

Investing in Well-being: An Analytical Framework

Veronica Jacobsen, Nicholas Mays,
Ron Crawford, Barbara Annesley,
Paul Christoffel, Grant Johnston
and Sid Durbin

NEW ZEALAND TREASURY
WORKING PAPER 02/23

DECEMBER, 2002



THE TREASURY
Kaitohutohu Kaupapa Rawa

**NZ TREASURY
WORKING PAPER
02/23**

Investing in Well-being: An Analytical Framework

MONTH/YEAR

December, 2002

**CORRESPONDING
AUTHOR**

Veronica Jacobsen
New Zealand Treasury
PO Box 3724
WELLINGTON
New Zealand

Email Veronica.jacobsen@treasury.govt.nz

Telephone +64-4-471-5160

Fax +64-4-472-4942

ACKNOWLEDGEMENTS

We are grateful to the reviewers of the larger report on which this working paper is based: Mary Corcoran, David Fergusson, Richie Poulton and Helen Roberts.

NZ TREASURY

New Zealand Treasury
PO Box 3724
Wellington 6008
NEW ZEALAND

Email information@treasury.govt.nz

Telephone +64-4-472-2733

Website www.treasury.govt.nz

DISCLAIMER

The views expressed in this Working Paper are those of the author(s) and do not necessarily reflect the views of the New Zealand Treasury. The paper is presented not as policy, but with a view to inform and stimulate wider debate.

Abstract

The NZ Treasury is currently engaged in a project to identify cost-effective interventions to improve outcomes for children and young adults in order to maximise the value of government expenditures across the social sector. The central aim of this paper is to provide an empirically-robust framework to compare intervention across a range of social sectors. There are two key components to the framework. The first is a life-course view of child development that emphasises that experiences and influences in childhood can affect well-being throughout life. The second component involves viewing social expenditures as investments addressed at achieving particular outcomes, typically directed at enhancing well-being. The paper presents evidence from a review of the literature on how the process and experiences of childhood have a later impact on well-being; how child development and outcomes are influenced by individual, family and communal factors and how risk and resilience can be used to indicate that an individual is at increased or decreased risk of negative outcomes. Case studies of youth suicide, teenage pregnancy, educational underachievement and youth inactivity provide evidence about what interventions work using key empirical findings from the literature.

J E L C L A S S I F I C A T I O N

J13 - Fertility; Child Care; Children; Youth
I31 - General Welfare; Basic Needs; Quality of Life
H50 - National Government Expenditures and Related Policies –
General

K E Y W O R D S

Well-being; social investment; life-course; child development; child and adult outcomes; portfolio; intervention

Table of Contents

Abstract	i
Table of Contents	ii
List of Tables	iii
List of Figures	iii
1 Introduction	1
2 Poor outcomes in New Zealand: Selected case studies	3
2.1 Youth suicide	3
2.2 Teenage pregnancy	5
2.3 Educational underachievement	6
2.4 Economic inactivity	9
2.5 Ethnic disparities.....	11
3 Child development and well-being	13
3.1 Developmental stages	13
3.2 Models of child development	15
3.3 Risk and resilience.....	17
4 Poor outcomes: Causes and contributors	21
4.1 Individual influences	21
4.2 Family influences	22
4.3 Community influences	27
5 Investing in the social sector	29
5.1 Timing	30
5.2 Success factors	30
5.3 Targeting.....	31
6 What interventions work?: Selected case studies	35
6.1 Youth suicide	35
6.2 Teenage pregnancy.....	39
6.3 Educational underachievement	41
6.4 Economic inactivity	44
7 Conclusion	46
References	49

List of Tables

Table 1 – Births and abortions to women aged under 20 years, by single year of age, 2000.....	6
Table 2 – New Zealand students' performance in TIMSS and TIMSS-R relative to other participating countries	7
Table 3 – School leavers with no qualifications, by ethnicity, by decile of school and by gender, 2000	8
Table 4 – Participation in education, training and work by the CHDS cohort between the ages of 16 and 21.....	11
Table 5 – Examples of adverse outcomes for children and young adults	13
Table 6 – General risk and protective factors	18
Table 7 – Early childhood disadvantage and risk of multiple problems as teenagers.....	32
Table 8 – Summary of preventive options for reducing imprisonment.....	33
Table 9 – The effectiveness of interventions for the prevention of youth suicidal behaviour	38

List of Figures

Figure 1 – Youth suicide rates (ages 15 to 24 years) in OECD countries, both genders combined, latest available years	4
Figure 2 – Youth suicide rates (ages 15 to 24 years), by gender, 1978 to 1998.....	4
Figure 3 – Teenage birth rates in selected countries.....	5
Figure 4 – Unemployment rates for young people by ethnicity, 1996.....	10
Figure 5 – Young people who are not studying and not employed, by age group and gender, 1996.....	10

Investing in Well-being: An Analytical Framework

1 Introduction

In New Zealand, as in other countries, there is increasing concern that the government should maximise the benefits arising from its expenditures. But there is no systematic approach to articulating objectives and spending priorities. Nor is there a systematic approach to identifying the services and other interventions that will achieve these outcomes and evaluating whether they are effective. There is weak link between government objectives and resource allocation decisions and difficulty in stopping doing things that are ineffective. Identifying the outcomes that matter and the cost-effectiveness of interventions can provide information that focuses decision-makers on effective ways to deliver results.

A key issue for governments is the prioritisation of expenditures across the social sector, which accounts for a large proportion of their total spending. Current allocations implicitly reflect judgements about the expected net benefits of expenditures, but with no clear or systematic way of comparing them across different types of intervention. The paper addresses a range of important, but difficult, questions about social policy:

What factors contribute most to negative outcomes for children and young adults, and what factors can protect against these negative outcomes?

Which interventions are most cost-effective?

How should interventions be targeted?

How can interventions be designed to deliver the best results?

The central aim of this paper is to provide a conceptual and analytical framework for identifying interventions that can improve outcomes for children and young adults. Considering how the government might best intervene in the social area requires a consideration of the factors that lead to poor outcomes, both in childhood and adulthood, and a logic that links interventions to improved outcomes. It also requires a means of comparing interventions so that limited resources can be deployed efficiently. Crucial information for such comparisons includes estimates of the cost-effectiveness of interventions. There are thus two components to the framework. The first is a life course approach that examines how childhood experiences and influences affect adult outcomes. The second is a social investment approach that evaluates the cost-effectiveness of interventions intended to improve outcomes.

The analytical approach underpinning this report therefore draws on a broad range of disciplines including sociology, science, medicine, psychology and economics. The starting point is the notion that people seek to improve their well-being and that of their

children.¹ But in fact well-being varies considerably between individuals. Most people do well, and most children grow up to be well-adjusted and productive adults. But some people's lives have poor outcomes – in terms of health, wealth or education, for example – and the roots of these may lie in childhood. The way that childhood and the context in which children are born and grow up affects well-being in adulthood is a core feature of the analysis.

Interventions designed to improve outcomes and to enhance well-being can be considered as social investments that involve current expenditure to produce a future benefit. Viewing interventions, from legislation to targeted assistance, as investments allows the costs to be arrayed against the benefits over time, and permits choices to be made among them. It also allows a portfolio of interventions to be selected.

A vast literature is available related to the core issues of this report. The impracticality of examining all the relevant literature has meant that we have had to be selective, attempting to identify relevant and robust meta-analyses and systematic reviews in the first instance and narrative reviews where these do not appear to be available. The evidence on causal linkages between childhood and adulthood relies on data from longitudinal surveys, which are particularly valuable for helping understand the mechanisms that link developmental factors to later outcomes.²

This paper provides a starting point for identifying ways that the government can intervene to improve well-being. It adopts a social investment approach that links government actions to expected improvements in outcomes.³ Understanding why and how interventions can work requires an appreciation of the developmental pathways of children and adolescents. It is also important to understand how the process and experiences of childhood have a later impact on well-being. Case studies of youth suicide, teenage pregnancy, educational underachievement and youth inactivity provide evidence from the international literature about what interventions work.

Section 2 describes outcomes of significant concern in New Zealand: youth suicide, teenage pregnancy, educational underachievement and youth inactivity. Models that explain how child development can affect later adult outcomes are described in Section 3, while the factors that can lead to poor outcomes for adults and children are described in Section 4. Section 5 outlines a social investment approach to assessing the value of social expenditures. Evidence from the literature about what interventions work to address selected outcomes is presented in Section 6. Section 7 summarises the findings from the empirical literature and presents conclusions about effective interventions.

