Canadian tax records, S, market income	male
Maani (2000)	NZ CHDS, S, employed rather than in school or out of labour force	male*
	Hauser and Sweeney (1997)	WLS, I, earnings
Corcoran and Adams (1997)	PSID, I, income-to-needs ratio	female
	PSID, I, poverty	male

* Indicates a statistically significant difference.

Notes: S indicates separate models were estimated. I indicates an interaction model was estimated. See Appendix for a list of data sets

Table 6

Estimates of Racial and Ethnic Differences in the Effect of Parental Income		
Outcome Study	Data, Estimation Method, Outcome	Result: Who Benefits More from Increase in Income?
Cognitive Skill		
Peters and Mullis (1997)	NLSLME, I, AFQT	white*
Barker and Maloney (2000)	CHDS, S, Burt Word Reading Test score	non-Māori*
Socio-emotional Functioning and Mental Health		
Hanson et al. (1997)	NSFH, I, low externalising	whites and blacks no difference; smaller effect for Hispanic and “other”
	NSFH, I, low internalising	no differences
	NSFH, I, sociability	no differences for black, Hispanic and white; smaller effect for “other”*
	NSFH, I, initiative	no difference
Health		
Korenman and Miller (1997)	CNLSY, S, stunting	non-black
	CNLSY, S, under-weight	no difference
	CNLSY, S, over-weight	no difference
Education		
Boggess (1998)	PSID, S, HS grad	black males, no difference for females
Teachman et al. (1997)	NLS, I, HS grad	no difference
Haveman et al. (1997)	PSID, I, HS grad	blacks
Peters and Mullis (1997)	NLSLME, I, years school	whites
Teachman et al. (1997)	NLS, I, years school	no difference
Duncan and Yeung (1995)	PSID, S, completed schooling	white males, depends on model for females
Out-of-wedlock birth		
Haveman et al. (1997)	PSID, I	whites
Labour Market Outcomes and Income		
Peters and Mullis (1997)	NLSLME, I, hourly wage	no difference
Corcoran and Adams (1997)	PSID, S, income-to-needs ratio	blacks*

* Indicates a statistically significant difference.

Notes: S indicates separate models were estimated. I indicates an interaction model was estimated. See Appendix for a list of data sets.

7



**Does the source of
parental income matter
for children?**

Several studies try to determine whether the source of parental income affects children's outcomes. A dollar should buy the same goods and services regardless of its source. However, the cost of getting a dollar may vary by source. When family income comes from mothers' labour market work, it often comes with associated costs in the form of forgone home production and expenditures on childcare, transportation, and other work-related expenses.

These costs reduce the amount of money that a family can spend on things that might benefit their children. Neither welfare income nor child support income require mothers to forgo home production or spend money on work-related expenses. Thus we might expect children whose family income comes from these sources to do better than children whose family income comes from mothers' labour market work when the families are otherwise identical, because their disposable income is higher. Ideally we might want to estimate the effect of only the purchasing power of income from different sources where the purchasing power is the value of the income less the monetary costs associated with getting it. I refer to this as the "income effect" of the source of income. However, it is very difficult to isolate the income effect of the source of income. For example, some researchers argue that welfare income is stigmatised and stressful and that these emotional costs reduce its value to children. Such emotional costs will often be counted as part of the income effect because it is hard to empirically separate them from the purchasing power of income.

Besides having different costs, different income sources may affect parental behaviour and hence children's behaviour differently. I refer to this as the "behavioural effect" of the income source. Income from welfare may, for example, reduce parents' motivation and set a bad example for children. If children whose parents get welfare expect it themselves, they may fail to work hard in school or avoid early childbearing, or otherwise fail to follow middle-class norms. Income from child support may increase the involvement of the absent parent, which could have positive or negative effects on children. Some of the emotional costs of getting income from different sources could also be subsumed in the

behavioural effect of income. Indeed the emotional costs could cause the behavioural effects. But as noted above, the emotional costs can also affect the purchasing power of income. Imagine a mother who gets welfare. The stigma of welfare is depressing and reduces her motivation. It also makes her more inclined to shop at the nearby but expensive grocery store rather than the farther away but less expensive supermarket. Depending how we estimate the effect of the source of income, the effect of stigma might be concatenated with the income effect or the behavioural effect.

The source of income could also be a proxy for unmeasured parental or family characteristics. I refer to this as the "selection effect" of the income source. More advantaged absent parents are more likely to pay child support, so child support could be partly a proxy for these advantages. In the US only about 60 percent of mothers eligible for the Aid to Families with Dependent Children (AFDC) programme actually took it up (Blank and Ruggles 1996).⁵³ Those who did probably differed in important ways from those who did not. Some researchers argue that parents who got AFDC had fewer resources or a greater need for resources than those who reported the same income but did not get welfare. Welfare recipients could have fewer resources because they get less help from their family and friends, or because they have special needs, such as high medical costs. If parental economic resources affect children's outcomes, and if welfare parents have fewer resources, welfare income would appear to hurt children's outcomes unless care is taken to control for parental resources. Similarly, parents whose income is from wages may differ in important ways from parents whose income is from interest and assets, and these differences – not the income source – may affect children's outcomes.