¹ The nature of well-being is not defined. Rather, interventions that are intended to prevent or ameliorate adverse outcomes can be viewed as improving well-being. The precise way in which well-being is improved depends on the nature of the outcome being addressed.

² New Zealand has two mature birth cohort studies, with an explicit focus on child development, but which are now providing data on early adult outcomes. They provide a valuable means by which to check the applicability of international findings to New Zealand. The Christchurch Health and Development Study (CHDS) follows a cohort of approximately 1000 children born in Christchurch area hospitals between April and August 1977. The Dunedin Multidisciplinary Health and Development Study (DMHDS) follows a cohort of just over 1,000 children born in Dunedin over a period of a year between April 1972 and March 1973. Both studies contain a rich set of data on the children's health and development, including academic progress, and on family characteristics over time, and a large body of research has been published in a variety of disciplines, using data from them.

³ Some interventions, including regulation, may be purely redistributive, serving the interests of particular groups at the expense of others, as explained by public choice theory. See Wilkinson (2001) for a summary of the economic theories of regulation.

2 Poor outcomes in New Zealand: Selected case studies

New Zealand has a young population compared with other OECD countries. Almost a quarter of the population is under 15 years of age, though this proportion is projected to decline steadily over the next fifty years. In many respects, the well-being of the child population has continued to improve in recent years (eg, infant mortality rates have halved since 1980). On the other hand, specific aspects of New Zealand children's and young people's well-being may be a cause for concern both in themselves and for what they indicate about later life outcomes.

Youth suicide, low educational attainment, youth inactivity and teenage pregnancy are areas in which New Zealand performs notably less well than other comparable countries, where there are seemingly important implications for overall social well-being (ie, problems affecting either a large number of people or a smaller number intensely or generating costs for society) and which appear to be amenable, at least in part, to public policy intervention.

While the information presented in this paper provides an indication of some areas of concern about adverse outcomes in New Zealand, it does not provide a thorough indication of the extent of the problem or who is most affected. A crucial step for the design of policy is an assessment of the size and distribution of all the direct and indirect costs of any problem. This will provide an initial assessment, at least of the scope for improvements in outcomes that could be achieved with effective interventions.

Some child outcomes in New Zealand are the subject of intense concern, but it is not clear, despite appearances, whether this country faces any more of a problem in general terms than other comparable countries in ensuring that its children can grow up into competent, happy, productive adults.

Other features of the family and household circumstances (such as lone parenthood) of New Zealand children are distinctive and potentially problematic, but the extent to which they should be priorities in themselves for policy action is more debatable.

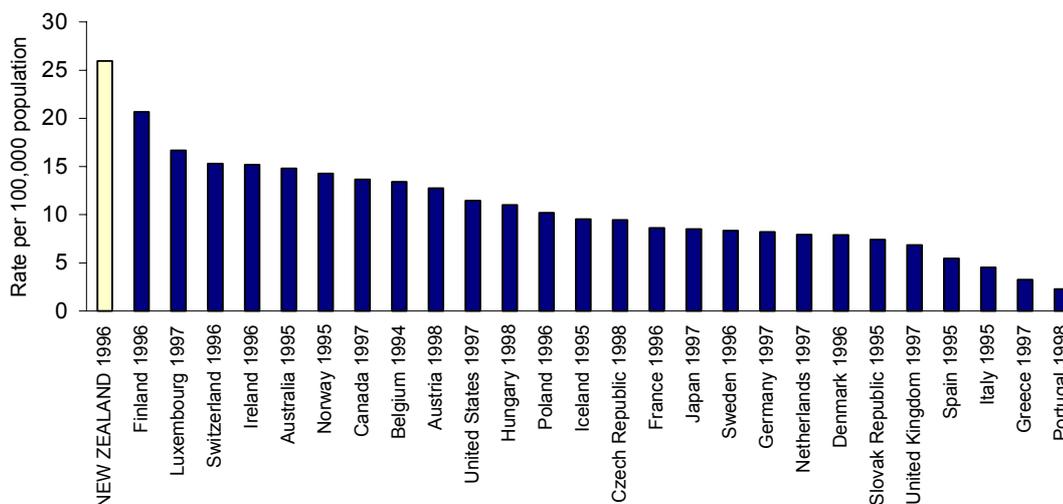
2.1 Youth suicide

New Zealand has the highest rate of youth (15 to 24 years) suicide in the OECD, with higher rates among Maori than non-Maori (Figure 1).⁴⁵ Youth suicide rates have risen, especially for males, over the last two decades (Figure 2). Youth suicide is a serious negative indicator of young people's well-being worthy of attention in its own right, although the number of deaths involved is small as a percentage of the number of young people.

⁴ There may however be some differences between countries in the accuracy and completeness of recording deaths as suicides, depending for example on social, religious and legal attitudes to suicide.

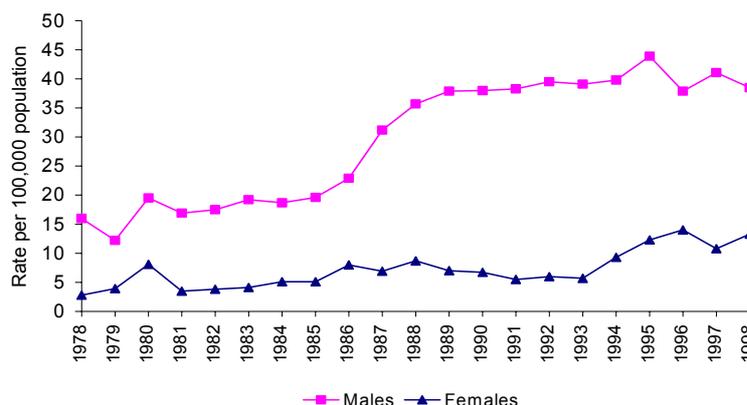
⁵ Maori are defined as individuals who have Maori ancestry and who identify themselves as Maori.

Figure 1 – Youth suicide rates (ages 15 to 24 years) in OECD countries, both genders combined, latest available years



Source: Calculated from information in World Health Organisation (2001)

Figure 2 – Youth suicide rates (ages 15 to 24 years), by gender, 1978 to 1998



Source: New Zealand Health Information Service (2001).

The main causes of death for children and young adults are accidents – particularly motor vehicle accidents – and suicides. Suicides are responsible for a third of deaths of young people. The most common method of suicide was hanging, which accounted for over half of youth suicides in 1998.

Suicides are uncommon during school-age years. The number of suicides rises during the teenage years reaching a sharp peak at age 20 for males, followed by a steady decline over the life course. Female suicides rise to a local maximum at around 19 years but do not markedly decline until much later in life (New Zealand Health Information Service 2001).

In most industrialised countries, the risk of suicide increases with age, but this is not the case in New Zealand (Skegg 1997). At the time Pritchard (1992) studied youth suicide in New Zealand and Australia, these countries were unique in having youth suicide rates higher than all-age suicide rates.

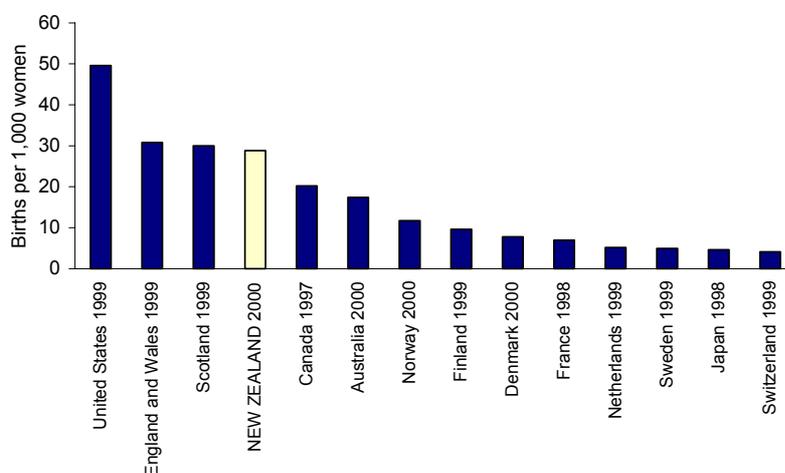
A total of 7.5% of participants in the CHDS had attempted suicide by the time they reached 21, and more than a quarter had had suicidal thoughts (Fergusson, Horwood and Woodward 2000). Mental health disorders, especially depression, were the most important predictors of suicide attempts. Adverse life events, and being raised in a family with low socio-economic status, were also associated with increased rates of suicide attempts, even when other confounding and intervening factors were taken into account (Fergusson *et al* 2000).