⁵³ The AFDC programme was until recently the primary cash transfer programme for families headed by a non-elderly adult in the US. From its origin in 1935 the programme primarily provided cash benefits to single mothers and their children. Married-couple families were never greater than 7 percent of the caseload. AFDC was replaced by Temporary Assistance for Needy Families (TANF) in 1996. TANF benefits also go mainly to single mothers and their children.





The correlation between the source of a family's income and children's outcomes is the sum of the income effect, the behavioural effect, and the selection effect.

Researchers are not always clear about which of these effects they wish to estimate. In a model that controls for selection into receipt of income from a particular source, the effect of income is the combination of the behavioural effect and the income effect. This is often what policy makers want to know because they are interested in whether an income transfer does more good (through the income effect) than harm (through the behavioural effect). If, on the other hand, one controls for a family's total income, but not selection into the income source, the effect of income from that source is the combination of the behavioural effect and the selection effect. This is generally less useful to policy makers because it does not separate potential incentive effects of an income transfer programme from selection into the programme. Nonetheless, as I show below, this is the model that most researchers estimate.

The correlation between the source of a family's income and children's outcomes is the sum of the income effect, the behavioural effect, and the selection effect.

7a Income from Welfare

Research in the US finds that income from parents' labour market work improves children's outcomes, while income from welfare hurts children's chances of graduating from high school (Haveman and Wolfe 1994, McLanahan 1985), reduces sons' earnings and hours of work (Corcoran et al. 1992, Corcoran and Adams 1993, Hill and Ponza 1983), and promotes "idleness" (not working, not in the military, and not in school) among young adults (Haveman and Wolfe 1994). A Canadian study concludes that welfare income is negatively associated with children's test scores (Lefebvre and Merrigan 1998). All these studies control for overall parental income but not for selection into welfare. Thus the estimated effect of welfare income

is partly due to the effect of characteristics that both cause mothers to go on welfare and affect their children's outcomes, and partly due to the behavioural consequences of taking welfare. By controlling total income, these studies take account of any benefit to children from the additional income that welfare brings.

Not all studies find that getting welfare income matters for children's outcomes. Teachman et al. (1997) found that neither the length of welfare receipt nor the amount of income received from welfare had a significant effect

on high school graduation, college attendance, or years of schooling when controls were used for the family's overall poverty ratio, parental education, and parental marital status. Although Haveman and Wolfe (1994) found that welfare income decreased a child's chances of graduating from high school, they also found that children in families who received welfare got slightly more years of schooling than children

in families with the same income but no welfare. Again these studies control for a family's total income (or poverty ratio) so that the estimated effect of welfare income is the combined effect of characteristics that make some mothers more likely to get welfare and the behavioural consequences of welfare.

Several studies do try to control for selection into the AFDC programme. Currie and Cole (1993) use data from the 1979 to 1988 NLSY to estimate the effect of AFDC receipt on mothers' use of prenatal care and children's birth weight. They control for selection into the AFDC programme by using state-level programme parameters as the control variables. AFDC benefit levels and eligibility requirements varied a great deal across states. Because these variations provided different incentives to participate in the programme, they provided an exogenous source of variation in programme participation.⁵⁴ Currie and Cole also estimate the effect of AFDC using sibling fixed-effect models to control for

54 For example, in states with higher benefits and easy eligibility, mothers with more skills were more likely to receive AFDC than in states with low benefits and difficult eligibility rules. By holding constant state AFDC programme rules, one in theory holds constant the "quality" of AFDC recipients or the "selection" of recipients across states. However, controls for AFDC programme parameters may not completely control for selection into the programme. AFDC programme parameters are also useful instruments for controlling welfare participation because they are correlated with the characteristics of welfare recipients but they do not directly affect most children's outcomes.



invariant family background characteristics. They average income over several years, and find no effect of AFDC receipt net of the effect of the families' overall level of income. This suggests that income from welfare has no behavioural effect that influences prenatal care or children's birth weight. The apparent negative effect of welfare income in other studies is either because welfare income affects different outcomes differently, or because unobserved parental characteristics associated with welfare receipt affect the outcomes.

Hill and O'Neill (1994) use the CNLSY to predict children's PPVT scores. Controlling for a large number of exogenous characteristics of both children and their mothers and total family income, they find that a child whose mother received welfare every year of his life scored 11.6 percentile points lower on the PPVT than a child whose mother never received welfare. Hill and O'Neill then use local labour market characteristics and state welfare parameters to predict each respondent's welfare receipt. Welfare receipt can then be divided into the "predicted propensity" to accept welfare, which is due to labour market conditions and welfare parameters, and the "residual propensity" to accept welfare, which is due to unobserved maternal characteristics (and error in the model predicting welfare receipt). They find that the "predicted propensity" to receive welfare has a negative but small and statistically insignificant effect on children's PPVT scores. The "residual propensity" to receive welfare has a large, significant negative effect. Because they also control for family income and the number of years a child was poor, they conclude that the negative effect of welfare is not due to welfare families being especially poor. They conclude instead that "residual propensity" to be on welfare (which is a measure of unobserved maternal characteristics) is correlated with ineffective parenting skills and that this accounts for the negative effect of welfare on children's PPVT scores.

Peters and Mullis (1997) also find that, after controlling for total income, children whose parents received welfare got less schooling and scored lower on the AFQT in young adulthood. For example, their results suggest that a child whose family received welfare scored 3.9 points (about 15 percent of a standard deviation) lower on the AFQT than a child

whose family had the same income (averaged over three years) but no welfare income. Because this model controls for total income, the effect of welfare income is due to a combination of the behavioural effect of welfare and selection into welfare. Peters and Mullis use the local unemployment rate and welfare benefit levels as instruments to control for selection into AFDC. Peters and Mullis find that welfare income has a very small and statistically insignificant effect on children's AFQT score, educational attainment, and earnings. These results suggest that the apparent effect of welfare income is due to characteristics of parents that affect their likelihood of getting welfare and, as in Currie and Cole, that receiving income from welfare produces no behavioural effects that influence children's schooling or AFQT scores.

There has been some New Zealand research on this matter, although the results were inconclusive. Barker and Maloney (2000), using data from the CHDS, find that children whose families receive welfare experience a greater increase in scores on the Burt Word Reading Test between ages 10 and 13 than those who do not receive welfare. But this effect is not statistically significant. Barker and Maloney for control an extensive list of family background characteristics, including total family income and several factors likely to be associated with both parental welfare receipt and children's test scores. But some of these, such as the child's years of preschool education and whether the child attends a private school, are probably at least partly the result of parental welfare receipt and not its cause, so controlling for them can produce a biased estimate of the total effect of receiving welfare.

Using CNLSY data, Levine and Zimmerman (2000) show that with no controls each additional 10 percent of a child's life spent in a home receiving welfare is associated with 2.4 fewer percentile points on the PIAT math, 2.3 fewer points on the PIAT reading recognition, 3.2 fewer points on the PPVT and an additional 1.4 points on the BPI. When controls were used for the child's race and ethnicity, age, birth order, whether first-born, parents' education, and mother's living arrangement at age 14, the effect of receiving welfare was reduced to between 1 and 1.5 fewer percentile points on each assessment. Levine and Zimmerman then use state welfare parameters and



local labour market conditions as instruments to control for parents' selection into welfare. They also estimate sibling fixed-effect models and child fixed-effect models to control for invariant unobserved factors affecting both parents' welfare receipt and children's outcomes. In these models the effect of welfare income is very small (less than one percentile point), sometimes positive, and seldom statistically significant.

Duncan and Yeung (1995) use PSID data to estimate the effect of the amount of welfare income received by families. Getting 1 to 10 percent of income from AFDC had a negative effect on white and black boys' and white girls' (but not black girls') years of schooling. Receiving more than 10 percent of income from AFDC had a negative effect on years of schooling for all groups. AFDC income also had a negative effect on whether children graduated from high school.

Duncan and Yeung reasoned that if parents receive AFDC after their children have completed their schooling, it cannot affect the children's educational attainment except through unobserved parental characteristics that affect both whether the parents receive welfare and their children's educational attainment. They found that a variable indicating whether the mother received AFDC when the child was 21 years old had a negative effect on years of schooling, suggesting that unobserved parental characteristics associated with welfare receipt affect educational attainment. But including this variable did not diminish the negative effect of receiving AFDC during the child's adolescence, suggesting that welfare receipt has an effect even after controlling for unobserved parental characteristics and the family's poverty ratio. Duncan and Yeung did not repeat the analysis for high school completion, controlling for mother's AFDC receipt when the child was 21, so we cannot tell whether unobserved parental

A substantial research literature documents that girls who grow up in families that receive welfare are themselves more likely to receive welfare once they are adults.

characteristics affect years of schooling primarily by influencing high school completion or by influencing participation in post-secondary education.

A substantial research literature documents that girls who grow up in families that receive welfare are themselves more likely to receive welfare once they are adults.⁵⁵ This correlation could result from several factors. First, poor children are more likely to grow up to be poor, so the correlation could just result from

shared economic circumstances. It could also arise if parents who get welfare have less distaste for welfare (and perhaps more distaste for work) and transmit these attitudes to their children. Finally, it could arise if parents who get welfare transmit information about getting welfare to their children in a way that lowers the transaction costs of the children's participation in welfare programmes. Gottschalk (1992), using NLSY data, finds that among individuals *eligible* for welfare, adults who grew up in families that received welfare were more likely to receive it themselves than adults who grew

up in families that did not receive welfare. This suggests that at least some of the intergenerational transmission of welfare use results either from parents and their children sharing norms and values about welfare receipt, or from parents and children sharing information about welfare receipt.

7b Income from Child Support

Among children in single-parent families, receipt of income from child support payments appears to increase children's educational attainment (Graham et al. 1994, Knox and Bane 1994), and achievement test scores (Baydar and Brooks-Gunn 1994) more than receipt of income from welfare or mothers' labour market work. Because these studies control for total income, the effect of child support is not due to additional income. It must be due either to the lower costs associated with child support income or to

55 See, e.g., Duncan et al. (1988), Gottschalk et al. (1994), and Moffitt (1992).



parental characteristics associated with both child support and children's outcomes.