Suggested explanations for rising youth suicide rates in industrialised countries have included a higher prevalence of depression in recent generations of young people, increased use and misuse of alcohol and psychoactive drugs, changes in family structure, and changing circumstances in society as a whole. There are no clear explanations for New Zealand's very high youth suicide rates, but psychological aspects of New Zealand youth such as risk-taking and help-seeking behaviour may need to be explored (Skegg 1997).

2.2 Teenage pregnancy

The teenage birth rate in New Zealand is relatively high by OECD standards, though lower than in Britain and the USA (Figure 3). Maori and Pacific Island young women are much more likely to become pregnant than other ethnic groups.⁶ The teenage pregnancy rate appears to have risen since 1984.

Figure 3 – Teenage birth rates in selected countries



Source: Statistics New Zealand (2001).

The teenage birth rate in New Zealand has been relatively stable since the early 1980s, after a steady decline from a peak in 1972 (Table 1). In 2000, the teenage birth rate was 29 births per 1,000 young women.⁷ The Maori teenage birth rate has been between around two-and-a-half times higher than the overall teenage birth rate and in 2000 was 69 births per 1,000 young women. Maori women have a higher total birth rate (taken across all ages), and higher age-specific birth rates up to age 30.

⁶ Pacific Island people are those who have ancestors from Pacific islands (excluding New Zealand) and identify themselves as Pacific Islanders.

⁷ Teen fertility is calculated from the number of births to women aged 15 to 19.

Table 1 – Births and abortions to women aged under 20 years, by single year of age, 2000

Age	Live births No	Live babies No	Still births No	Abortions No
12	1	1		3
13	6	6		10
14	23	24		60
15	120	120	1	188
16	334	335	1	438
17	680	689	6	629
18	1,162	1,172	4	839
19	1,456	1,471	10	1,013
Total	3,782	3,818	22	3,180

Source: Statistics New Zealand (2001).

The teenage pregnancy rate, as opposed to the teenage birth rate, has been rising since 1984 and in 2000, was estimated as 60 pregnancies per 1,000 young women (Dickson, Rimene and Paul 2000).⁸ Maori teenagers are nearly three times more likely than European teenagers to become pregnant and Pacific Island teenagers are 2.4 times more likely (Dickson *et al* 2000). It is unclear whether the increase in estimated teenage pregnancy rates, and the difference between ethnic groups, is due to more sexual activity, or less use of effective contraception. A number of New Zealand studies have shown that a significant proportion of high school students do not use contraception at all, or not on all occasions of sexual intercourse. It is likely that 30% to 40% of first sexual experiences do not involve any form of contraception (Hodges, Maskill, Coulson, Christie and Quigley 1998). A total of 29% of the young women in the CHDS reported having unprotected consensual intercourse on at least one occasion by the age of 18 (Fergusson, Horwood and Lynskey 1997).

At age 16, a quarter of the Christchurch cohort and 30% of the Dunedin cohort reported having had sex and 16% of young people in the DMHDS (Dickson, Paul, Herbison and Silva 1998, Lynskey and Fergusson 1993). In the CHDS, Maori and Pacific teenagers, and those from disadvantaged families, were more likely to have had sexual intercourse at a younger age than the rest of the cohort (Lynskey and Fergusson 1993). By age 21, over a quarter of the women in the CHDS had been pregnant at least once, and 14% had become parents. A range of factors was associated with an increased risk of early pregnancy, specifically conduct disorders in early adolescence, poor school achievement, family adversity, early onset sexual intercourse and Maori ethnicity (Fergusson, Horwood and Woodward 2001). Daughters of young lone mothers were themselves at high risk of going on to be young mothers.

2.3 Educational underachievement

Participation rates in education from early childhood through to post-compulsory schooling are high in New Zealand. The main issues are the proportion of each age group that leaves school without a qualification and the proportion of poor achievers on standard numeracy and literacy assessments by international standards. International studies show that the average knowledge and skills of New Zealand secondary school pupils are

⁸ The sum of the number of births and abortions, and an estimate of early miscarriages.

relatively high and that the best performing groups rival any in the world, but that there is a long “tail” of low achievers.

The National Education Monitoring Project (NEMP) indicates that girls outperformed boys on a substantial percentage of tasks, particularly in writing and reading; Maori students performed less well than non-Maori students in most curriculum areas, the exception being physical education; and with exceptions in physical education and art, students in low decile schools performed poorly (Flockton and Crooks 1999). Data from the CHDS cohort shows that females achieved, on average, better educational outcomes than males, with males more prone to disruptive, inattentive or distracting classroom behaviours that impede learning (Fergusson and Horwood 1997).

The Third International Mathematics and Science Study (TIMSS) in 1994/95 and a subsequent follow-up (TIMSS-R) showed a broad range of achievement across participating countries. The performance of New Zealand students was generally average or above average (Table 2).⁹

Table 2 – New Zealand students’ performance in TIMSS and TIMSS-R relative to other participating countries

Year group sampled	No of countries sampled	NZ science achievement (rank)	NZ mathematics achievement (rank)
TIMSS (1994/95)			
Standards 2 and 3	26	average (16)	below average (20)
Forms 2 and 3	41	above average (21)	average (24)
Forms 6 and 7	21	above average (6)	above average (9)
TIMSS-R (1999)			
Form 3	38	above average (19)	average (21)

Notes: Differences from the international average reported in this table are statistically significant.
Sources: Martin (1997), Mullis (1997), Beaton (1997a), Beaton (1997b), Mullis (1998), Martin (2000) and Mullis (2000)

Within New Zealand, TIMSS showed no significant differences in mathematics or science achievement between primary-school-aged girls and boys (Martin *et al* 1997, Mullis *et al* 1997). In Forms 2 and 3, however, boys scored significantly more highly in science achievement (Beaton *et al* 1997a).¹⁰ In the last year of school, boys scored more highly in both science and mathematics literacy (Mullis *et al* 1998). In the primary school and early secondary school studies, European and Asian students tested in TIMSS had higher scores in both mathematics and science than students of Maori or Pacific Island ethnicity (Statistics New Zealand 1999).

The OECD PISA study of 15-year-old students’ performance in reading literacy, mathematical literacy and scientific literacy confirmed those from TIMSS in indicating that the knowledge and skills of New Zealand secondary school students is, on average, relatively high by international standards (OECD 2001b).

However, while New Zealand had high *mean* scores in each of the domains of literacy, it had a wide *distribution* of scores. New Zealand had the second greatest variation in

⁹ New Zealand’s performance relative to the international average has been reported in different ways, depending on which countries are chosen for comparison, eg, the OECD countries which took part, countries which took part in both TIMSS and TIMSS-R, or countries which took part at all the grade levels. This paper takes the widest scope and reports New Zealand’s performance relative to all the countries which took part in each grade level of each study.

¹⁰ While boys also scored more highly in TIMSS-R, this was not found to be statistically significant Martin (2000).

reading literacy, and the sixth greatest in scientific literacy and mathematical literacy.¹¹ In New Zealand, more than in any other country, the variation in performance was within individual schools rather than between schools. The lowest quartile of students in New Zealand still did relatively well by international standards, but the disparities in test scores indicate a degree of underachievement by some groups of students. Within New Zealand, girls had a higher average reading literacy score than boys, but average scores for scientific and mathematical literacy were similar (OECD 2001a).

Just over 10,000 students – 18.7% of those who left school in 2000 – left with no qualifications.¹² This proportion has remained reasonably constant over the past decade (Ministry of Education 2002b). In addition, 3,200 students were granted exemptions to leave school before turning 16 years old, and almost all of these students were likely to have left with no qualifications (therefore making up around 30% of school leavers with no qualifications).