Argys et al. (1998), using 1986 to 1992 NLSY data and controlling for total parental income and the amount of income from welfare benefits, find that child support income has a small and statistically insignificant effect on children's PIAT and PPVT scores among children of both never married and divorced or separated parents. Argys et al. control for total income, so the effect of child support is not due to an increase in income. They also control for several characteristics of absent fathers likely to affect the amount of child support they provide.⁵⁶ Child support payments seem to have a positive and statistically significant effect on blacks whose parents have divorced or separated and whites whose parents were never married. To see if these positive effects of child support are due to fathers who are more involved with their children being more likely to pay child support, Argys et al. include a variable for whether the child support agreement was co-operative or ordered by a court. They find that the effect of child support payments on PPVT scores is greater for children whose child support agreement is co-operative. But the form of the agreement did not change the effect of child support payments on PIAT scores.

Peters and Mullis (1997) in the study described above found that, net of families' average income, children in single-parent families that received child support scored higher on the AFQT and received more schooling than children in single-parent families that did not receive child support. However, when they control for unobserved characteristics of parents that affect their receipt of child support, the effect of child support income had a statistically insignificant effect on children's AFQT scores and educational attainment, net of the family's average income. These results suggest that the apparent positive effect of child support is largely due to characteristics of parents that affect the likelihood of payment of child support.

7C Income from Other Sources

Several studies try to separate the effect of the "first dollar" of income from a particular source from the effect of the amount of income from that source. The idea for this approach is that the effect of the first dollar (a dummy variable indicating whether the family had any income from the source) accounts for unobserved parental characteristics associated with receiving income from that source, while the dollar amount effect indicates the importance of the level of income from that source.

Hill and Duncan (1987), using PSID data, find that the first dollar of welfare income reduced daughters' completed schooling, but not their wages. But the first dollar of fathers' labour income also reduced daughters' completed schooling. The first dollar of mothers' labour income reduced both sons' and daughters' schooling and wages. The results were equally equivocal for subsequent income from these sources, except that fathers' labour income had a positive and statistically significant effect on both sons' and daughters' schooling and wages. An additional \$1,000 in income averaged over three years (in 1983 dollars, about 6 percent of a standard deviation) increased sons' years of schooling by .034 years and increased sons' wages by less than 1 percent. Hill and Duncan's samples were quite small (between 300 and 400 cases), so it not surprising that these results were sensitive to different specifications of the models, and were thus inconclusive.

Corak and Heisz (1998) use Canadian income tax data to estimate the effect of the first dollar, and the amount received in a single year, of fathers' income from earnings, self-employment, assets, unemployment insurance, family allowance, and other sources separately on sons' and daughters' market income. They control for several neighbourhood characteristics, how often the family moved, whether the family spoke the majority language, number of children, income from other

⁵⁶ This study uses a range of variables – including policy concerning divorce, child support, and the generosity of welfare, as well as the strength of the economy in the family's county of residence, and relevant demographic characteristics of the county – as instruments in two-stage least-squares models to control unobserved heterogeneity.



sources, and the marital status of the parents. Because they do not control for overall income, the effect of income from a particular source includes both the income and the behavioural effects. However, because they control for several factors that are endogenous with respect to income, their estimates might under-state the effect of income. Corak and Heisz find that a son whose father received any income from assets earned about \$3,000 (1998 Canadian dollars) more than a son whose father had no asset income. A son whose father received any unemployment compensation earned about \$1,441 less than a son whose father never received unemployment compensation. Both of these effects are statistically significant. The effects of fathers' having any earnings or family allowance income are both smaller while remaining statistically significant (although the former is positive and the latter is negative). The first dollar effects are generally similar (though smaller) for daughters, except that daughters whose fathers received family allowance income earn on average \$507 more than daughters of fathers who never received family allowance income, and this estimate is statistically significant. Dollar amount effects also vary by source but overall these effects are smaller than the first dollar effects. Each \$1,000 of fathers' income from earnings and self-employment raises children's income more than \$1,000 of fathers' income from assets or unemployment insurance.⁵⁷ The effect of \$1,000 of income from the family allowance is large and positive but statistically insignificant.

7d Effects for Different Children

The source of income could affect different children differently if a) the effect of income differs by child characteristics, b) behaviours of parents induced by income from different sources differ by child characteristics, or c) the unobserved characteristics of parents who receive income from different income sources differ by child characteristics. I have already described some results that differ by child's gender or race. In this section I describe additional results for the source of income.

Some studies find that welfare receipt affects some children more than others. Maani (2000), using CHDS data, controls for the income decile of a family and finds that receiving a higher proportion of income from welfare benefits increases the chances that New Zealand boys but not girls will stay in school after age 16. Maani's estimates suggest that, all else being equal, the probability that a girl whose family gets half of its income from benefits will drop out by age 16 is .148. If all family income comes from benefits, the probability is .197.

Barker and Maloney (2000), in the study described above using the CHDS, find that, net of overall income, the effect of parental welfare benefits on children's Burt Word Reading Test scores is positive for boys but negative for girls. Thus both Barker and Maloney and Maani (2000) find that welfare receipt benefits sons but not daughters. This may be because the role modelling effect dominates for girls. However, in the Canadian study by Corak and Heisz described above, daughters of fathers who received income from the Canadian family allowance earned more as adults than daughters whose fathers did not receive family allowance income, while the effect of receiving income from the family allowance was small and statistically significant for sons. Corak and Heisz (1998) try to control for unobserved family background characteristics while the other studies do not. Thus the evidence that welfare benefits affect sons and daughters differently is equivocal at best.