Males were much more likely than females to have left school with no qualifications. Maori and Pacific students were also over-represented amongst school leavers with no qualifications. Students from schools in the highest socio-economic decile were least likely to leave with no qualifications (Table 3).¹³

Table 3 – School leavers with no qualifications, by ethnicity, by decile of school and by gender, 2000

	Number	% of all school leavers
European	5,348	14.5
Maori	3,381	35.5
Pacific Islands	925	26.2
Asian	399	9.6
Other	209	23.5
Deciles 1-3	2,966	29.3
Deciles 4-7	5,095	20.4
Deciles 8-10	1,597	8.5
Decile not available	604	56.4
Males	5,812	20.7
Females	4,450	16.6
Total	10,262	18.7

Source: Ministry of Education (2002a).

Members of the CHDS cohort who left school with no formal qualifications were found to be at increased risk of a number of poor outcomes at age 21. After adjustment for confounding social, family and individual factors, there remained significant associations between leaving school with no qualifications and nicotine dependence, receiving a benefit, and having no training or education after leaving school. Apparent associations between leaving school with no qualifications and juvenile offending and substance abuse

¹¹ Variation was calculated as the square of the standard deviation of test scores.

¹² “No qualifications” means that a student has no formal qualifications or less than 12 National Certificate credits Level 1.

¹³ Schools are sorted into deciles, based on the socio-economic status of the communities from which they draw their students. Decile 1 contains the schools drawing from communities with the lowest socio-economic status. These gradings are used in determining school funding.

were explained by covariates such as deviant peer affiliations at an earlier age (Fergusson, Swain-Campbell and Horwood, in press).

2.4 Economic inactivity

The ten years following the completion of compulsory schooling are a time when divergent paths of human capital accumulation through education, training and labour market experience lead to big differences in long term adult outcomes. By the time they reach school leaving age, a sizeable proportion of young people are unable or unwilling to access opportunities for further education and training, or labour market experience. For instance, data from the CHDS suggests that around 14% of young people accumulate barely more than a half-year in education, training or work over the five years between age 16 and 21.

While access to education and employment is limited by prior educational achievement, these years represent a further opportunity to redress developmental deficits that are likely to have adverse effects on the life-course. Evidence suggests that in New Zealand educational enrolment rates over the years 16 to 18 are quite low, for instance by comparison with Australia (Treasury 2001a).

In 2001, just over half of 15- to 19-year-olds, and almost three-quarters of 20- to 24-year-olds were in the labour force that is, they were either employed (full-time or part-time), or unemployed and actively seeking work. The 1996 Census showed that labour force participation amongst young people increased steadily with each year of age from 15 to 24 years (Statistics New Zealand 1998).

Beginning at around age 17, women have lower participation rates than men, and the difference in their participation rates grows with age (Statistics New Zealand 1998). In the main, this reflects the growing impact of childbirth and childcare on women's labour force participation. Young Maori and Pacific Island people have much lower rates of participation in the labour force than young Europeans (Statistics New Zealand 1998).

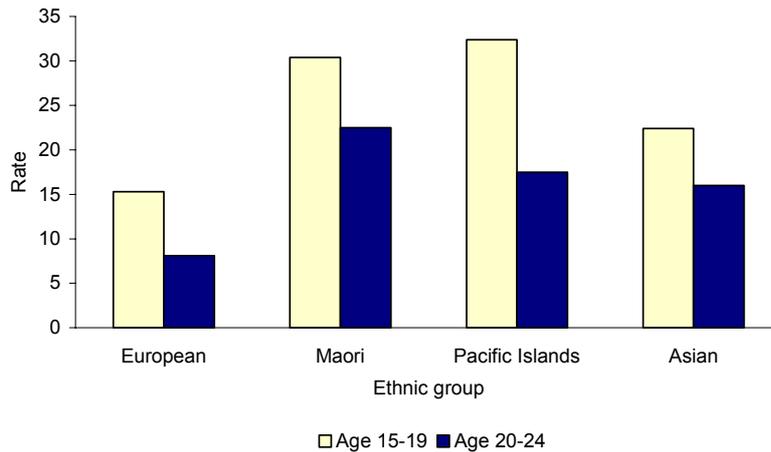
The labour force participation of young people has in general declined since 1987, in part reflecting increased retention in secondary school and greater participation in tertiary education. Within this general decline there has also been a change in the nature of employment of young people, with marked growth in part-time employment and an accompanying decline in full-time employment (Statistics New Zealand 1998). Women are more likely to work part-time than men.

The unemployment rate of 15- to 19-year-olds is very high in New Zealand compared to other OECD countries and much higher than for those aged over 25 years (Curtain 2001, OECD 2000, Statistics New Zealand 1998).¹⁴ This is likely to reflect the lack of education, work experience and, therefore, employability of young people who leave school at a relatively young age. Unemployment rates have fluctuated depending on economic conditions, reaching a peak for young people in the early 1990s.

¹⁴ The official unemployment rate only measures those people out of work who are actively searching for a job (ie, more than just looking in the newspaper). Other young people who consider themselves unemployed may be searching less diligently, or be resigned to not finding a job, at least in the short term (and would therefore be officially classed as being out of the labour force). Twice the number of people who are officially unemployed are registered as jobseekers with the Department of Work and Income.

Maori and Pacific Island young people experience high rates of unemployment compared to Europeans (Figure 4). Maori and Pacific people are much more likely to leave secondary school with no qualifications, or with poor qualifications. A lack of qualifications is itself highly associated with lack of employment. Of 20- to 24-year-olds in 1996, just over 80% of those with a degree were employed while the corresponding figure for those with no qualification was 52% (Statistics New Zealand 1998). However, for most young people, unemployment is relatively short-term, although it may recur.

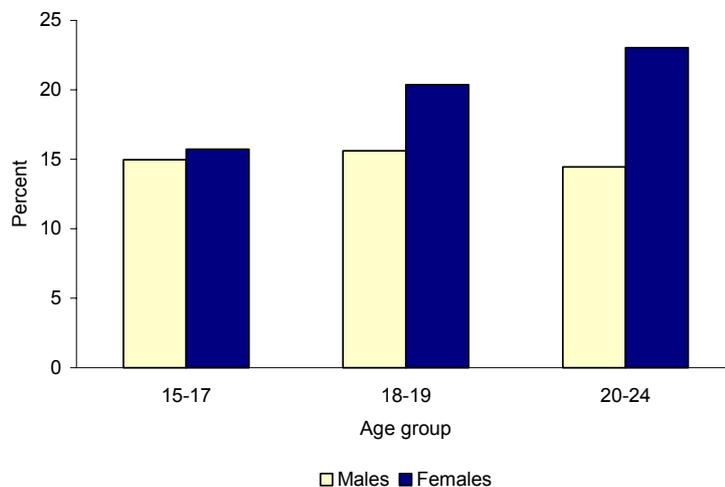
Figure 4 – Unemployment rates for young people by ethnicity, 1996



Source: Statistics New Zealand (1998).

Some young people may be neither economically active (employed full or part time) nor engaged in education and training. Figures from the 1996 census, show that 15% of 15-17 year olds, 18% of 18-19 year olds and 19% of 20-24 year olds were economically inactive (Figure 5). In each age group, around 15% of young men were inactive. The greater inactivity of women is likely to reflect their responsibilities in looking after children at home (Statistics New Zealand 1997).

Figure 5 – Young people who are not studying and not employed, by age group and gender, 1996



Source: Statistics New Zealand (1997).

The CHDS also provides information on the periods of education and training, and the periods of inactivity, that young people face (Table 4). A sizeable part of the CHDS cohort – 14% – spent an average of 3.4 years inactive between the ages of 16 and 21. Part of this group is likely to be young people characterised by multiple disadvantage.

Table 4 – Participation in education, training and work by the CHDS cohort between the ages of 16 and 21

Years of education, training or work between ages 16 and 21	Percentage of the cohort	Mean years of education and training	Mean years of economic inactivity
Less than 3 years	13.8	0.59	3.4
3 to 4.33 years	33.2	1.88	1.2
4.33 to 5 years	32.2	2.86	0.35
5 years	20.7	3.57	0

Source: Tim Maloney pers.comm.