Also in a study described above, Peters and Mullis (1997) find that parents' receipt of welfare is negatively associated with children's AFQT scores, years of schooling, earnings, and labour market experience. However, for black children parents' welfare receipt has a large positive and statistically significant effect on AFQT scores and completed schooling in models that control for selection into the welfare programme. It also has a positive effect on children's earnings, but this is not significant. This model controls for total family income, so the benefit of welfare for black children is not due to the income effect provided by welfare. Welfare receipt may

57 The β coefficients were as follows: earnings 90.7; self-employment 76.2; assets 27.7; and unemployment insurance -9.7.



benefit black but not white children because it is less stigmatising for blacks than for whites. Or it may be more important for black than white children to have a parent at home monitoring their behaviour, perhaps because black children are more likely to live in potentially dangerous neighbourhoods. In this case the economic benefit of a mother's working would be more than off-set by the liability of having less supervision at home.

Corcoran and Adams (1997) report mixed results on the effect of welfare receipt on children's eventual income and labour market outcomes. Children's eventual poverty ratio was lower for black men and white women raised in families in which welfare accounted for a "large" proportion of income (greater than 15 percent for whites and greater than 50 percent for blacks). The chances of being poor in early adulthood (that is, having a poverty ratio of less than 1) were also greater for white women whose families received a lot of welfare. Family welfare income had a small and statistically insignificant effect on white men's and black women's poverty ratio and poverty status.

7e Conclusions about the Source of Income

Research on the source of income consistently shows that welfare income is negatively associated with children's outcomes. Most (but not all) studies also show that even after controlling for total family income, welfare receipt is still negatively associated with children's outcomes. This is true for research in New Zealand, Canada and the US. It implies that, although the additional income from welfare may improve children's outcomes, either parental characteristics

associated with welfare receipt or behavioural changes due to welfare receipt hurt children's outcomes. Studies that try to control for selection into welfare programmes find much smaller effects of welfare income. Thus the weight of the evidence suggests that the apparent negative effect of welfare income is largely due to parental characteristics that make some parents more prone than others to be on welfare and not to either negative role modeling or to greater economic deprivation among welfare recipients compared to other families with the same income who do not receive welfare.

Less research has been done on other sources of income. However, some research suggests a positive association between receipt of child support payments and children's outcomes. This positive association appears to be at least partly because parents who pay child support are more involved with their children to start with, or because paying child support increases involvement from absent parents. It could also be because parents who pay child support have different characteristics from those who do not, and these characteristics affect children's outcomes.

Research consistently shows that the first dollar from an income source has a greater effect on children's outcomes than the dollar amount from that source. This too lends support to the idea that parental characteristics associated with the source of income are important to children's outcomes.

The evidence that welfare income has different effects on children depending on their race or gender is ambiguous because few studies have addressed this question, and those that have often end up with contradictory results.

8



Conclusions and policy discussion

Research suggests that low parental income is one of many risk factors that affect children both as they grow up and when they reach adulthood. The main conclusions from this review are the following:

- The effect of parental income is positive for all outcomes included in this review. These outcomes include cognitive test scores, socio-emotional well-being, mental health, behavioural problems, several measures of health, teenage childbearing, educational outcomes, and future economic status.
- The size of the effect of parental income depends on many factors, including the particular outcome under study, the length of time over which income is measured, and what control variables are employed. The effect of parental income declines in models that control for exogenous family background factors. The effect usually but not always declines further in models that use techniques to control for all observed and unobserved family background characteristics. With controls for family background variables, the effect of parental income on children's outcomes is generally small to modest. Estimates of the effect of income generally represent the average effect across the whole income range.
- Some evidence suggests that the effect of parental income is greater for low-income than for high-income children. But other evidence does not support this. Research on the functional form of the income–outcome relationship has mainly been done using data from the US and Canada, both rich countries. If the true effect of parental income is non-linear, evidence on the functional form of the relationship obtained from rich countries may not be relevant for less affluent countries where the poor are likely to be poorer.
- Almost all evidence suggests that permanent income is more important to children's outcomes than short-term income. Studies that measure parental income averaged over 10 years produce estimates that are two to five times larger than estimates generated from studies that measure income in only one year. But studies that measure income over five years produce estimates similar to those using more years of income. Most of the studies reviewed in this report do average income over at least three years.
- No general conclusions can be drawn about whether parental income is more important at different stages of childhood. However, there is some evidence to suggest that income is more important during early childhood for schooling outcomes.
- Evidence that the effect of parental income differs by the gender or race of the child is weak.
- Welfare income is negatively associated with a range of children's outcomes. Some studies find that the association persists even after controlling for the level of family income. However, the apparent negative effect of welfare income is largely due to parental characteristics that make some parents more prone to be on welfare than others.
- There is insufficient comparative research to draw any conclusions about how the effect of income differs across countries. There is insufficient New Zealand research to draw strong conclusions about whether the effect of income in New Zealand might differ from the effect in the US.

Both theories that try to explain the relationship between parental income and children's outcomes – the investment theory and the good parent theory – predict a positive effect of parental income on children's outcomes. Neither predicts the magnitude of the effect, but based on these theories social





scientists and policy makers have usually expected large effects. Almost no research has tried to estimate models that would distinguish between these theories. What evidence we do have suggests that additional income increases the amount that parents spend on behalf of their children, as predicted by the investment theory. But these additional investments only improve children's outcomes by a small amount. Parents' level of stress and their parenting practices have an important effect on children's outcomes, as predicted by the good parent theory. But additional parental income seems to have at best a modest effect on parents' level of stress and parenting practices. Thus the things that change when income increases have only a modest effect on outcomes, while the things that have a large effect on outcomes change only a little when income increases.

Methodological Limitations

Research on the effect of parental income has serious short-comings that limit the confidence we can have in making policy recommendations regarding family income. In this review I have included the highest quality studies available. These generally average income over a few years, use representative samples, and control for at least some potentially confounding family background variables. But even these studies have many limitations. Most studies omit potentially important exogenous family background characteristics, and many include potentially important endogenous factors. Only small numbers of studies estimate the effect of parental income on the same outcomes, so we do not have enough replication of results to be confident that the findings are robust across different samples and reasonable changes in estimation models. Few studies try to model the functional form of the relationship between parental income and children's outcomes.

The fact that parental income seems to have a relatively modest effect on children's outcomes should not be interpreted to mean that money spent on behalf of children cannot make a difference in their lives.

There is very little high-quality research on some outcomes, such as child health, teenage childbearing, or delinquency.

However, even with these shortcomings, it is possible to draw some tentative policy insights from this review, even if it is not possible to draw strong policy conclusions. I now turn to that discussion.

Policy Insights

Children who are physically and mentally well endowed, whose physical needs are met, who live in a safe and stable environment, and who consistently have present in their lives an adult whom they respect and can trust are likely to succeed. Many children

lacking some of these benefits succeed, and some children lacking all of them succeed. Some children with all these benefits and more fail. This is another way of saying that we do not know how to guarantee that children will succeed. But we do know that it takes more than money to raise a successful child.

The fact that parental income seems to have a relatively modest effect on children's outcomes should not be interpreted to mean that money spent on behalf of children cannot make a difference in their lives. Nor should it be taken to mean that income transfers to families are useless for improving the well-being of children. The challenge for policy makers is to determine whether income transfers to families are the most efficient way to improve children's well-being. Imagine 100 children in 100 identical families. The government has \$100,000 to spend on these children. It can transfer \$1,000 to each family or it can give the \$100,000 to the childcare centre they all attend. Almost no research would tell us which one of these strategies would improve the life chances of the children the most, or under what circumstances one strategy would be more useful than the other.



All the research reviewed in this report suggests that the often large correlation between parental income and children's outcomes is mainly due to family background characteristics that result in both low parental income and worse life chances for children. This is because low income does not occur randomly, at least in the nations included in this review. If income were distributed randomly, parental traits would by definition be unrelated to their income.⁵⁸ But income is never completely random, even though it can sometimes be affected by more or less random events. Historically, severe depressions, agricultural catastrophes, and other natural disasters have plunged people from all backgrounds into poverty. In those cases income was still not completely random, but the poor were more like everyone else than they are today.

As countries get richer, they often implement policies to reduce poverty among families hit by random catastrophes. Such policies include disability payments, unemployment compensation, health insurance, and old-age pensions. When nations do this, poverty declines. But families who remain poor for long periods of time also become less like everyone else. In the US, and no doubt in the other countries included in this review, short spells of poverty are still common. Marital break-ups, job loss, and other unexpected problems can cause families with a wide variety of characteristics to be poor for short periods. As we have seen, a short period of low income has very few long-term consequences for children. On the other hand, families that are poor for a long time are much more likely than other families to be headed by someone who suffers from depression, anxiety or other psychological problems, physical health problems, low cognitive skills, drug and alcohol use or other problems. All these factors make it difficult to provide involved, consistent and nurturing parenting. The challenge for rich nations with successful social welfare programmes is to

address the needs of children in families that remain poor even with such government protection. But these are the families for whom additional money alone may not be enough.

If parents were the only source of investment in children, parental income would have a large effect on children's outcomes because investments in children would be highly correlated with parental income. However, as countries get richer they usually implement policies not only to reduce poverty but also to equalise the availability of some important goods and services to families. For example, all rich countries (and many others) provide some free public education. Most also provide health insurance or subsidised health services to their citizens. Others have programmes to reduce disparities in housing and food consumption. Once the state assumes a role in reducing disparities in the most important material and pedagogic investments in children, parental income is likely to matter less for children's success. Social and psychological differences between parents and between children will explain a larger percentage of the variation in children's success and the marginal returns to additional parental income will also fall.

Over the last 30 years or so in the US, and probably in other wealthy countries as well, governments have not only implemented or expanded policies to increase the incomes of the poor, but also increased their direct investments in children. Subsidies for childcare, per-pupil expenditures for primary and secondary schooling, and college tuition fees aid have all increased. Federal outlays on programmes for children increased from \$1,020 to \$1,400 (1990 dollars) per child under 18 years of age between 1990 and 1995 alone, and this does not count any part of the transfer that goes to their parents.⁵⁹

Government investment in children usually benefits low-income children more than high-income children. This is obvious in the case of means-tested transfers. If

⁵⁸ In the long run, however, income itself could alter parental traits. Unfortunately, we have little research on this topic.