2.5 Ethnic disparities

Some ethnic disparities are evidenced not only in the case studies outlined above, but also in other areas of well-being. Demographic and socio-economic factors underlie some of these disparities between Maori and other population groups. Maori children are far more likely than other children in New Zealand to: live in a lone-parent family; live in a household in the lowest income quintile; be born to a young mother who smokes and become smokers themselves; not be breast fed; not be immunised; have no parent in paid work; be assessed as having suffered physical or sexual abuse or neglect; die in infancy; commit suicide before 24 years of age; have a mental health problem at age 18; have a dependence on cannabis; be prosecuted for a criminal offence; leave school at 16 years; truant and be suspended from school; leave school with no qualifications; have lower literacy and numeracy skills; and not go to university. There are many similarities between Maori and Pacific Island children’s circumstances and outcomes. The causal relationships between these phenomena are complex.

Some, but not all, of these disparities are accounted for by demographic and socio-economic differences between Maori, Pacific Island and other families rather than by features intrinsic to ethnicity. For instance, Maori and Pacific Island children were more likely to live with a lone parent who was not in paid work at the 1996 Census partly because these children were, on average, younger than the rest of the child population and lone parents are more likely to work as their children get older. Similarly, Maori and Pacific Island children were more likely to be in the lowest income quintile partly because their parents tended to be younger than other parents and people’s incomes generally rise with their age, and partly because they were more likely to live in lone parent families that have much lower average incomes than the rest of the population.

Once factors associated with ethnicity that are particularly important for later outcomes, such as education and skills, are taken into account, the relationship between Maori and Pacific ethnicity and poor outcomes is much reduced, though it does not disappear, suggesting that the direct effect of ethnicity is far less than the raw correlations would suggest.

This, in turn, raises the question of why poorer educational attainment and low skills are disproportionately concentrated in the Maori and Pacific Island population, given their

importance for later outcomes and destinations. A wide range of explanations has been advanced.

From an historical perspective, the position of Maori as an indigenous people in a country subject to European colonisation is potentially relevant. Immigrant settlement has involved a substantial impact on Maori social and political organisation, demography and economic life. While undoubtedly much of this impact has been negative (as reflected in processes established to redress historic Treaty of Waitangi grievances) for better or for worse it has set indigenous and immigrant peoples on substantially and increasingly shared processes of development, but from very different starting points. The last 50 years have seen a substantial (though uneven and incomplete) convergence between Maori and non-Maori on a range of outcomes commonly used to measure development (including educational attainment and income) (Treasury 2001b).

A different starting point for recent migrants from the Pacific is also part of the explanation. International evidence points to a slow process (a century long in the case of some groups in the US) of convergence in social and economic outcomes between immigrants from less developed countries and the native population of the host country (Treasury 2001b).

The question therefore is not so much why disparities have existed in the past, but rather why they are so persistent. One possible explanation is discriminatory behaviour in the provision of services, and in access to economic opportunities, particularly in the provision of credit and employment. However, the fact that income disparities between Maori and non-Maori diminish as educational qualifications rise suggests that if discrimination in the labour market is important, it is likely to be operating more amongst the low skilled (Treasury 2001b). Other explanations for persisting disparities relate to cultural differences in values and aspirations, and to culturally inappropriate design of goods and services.

Even without discrimination, models of the inter-generational transmission of inequality suggest that disparities will be persistent (Lundberg and Startz 1998). Children's outcomes in one generation depend on the success of their parents in the previous (Borjas 1992). In addition they also depend on the resources (such as schools and social and economic networks) available in their communities to assist with providing them with the skills and capabilities to be successful. On both these counts, Maori and Pacific children are, on average, disadvantaged relative to the rest of the population (Chapple 2000, Howden-Chapman and Tobias 2000, Maani 2000b). Because of this, even without active barriers to current achievement, reduction in disparities is likely to be a slow process.

3 Child development and well-being

It is important to have a broad idea of the main causal factors implicated in good and bad outcomes over time in order to be able to design policies and specific interventions which stand a reasonable chance of influencing outcomes positively. A development approach to intervention design involves understanding the stages of child development, what underlies behaviour at each stage and creating age-appropriate interventions.

A number of developmental models try to explain how the way that children develop affects their well-being later in life. An understanding of how children develop is important in identifying how and why individuals differ in terms of well-being and in developing effective interventions. Yet causal pathways are complex and often not well-understood, so that it can be difficult both to identify the causes of adverse outcomes and to devise interventions that address underlying causes. A pragmatic approach to interventions involves identifying those factors that increase or decrease the risk of poor outcomes later in life. This section explores the way child development can affect later well-being and reviews how risk and resilience can be used to identify individuals at risk of adverse outcomes and to target interventions.

3.1 Developmental stages

A developmental or life course approach focuses on the impact of early experiences in childhood on later life and the following generation. It recognises that improving the well-being of children not only helps them immediately, but can also assist them to attain better outcomes later on. A number of adverse outcomes for children and young people have particular importance for later outcomes in adulthood (see Table 5).

Table 5 – Examples of adverse outcomes for children and young adults

Outcomes	Infancy and early childhood 0 to 7 years	Childhood 7 to 16 years	Young adulthood 16 to 25 years
Educational, developmental and employment	<ul style="list-style-type: none"> • Failure to meet developmental milestones • Limited or no engagement in early childhood education • Lack of school readiness 	<ul style="list-style-type: none"> • Poor literacy/numeracy • Truancy and exclusion • Early school leaving • Poor academic achievement/educational under-attainment 	<ul style="list-style-type: none"> • Few or no recognised educational or trade qualifications • Extended or repeat periods of unemployment or economic inactivity
Social	<ul style="list-style-type: none"> • Disruptive, aggressive and attention seeking behaviour • Emotional and behavioural difficulties 	<ul style="list-style-type: none"> • Delinquency and antisocial behaviour • Emotional and behavioural difficulties 	<ul style="list-style-type: none"> • Early and unprotected sex (resulting in STDs, teenage pregnancy) • Criminal offending/imprisonment • Antisocial and anti-civic behaviour • Poor parenting practices
Physical and mental health	<ul style="list-style-type: none"> • Low birth weight • Preventable abnormalities at birth (due to maternal health) • Subject to abuse and neglect • Serious or chronic 	<ul style="list-style-type: none"> • Subject to abuse and neglect • Serious accidents and non-accidental injury • Alcohol and substance abuse • Mental health 	<ul style="list-style-type: none"> • Preventable accidents leading to death/incapacitation • Serious or chronic preventable illness • Alcohol and substance abuse

Outcomes	Infancy and early childhood 0 to 7 years	Childhood 7 to 16 years	Young adulthood 16 to 25 years
	preventable illness <ul style="list-style-type: none"> • Serious accidents and non-accidental injury • Infant mortality 	disorders/depression	<ul style="list-style-type: none"> • Mental health disorders, suicide and self-harm

Different negative outcomes become apparent at different ages, as the child develops, although they are usually strongly influenced by prior experiences. Interventions to remedy causes of specific adverse outcomes should target behaviours and influences that occur at particular ages. For example, interventions designed to counter negative peer influences are ineffective before adolescence (US Surgeon General 2001).

Recent biological and medical research on brain development and antenatal health confirms the importance of the early years for future outcomes (Tremblay 1999). Cognition, language, literacy, emotional regulation, curiosity, the ability to care for others, creativity, motor skills and so on all derive from the early interaction between a child’s experience, particularly of nurturing and stimulation, and its developing brain (Zuckerman and Kahn 2000). An early history of responsive care-taking and secure relationships with parents reduces the individual’s vulnerability to subsequent environmental threats. Early negative events can cause physiological changes with lasting consequences due to sensitive periods in development when particular skills and abilities are acquired. Adverse health outcomes in infancy and early life (such as low birth weight or developmental delay) are also risk factors for later ill-health (Currie and Hyson 1999). While early childhood is important for human development, subsequent experiences are also important for adult outcomes.

During middle childhood (ages 5 to 11) children move from home into wider social contexts. At the same time they begin to reason and develop key thinking and conceptual skills and self-awareness. The transition to school plays a critical role in the incubation of pre-existing risk and protective factors in the child, as well as in the development of new ones (Huffman, Mehlinger, Kerivan, Cavanaugh, Lippitt and Moyo 2000b). Children’s competency at school depends on having basic neuro-developmental functions, social skills and emotion regulation capacities. Thus, “school-readiness” (involving the establishment of early literacy foundations, an internal locus of control, self-regulation of one’s own attention, emotions and behaviour, and appropriate social behaviour) is important for enabling a smooth transition into, and success at, school.

The transitions from childhood to adolescence and adulthood are difficult to navigate (CSR Incorporated 1997). Adolescence involves significant biological changes, educational transitions, and psychological shifts that accompany the emergence of sexuality. Most teenagers have newly-granted independence and a desire to test limits, yet they lack information and decision-making skills. Key spheres of influence change as teenagers spend much more unsupervised time with peers and less time interacting with parents. Even more important is the effect of peers on the decisions of young people. Susceptibility to peer influences is highest at around 14 years, and then declines. Adults outside the family, such as teachers, also play an increasingly significant role in young people’s lives. Adolescent cognition transforms from concrete to formal-logical thought that has implications for almost all areas of functioning, including problem-solving, negotiation, performance in academic tests, establishment of identity, and relationships with parents (CSR Incorporated 1997).

While late adolescence and early adulthood are not characterised by the physical changes of childhood and early adolescence, they involve continuing, more subtle, cognitive and social development. For example, young drivers are at greater risk of accidents in part because they still do not have fully developed perceptual and cognitive skills (eg, young drivers are slower to detect hazards while driving and over-estimate their driving skills).

Most individuals seem to engage temporarily in some antisocial or risky behaviour in the transition to adulthood (Fischhoff 1992). Risky and antisocial behaviours may be seen as a means of attaining adult status (Moffitt 1993). Or it may be that the neurological, hormonal, and cognitive characteristics of adolescence foster both sensation-seeking behaviours and a reduced perception of potential negative consequences of actions, resulting in a temporary increase in risk-taking behaviours (Arnett 1992). Young people also have volatile moods that they find hard to control and which may allow transient emotions to resolve uncertain situations.

Regardless of the causal explanations, a certain amount of experimentation with risky behaviours may be an essential component healthy adolescent experience and development. However, a key issue is to differentiate between temporary, normal antisocial behaviours, and those that may result in a pattern of maladaptive functioning continuing into adulthood (CSR Incorporated 1997, Gruber 2000).

3.2 Models of child development

All approaches to child development emphasise that there are particularly sensitive periods before birth, in childhood and in adolescence when optimal developmental changes occur, but that change is not confined to these periods. Children who “miss out” at important times can “catch up”, but this becomes progressively more difficult to accomplish with age. Failure to provide a supportive environment for child development can generate very large costs in later life for government and society as a whole. All approaches emphasise that development over time is influenced, but not wholly determined, by what has gone before. The outcomes of development at one life-stage are likely to lead to similar outcomes at later stages in the absence of specific interventions to alter trajectories.

These insights underline the importance of trying to give children a good start in life, particularly those who are statistically “at-risk” of poor outcomes. However, early life cannot be an exclusive focus for policy since not all people who do badly in adulthood exhibit risk factors at earlier stages and not all who do well enjoy favourable circumstances in childhood.

There is no single, relatively simple, robust account of the main determinants of adult outcomes. Much of the variation in outcomes remains unexplained. There are a number of approaches to understanding the potential range of factors implicated in child and later adult well-being. They attempt, first, to document the universal principles underlying the development of all children and, secondly, to explain individual differences between children, why good outcomes and bad outcomes tend to coincide in the same people and why some children appear to do well despite the odds.

The most widely accepted, transactional, theory of child development focuses on the interplay between the characteristics of the individual child and the influences of its environment to explain physical, social and cognitive development (Chase-Lansdale 1998). For example, the stress of socio-economic problems such as poverty may limit the

ability of many parents to act as effectively as they might. However, the precise causal links, as opposed to correlations, between poverty and children's outcomes are likely to be complex since unmeasured variables leading both to poverty and children's outcomes cannot be ruled out (Mayer 1997).

Transactional theory has been increasingly influenced in recent years by behavioural genetics, neuropsychology and psychophysiology because of increasing evidence of the importance of genetic influences and biological factors in child development. The interaction between genetic characteristics and environmental experiences may help explain why some children do well despite a seemingly negative upbringing and *vice versa*.

Developmental theory supports three general principles of child development (Chase-Lansdale 1998). First, the past is a good predictor of the future, since large changes are limited by what has gone before, although change is possible at every point in development up to and into adulthood. Secondly, there are especially sensitive periods in the developmental trajectory when certain changes occur. This does not mean that change is impossible later, but that it is not as easy as putting in place a secure base in early childhood. Finally, change can occur throughout life, but there is more evidence for malleability in the early years than in later periods.

There is considerable variation in outcomes among individuals. There are also consistent cross-sectional associations between the socio-economic status of individuals and a wide range of developmental outcomes such as physical and mental health, behavioural adjustment, coping skills and educational attainment (Keating and Hertzman 1999).

There are a number of ways that outcomes can be affected. Latent effects are those causal factors that have a lifelong impact on well-being, independent of intervening experience (although the intervening experiences may have the effect of magnifying or diminishing the impact of latent effects). Pathway effects are those causal factors that shape subsequent life trajectories. A third set of influences is cumulative. The effect on outcomes is due to the accumulation of advantage or disadvantage over time based on the duration and intensity of exposure to a range of risk and protective factors. In practice, it can be difficult to disentangle the latent, pathway and cumulative effects shaping adult outcomes.

The notion of latent effects reflects the findings of developmental psychology that there are particularly sensitive periods before birth, in childhood and in adolescence when optimal developmental changes occur, but that change is not confined to these periods (Zuckerman and Kahn 2000). Opportunities to develop particular competencies occur at unique times in early life, and are socially patterned. Developing these competencies has life-long effects on well-being, regardless of intervening experience.

Brain science suggests that brains are changed by early experiences in ways that are difficult to reverse later (McCain and Mustard 1999). Experiences of nurture, stimulation, and support, and opportunities for exploration of the immediate environment, shape the brain positively and enduringly in early life. However, the use of modern brain science to draw conclusions about critical periods in human development with crucial implications for later outcomes remains debated (Bruer 1998, Mustard 2000). Adding weight to latency theory is research linking foetal and infant conditions, such as malnutrition, with adult physical health (Barker 1992, Marmot and Wadsworth 1997).

Although some adverse experiences are biologically encoded such that they are virtually irreversible, there is sufficient evidence of flexibility to indicate that not all biological

embedding is deterministic. For example, not all children who experience nutritional deficits *in utero* have poor outcomes in later life. However, the evidence suggests that the negative effects of adverse experiences in early childhood are harder to overcome later in development, underlining the importance of giving children a good start in life.

Under the pathways model, risks of poor outcomes accumulate over time, rather than being significant from the outset as in the latency model. Such a pathway may begin with infant stress leading to lack of school readiness, leading to behavioural problems at school, leading to school failure, leading to poor mental health in adulthood. While the effect is cumulative, intervention at any time can influence the life course, albeit less effectively in later life because of the limiting effects of previous latent factors.

It is important for policy development and intervention design to have some idea of whether latent and pathway effects on development are complementary or mutually exclusive. If both sets of factors are important, one may be more important than the other in influencing adult outcomes and at which points in the life cycle. However, even with longitudinal data it is difficult to distinguish latent and pathway effects. Overall, the insights from the latent and pathways models indicate that intervention and prevention strategies aimed at improving childhood and subsequent adult outcomes stand a greater chance of success if they are aimed at core developmental processes (eg, language acquisition) and occur at important transition points in children's development (eg, diverting children from problematic pathways by intervening before entry to school). It is also important to improve early experience since this conditions neurophysiological development which has long term effects (Keating and Hertzman 1999).

3.3 Risk and resilience

Precise pathways or causal sequences explored in developmental models may have little relevance to the practical choice of intervention since they are so complex that they may not offer much policy guidance on where and how to invest in relation to specific outcomes. The difficulties of determining causation have led to the use of a pragmatic risk and protective factor approach to intervention (see for example US Surgeon General, 2001). This approach is used to identify the factors that indicate that an individual is at increased risk of negative outcomes, and those that are likely to lead to a decreased risk of such an outcome. A caveat in using this approach is that while such factors may be correlated with particular outcomes, they are not necessarily causal, and may simply act as markers. For example, while having a teenage mother may be a risk factor for a number of poor outcomes for children, early motherhood *per se* is not necessarily the underlying cause of subsequent problems, as discussed below. Risk and protective factors differ for particular outcomes, although common themes emerge.