⁵⁹ US House of Representatives, Committee on Ways and Means (1993): pp. 1566–67. The 1995 expenditures are Congressional Budget Office projections. Actual outlays by these categories are not published regularly, so it is not possible to see how well the projections correspond to what was actually spent in 1995. However, government expenditure projections tend to be fairly accurate for one or two years. These numbers exclude administrative costs.



the government provides health insurance to poor but not affluent children, most affluent parents will still purchase health insurance for their children: the government programme assures that both low- and high-income children get health insurance. But if the effect of investments in children on their outcomes is non-linear (with a diminishing effect for higher-income families), even universal investments will help equalise outcomes between rich and poor children. For example, if health insurance improves the health of poor children more than it improves the health of affluent children (say, because poor children are sicker), when the government provides the same health insurance to all children, poor children's health will improve more than affluent children's health. Thus when government invests equally in all children, poor children will gain more than affluent children.

If government investment in children has increased and these investments have paid off, the effect of parental income should have declined since the programmes were implemented.

If government investment in children has increased and these investments have paid off, the effect of parental income should have declined since the programmes were implemented. Some evidence suggests that this is what has happened in the US (Mayer and Lopoo 2001). If government investment reduces the effect of parental income, poor children who live in countries, states, or cities that invest a lot in children will be better off than poor children who live in locations that invest less in children. Because they have already addressed the causes of child failure that are easy for policy makers to address, affluent nations with well-developed institutions are not likely to find a “smoking gun” cause of child failure. In such countries child success is likely to depend on many factors and combinations of factors that are currently poorly measured or not measured at all by social scientists.

The argument that direct government investment in children narrows the gap in outcomes between rich and poor children may seem to suggest that government is more efficient than families at investing in children, and thus that nations should substitute direct government investments for income transfers to families. However, an important conclusion of this review is that even with the existing government investments in children, parental income appears to improve all the child outcomes that researchers have

studied. Although the effect of additional income is likely to be rather small on any particular outcome, when additional income improves many outcomes even by a little, it might make a very big difference in the lives of children.⁶⁰

Income transfers are what I have referred to elsewhere (Mayer 1997) as “multi-

purpose” policies. Such policies

assume that a given cause has many different effects. For example, suppose that a particular underlying factor in a family has a range of effects on children's outcomes. Changing that factor can thus solve many problems at once. Multi-purpose policies try to identify and change such factors. By their nature multi-purpose policies are likely to have a relatively small effect on any one outcome because they also tend to be directed at outcomes that have many different causes. It follows that their effect on any one outcome is usually relatively small.

The virtue of multi-purpose policies is that they improve many outcomes at once. But social scientists seldom measure all the outcomes that are potentially affected by a multi-purpose policy and, even if they did, they would be unlikely to agree on what weights

⁶⁰ Of course, if the effects of income on childhood outcomes accumulate, we would expect to see a large effect of parental income on adult outcomes that depend on the accumulation of child outcomes. Thus if parental income has a small effect on children's health, cognitive skill, and socio-emotional development, we would expect a larger effect of parental income on children's eventual wages if, as most people believe, wages depend on the accumulation of these childhood experiences. But in fact the effect of parental income on wages is not large either.



to place on different effects. Correctly weighting the outcomes is crucial if the effects go in opposite directions. For example, imagine that income transfers reduce the work effort of parents, but at the same time improve daughters' cognitive skills. Those who think that the social benefit from the increase in daughters' cognitive skills outweighs the social cost of the decline in mothers' work efforts will think income transfers are a good idea. Those who think the converse will draw the opposite conclusion. Correctly weighting the outcomes is crucial even if the effects all go in one direction, because the only way to assess the total benefit of a policy is by summing all its effects and assigning each its due importance.

There is no doubt that the family remains a very important institution for assuring successful outcomes for children. Parents pass on genetic endowments to their children, help shape their moral

development and normative behaviour, and make decisions about investments in children. In rich nations that seek to ensure that the basic material needs of the poor are met and to provide relatively equal opportunities for all children, the importance of family financial investment in children is reduced. Neither of the other factors relies greatly on the income of families. Although the effect of parental income on any particular outcome is generally small to modest, it is clear that parental income makes a contribution to many aspects of children's well-being. This means that income gains have the potential to make a big difference in the lives of children. Policy makers will need to weigh the potential for gain to child well-being from policies that enhance the income of low-income families against the cost of such policies, including the social cost of any countervailing negative effects on families



The **Christchurch Health and Development Study (CHDS)** is a longitudinal survey of a cohort of children born in hospitals in or near Christchurch, New Zealand, between April and August 1977. The original sample included 1,263 families. Assessments and interviews were conducted at birth, four months and then annually until the most recent survey, which was at age 18. The data include information on family background, home environments, school characteristics and on the cognitive development, educational attainment, health status and other individual attributes of the children.