Risk factors are characteristics of a group of people that are associated with an elevated probability of undesired outcomes (Masten 1994). In contrast, a protective factor decreases the likelihood that a risk factor will be associated with a harmful effect. Risk is a statistical concept and actual outcomes for people who are in a risk group, or exposed to risk, will vary. According to (Huffman, Mehlinger and Kerivan 2000a, p 5):

Risk factors will predict problematic outcomes, but may or may not be causally related to the onset or maintenance of problems ... to show a characteristic as a risk factor requires a demonstration that the risk factor temporally precedes the adverse outcome and is correlated with it. A characteristic that cannot be shown to precede the outcome but is related to it is a "correlate", not a risk factor. A major problem in

the past literature is that correlates are presented as risk factors, and sometimes even as causal factors.

Risk factors are not necessarily causes of adverse states of well-being, but indicate the probability that some negative outcome will occur (ie, they include a broader range of variables than strict causal models would indicate). Researchers typically identify risk factors by tracking the development of children and measuring the extent to which particular factors are linked statistically to later outcomes such as violent behaviour.

Risk factors are useful for targeting resources and interventions on particular people. Much research isolates and measures the probabilistic effect of particular variables, such as family composition, income levels, or neighbourhood characteristics, on particular outcomes for targeting.

The interaction of a number of factors can increase the probability of a particular adverse or positive outcome. For children aged 2 to 3 years, the number of risk factors has been found to be a strong predictor of negative outcomes (Landy and Kwan Tam 1998). A meta-analysis concludes that all negative outcomes have several risk factors in common, as shown in Table 6 (Durlak 1998). There are multiple pathways and processes which determine the ultimate outcomes (Landy and Kwan Tam 1998). For example, poor educational attainment is typically found to be strongly associated with all the main negative outcomes in childhood (Bynner n.d., Kiernan 1995). Although these risk factors are common to a number of adverse outcomes, specific risk factors are relevant for particular adverse outcomes.

Table 6 – General risk and protective factors

	Risk Factors	Protective Factors
Individual	<ul style="list-style-type: none"> • Early onset of target problem • Problems in other areas 	<ul style="list-style-type: none"> • Personal and social skills • Self-efficacy
Family	<ul style="list-style-type: none"> • Low socio-economic status (SES) • Parental psychopath • Marital discord • Punitive childrearing 	<ul style="list-style-type: none"> • Good parent-child relationships • Pro-social norms
Peers	<ul style="list-style-type: none"> • Negative peer pressure/modelling • Peer rejection 	<ul style="list-style-type: none"> • Positive peer modelling
Schools	<ul style="list-style-type: none"> • Poor quality schools 	<ul style="list-style-type: none"> • High quality schools
Community	<ul style="list-style-type: none"> • Impoverished neighbourhood • Ineffectual social policies 	<ul style="list-style-type: none"> • Social support • Effective social policies

Source: Durlak (1998); Hema (2000)

Risk factors appear to have a multiplicative or cumulative effect – the likelihood of adverse outcomes grows disproportionately as a child is exposed to more risk factors. Any single risk factor makes a relatively modest contribution to individual risk, and exposure to one or two risk factors, unless they are extreme, is unlikely to have a negative impact on the likelihood of a child’s development proceeding normally (Fergusson 1998). Having four or more risk factors, however, can lead to a ten-fold increase in the probability of poor outcomes irrespective of their causal role (Landy and Kwan Tam 1998, Zimmerman and Arunkumar 1994).

Risk, like causality, is a dynamic process. Children can be exposed to multiple risk factors, can move in and out of risk at various times, can be exposed to risk factors at

varying levels over the course of their life, and may be more vulnerable to particular risk factors at different points in their development. Risks can accumulate over time, or can be additive at one particular point in time. Risk factors may operate in causal chains, with one risk factor leading to another, with the ultimate result being a problematic outcome. Within a causal chain there may be “mediator” risk factors (eg, harsh discipline), which explain how an earlier risk factor (eg, low income) works to produce a negative outcome (eg, behaviour problems in school), and “moderator” risk factors (eg, male gender), which help to identify the individuals on whom this additional risk factor is most likely to exert an effect (Huffman *et al* 2000b).

There are a number of limitations regarding the use of risk factors to identify those who are likely to experience bad outcomes in the future and who thus merit intervention before these outcomes occur (US Surgeon General 2001). No single risk factor or set of risk factors can predict negative well-being with certainty, particularly not at the individual level. Not all individuals who exhibit all the best-established risk factors for violence become violent, for example. Risk factors can be used for reasonably robust prediction in groups with particular characteristics, but are far less useful for individuals. Some risk factors are not amenable to change, and so are not good targets for intervention (Huizinga, Loeber and Thornberry 1995). Even if some risk factors, such as poverty, can be changed, they may not be realistic targets for change, in the short run, at least. Longitudinal studies used to identify risk factors may not identify those factors that are relevant in specific situations or that are relevant to all population sub-groups due to limitations of size and representativeness of samples.

Most children living in disadvantaged circumstances grow up to be well-functioning members of society. The fact that some children are resilient in the face of adversity has led to an interest in identifying the factors and processes that may protect children from outcomes.

Resilience is “a dynamic process encompassing positive adaptation within the context of significant adversity” (Kalil 2001). Resilience occurs only with exposure to risk and adversity – it involves successful engagement with risk, rather than an evasion of risk. Resilience, like risk, alters with circumstances so that the attributes or factors that create resilience in one situation may not produce it in another.

Protective effects may operate by buffering or mitigating the negative effects of a risk factor (eg, assertiveness and high self esteem are protectors against the negative influence of parental conflict on the mental health of teenage girls) or by enhancing the protective effects of variables found to decrease the probability of negative outcomes (eg, cultural identity enhances the effects of self-esteem as a protective factor lowering the risk of alcohol and drug use) (Brook, Brook, Gordon and Whiteman 1990). The presence of protective factors explains why individuals who face the same degree of risk may be affected differently.

Not all protective factors are common to all children or are similarly protective against all risks. Nevertheless there may be common characteristics amongst those children who achieve positive outcomes despite facing a high level of risk and adversity during childhood, as shown in Table 6 (Durlak 1998, Masten and Coatsworth 1998). For example, positive social relationships with siblings and with peers and adults outside the immediate family have been found to play an important role in buffering children against the negative effect of risk factors such as marital conflict and low income.

Developmental research suggests the existence of three types of protective factor: the individual characteristics of the child; a close relationship within the family, not necessarily with a parent; and a certain type of social support outside the family (Bynner 1998a). The internal resources of a child that promote resilience are an easy temperament, at least average intelligence and a sense of self-efficacy. One strong, emotionally close relationship in the family seems to protect children even when the family is otherwise dysfunctional. Social support outside the family that combines a close relationship with practical help can promote resilience. Although general protective factors play a role in the general resilience of children, specific factors are relevant in conferring protection against specific adverse outcomes (Bynner 1998b).

4 Poor outcomes: Causes and contributors

While the previous section reviewed the way child development can affect later well-being, this section explores the principal influences that affect child and adult outcomes. These influences include individual, family and community factors.

Outcomes in adulthood reflect a complex interplay of genetic and environmental factors over a person's life course. Genetic factors can contribute to susceptibility to negative outcomes. Inherited characteristics seem to be particularly important in physical and cognitive development, aspects of personality, and some forms of mental illness. The influence of genetic factors tends to increase as individuals get older, relative to peer and family influences.

A relatively small proportion of the variation in adult outcomes is attributable to differences in the home environment. Nevertheless, "within-home" family factors do have a significant developmental effect. Although it is not clear how neighbourhoods affect children, it is likely that any effect operates through resources, norms and the social networks available to parents. A relatively small, yet economically significant proportion of the variation in individual outcomes is attributable to differences in the characteristics of schools.

A large part of individual variation in outcomes, however, remains unexplained. There is no single theory of the determinants of well-being, and simple responses to adverse outcomes are not likely to be effective. A number of domains are likely relevant to understanding the determinants of particular outcomes of interest, and this needs to be taken into account in policy design.