The **Infant Health and Development Program (IHDP)** is an eight-site clinical randomised trial designed to test the efficacy of family and educational support services among low birth-weight, pre-term infants. Participants were drawn from eight participating medical institutions (in eight states). Eligible children were born in 1985 weighing less than 2,500 grams in any of these medical institutions. Because low birth weight is more common among black and low-income children, the data include an over-sample of such children. Of the original nearly 1,000 children, one-third were assigned to an intervention group and the other two-thirds to a control group. Thus this sample cannot be considered to be representative of all US children. The children were assessed at birth and ages one, two and five years.

The **Panel Study of Income Dynamics (PSID)** is an ongoing longitudinal survey of US households begun in 1968 by the Survey Research Center at the University of Michigan. Originally the PSID was a stratified random sample of 5,000 American families. This sample included 2,900 families chosen to be representative of the non-institutionalised US population in 1968, and an over-sample of 1,900 low-income families with heads under the age of 60. In 1990 2,000 Hispanic families were added to the sample. The PSID follows the children of all the original families once they leave their parents' household. The PSID includes extensive information on family members, including data on education, labour market experience, marriage, fertility, and geographic mobility. It also includes special supplements on topical issues. Several studies of attrition in the PSID have been done. PSID data appear to be representative on major demographic categories except that the PSID has fewer white families and fewer families that report very low incomes. The studies suggest that attrition has not caused the PSID to become seriously unrepresentative of the black and white non-immigrant population of the US.

The **National Longitudinal Survey of Labor Market Experience of Youth (NLSLME)** is an on-going survey of men and women who were aged 14 to 22 in 1979, the first year of the survey. Interviews have been conducted annually since the first survey. The original sample included about 12,000 individuals. Black, Hispanics and low-income individuals were over-sampled. The survey includes extensive information on educational attainment, employment, income, fertility, and family background.

The **National Longitudinal Survey of Youth (NLSY)** and **Children of the National Longitudinal Survey of Youth (CNLSY)**. The National Longitudinal Survey of Youth is a multi-stage stratified random sample of 12,686 individuals aged 14 to 21 in 1979. The sample includes an over-sample of black, Hispanic, and low-income youth. Beginning in 1986 women in the original NLSY sample who had become mothers took part in the mother-child supplement to the NLSY, and their children were subject to cognitive and other assessments. In 1986 3,053 women had 5,236 children. (See Chase-Lansdale et al. 1991 for a description of this data set.) Children who were five to seven years old in 1986 had mothers who were 15 to 23 years old at the time of their birth. Consequently these children were born to rather young mothers. Children who were five to seven years old in 1990 had mothers who were four years older. With each additional cohort the children become more representative of all children. Interviews were completed in 1986, 1988, 1990, and 1992.

The **Ontario Child Health Study and Follow-Up** is a survey of a random sample of children aged four to 16 years in the province of Ontario, Canada. The original survey was conducted in 1983 and a follow-up of sample participants was conducted in 1987. The survey was intended to assess the prevalence of conduct disorder, hyperactivity, emotional disorder and somatisation among children. Children living on Indian reservations, in collective dwellings, and dwellings constructed after 1 June 1981 were excluded from the survey. A total of 1,869 families with 3,294 children were sampled in the 1983 survey. Of these, 72.5 percent participated in the follow-up survey.

Outcome Measures

Following is a description of some of the measures of child outcomes that appear in this report. Those that are not included here are described in the text.

Peabody Individual Achievement Tests (PIATs) are tests of achievement. The PIAT-math is an achievement test of maths skills. It was normed more than 20 years ago. The PIAT-read is a test of reading recognition. It was also normed over 20 years ago to have a mean of 100 and a standard deviation of 15.

The **Peabody Picture Vocabulary Test (PPVT)** is a test of receptive vocabulary. The PPVT was normed on a sample of 4,200 children in 1979 to have a mean of 100 and a standard deviation of 15. The NLSY eliminates scores less than 40. The PPVT was given once to each child at the first interview in which the child was eligible, which was age three.

The **Behavior Problems Index (BPI)** was developed for children aged four to 17. It includes 28 items reported by mothers.

Scores on the above three assessments are usually measured either as percentile scores or standardised scores. Percentile scores are the percent of a sample of test-takers who score below an individual child's score. So if a child's percentile score is 50, half the test-takers scored higher and half scored lower than that child. Standardised scores are derived from a norming sample. In that sample scores are adjusted so that the mean score is 100 and the standard deviation is 15. Any other sample may have a somewhat different mean and standard deviation.

The **Burt Word Reading Test** measures word recognition and reading ability for school-age children.

The **Armed Forces Qualification Test (AFQT)** is a measure of aptitude that is used by the armed forces in the US to determine eligibility for enlistment. The score is derived from several sections of the Armed Services Vocational Aptitude Battery that assess maths, reading and other skills.

Low Birth Weight. Children born weighing less than 2,500 grams are considered to have a low birth weight.

Price Adjustments for US Dollars

Many of the studies estimate the effect of a \$10,000 increase in parental income. In the text of the report, I report findings based on the income measure used in the study because that is the most accurate way to report the results. However, \$10,000 in 1978 does not have the same purchasing power as \$10,000 in 1995. I provide the following price adjustments for various years based on the Consumer Price Index for urban consumers so readers who are inclined can translate results into constant dollars.

Year	Index
1978	65.2
1983	99.6
1990	130.7
1992	140.3
1993	144.5



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