The determinants of good and bad outcomes in adulthood from a life-course perspective are multiple, complex and inter-related. No single set of factors has an over-riding influence on any one outcome. Yet it is useful to be able to identify the nature and relative importance of different influences through time to understand the potential effects of interventions intended to ameliorate or prevent adverse outcomes.

4.1 Individual influences

Genetic factors are important in a wide range of child outcomes, particularly IQ and verbal ability, that affect later outcomes. Between 25% and 55% of many cognitive abilities seem to be heritable. This suggests an appreciable variation adult outcomes is inherent.

The relative effect of inheritance is masked for most children by the pervasive influence of family influences in early childhood (Plomin and Petrill 1997). Also, inherited characteristics can influence the environments in which people grow up and *vice versa*, and thus affect adult outcomes (Burgess, Gardiner and Propper 2001, Masten 1994). For example, personality appears to have a strong heritable component that leads individuals to take part in different activities and mix with different sorts of people, thereby developing different life skills.

Much evidence points to the fact that children from ethnic minorities have poorer outcomes than the dominant ethnic group in many societies – though this is by no means universal, since children from some ethnic minority groups have better outcomes than their peers. In New Zealand, young people of Maori and Pacific Island descent have poorer health and education outcomes in both childhood and adulthood than their European counterparts (Treasury 2001b).

It is not clear whether the link between ethnicity and outcomes is causal or correlational: does ethnicity itself have an effect on child and adult outcomes, or do these outcomes result from other factors that are associated with ethnicity, such as income, family structure, level of parental education, or neighbourhood disadvantage? This distinction is important because it may help identify the relative importance of particular causal mechanisms that need to be addressed through interventions.

Overall, once other factors have been taken into account (age, marital status, industry and occupation, education and literacy), research suggests that the effect of ethnicity on outcomes such as earnings (measured in terms of differences in means) is usually much reduced (Alexander, Genc and Jaforullah 2000, Gibson 2000, Maani 2000a, 2002).¹⁵ Nevertheless, the remaining effect may be both statistically and economically significant, and it is useful to gauge its importance relative to the effect of other factors.

In seeking to understand the effect of ethnicity on outcomes, it is important to understand the mechanisms through which it may cause disparities in the outcomes of children from different ethnic groups. For example, there is strong evidence that average literacy and numeracy levels of Maori and Pacific adults are lower than those for the rest of the population, even for people in similar occupations, and that this affects employment and earnings outcomes (Chapple 2000, Maré and Chapple 1999, Nash 1997). There is also evidence that this affects the ability of families to support their children's education in the home (Nash 1997). It is precisely in the areas of literacy and numeracy that the disparity between Maori and Pacific children and others is widest in primary schools (Crooks and Caygill 1999). Finally, there is growing evidence that these differences are important causes of disparities in adulthood (Boozer and Maloney 2001). Higher rates of lone parenting amongst Maori, entailing on average lower household incomes and resources of time, may also play a role in Maori children's poorer educational outcomes. Higher rates of lone parenting, in turn, may be partly due to lower earnings capacity on average amongst Maori adults, as there is evidence that earnings capacity is a determinant of couple formation (Ermisch and Wright 1996). For Pacific peoples, recent migration and poor education levels are associated with poorer employment outcomes.

It is likely that these patterns hold for most other major outcomes of concern. While ethnicity may provide a "marker" for the risk of poor outcomes, other mechanisms, which are amenable to change, can provide a focus for intervention.

4.2 Family influences

From the vantage point of adulthood, perhaps only 10% to 20% of the variation in individual outcomes can be causally attributed to differences in family and home environment, at least within the range of circumstances most commonly studied (Nechyba, McEwan and Older-Aguilar 1999). It is possible that in more extreme circumstances a stronger effect of immediate family and home characteristics could be found.

Many studies find a correlation between parents' education and their children's incomes, but as in the case of parental and children's education, not all studies agree (Levine 1999, Murnane, Willet and Levy 1995). The orthodox view of parental education is that it

¹⁵ Both a finding that ethnicity has no statistically measurable effect and or that it has a significant effect after controlling for other factors, need to be interpreted cautiously. Many studies have limitations relating to sample size and representation, the range of variables available in the data, or the way in which relationships are specified. Often complex statistical issues need to be addressed in order to be confident of identifying causal relationships. Usually a large amount of the variation in outcomes remains unexplained, and there is scope to hypothesise about a range of unmeasured factors correlated with ethnicity, that account for this effect.

influences the level of educational attainment of the next generation and that mothers' education is more influential than fathers' in this respect, for example, because of the greater amount of time that mothers are likely to spend at home informally improving their children's educational skills (Haveman and Wolfe 1995). Results from a study of identical female and male twins, that enabled the existence of unmeasured heritable traits and marital sorting to be taken into account, showed that the positive relationship between children's and mothers' schooling in their US dataset is solely due to the correlation between mothers' unobserved endowments and their schooling (Behrman and Rosenzweig 2002).

Overall, parental education *per se* appears to have little causal significance for outcomes in the next generation. Rather, the ability and willingness of parents to provide cognitive stimulation for their children (which may not necessarily be related to their level of education) may be more important (Lefebvre and Merrigan 1998).

Family income is often cited as a powerful determinant of children's outcomes with the expectation that raising incomes, particularly of the poorest families with children, would make a major impact on outcomes. There is a consistent correlation in a large number of studies between household income and child and adult outcomes in the next generation (see for example Boggess, Corcoran and Jenkins 1999). Yet the best evidence indicates that the effect of family income on children's outcomes is complex, correlated with other variables likely to have an independent effect, and likely to be non-linear and mediated through other variables. The effect of low income may be greatest for young children, and for cognitive development and school readiness. However, the evidence indicates that even as much as a doubling of parental income would increase children's cognitive test scores by amounts unlikely to have any practical impact on their later trajectories (Mayer 2002).

Parental employment is perhaps the most important route by which family income can be raised. However, the benefits of extra income (both for parents and for children) need to be weighed against the effects on children's development (Ruhm 2000). Effects of parental employment may vary by the age of the child at which the parent is employed, by the child's gender, by the gender of the parent employed, and may also be manifest at differing stages during the child's development. Some effects evident at one point may fade over time.

A number of studies show a correlation between early maternal employment and poorer behavioural and cognitive outcomes during early childhood for most children (see Nechyba *et al* 1999).¹⁶ However, a New Zealand study found that at age 10 there is no association between current maternal employment and children's competencies (Wylie, Thompson and Lythe 2001).

Parental employment in the very early years and in adolescence appears to have the ability to harm children's development, even when the potential effects of the extra income earned are taken into account. A study using data from the National Longitudinal Survey of Youth (NLSY) that controls for unobserved characteristics concludes that substantial cognitive gains accrue to children whose mothers stay home for at least two to three years after giving birth (Ruhm 2000). Working during the second and third years appears to

¹⁶ Belsky (2001) reviews two decades of research and concludes that evidence for adverse effects of extended periods of maternal employment from the first year of life is firm, particularly for mothers with high levels of depressive symptomatology. It is not clear, however, whether this research succeeds in controlling adequately for unobserved parental characteristics which may influence both parental employment and children's behavioural outcomes.

¹⁷ There is some evidence that those coming from particularly disadvantaged backgrounds do not suffer ill effects from early (infant) childcare.

have less favourable or more deleterious consequences when the mother is also employed in the first year.¹⁸

Data from the CHDS show positive but weak associations between mother's current work and reading scores between ages 8 and 13 (Barker and Maloney 1999). However, the results suggest that mothers' work does not have a direct causal effect, but is rather a proxy for other characteristics of the mother or family that independently have positive effects on test-scores.

Overall, the evidence suggests that parental employment, particularly during early infancy, and also in adolescence, does have the potential to harm children, even when the effects of extra income earned are taken into account. The effects are likely to be ameliorated by the availability of affordable good quality childcare and out of school supervision. Some evidence suggests that negative effects are stronger for children from two-parent, and more affluent families – but this needs to be seen in a context where such children on average have significantly better outcomes than children from lone parent families.

The impact of parental separation, divorce, lone parenthood, co-habitation and remarriage on children has been addressed in a large number of studies. In general, being raised in a lone parent or step-family (as compared with being raised in a family with both biological parents) or in an “out of family” placement, is correlated with poorer outcomes on a wide range of measures.

Research from longitudinal studies suggests that on average children in lone parent families – regardless of the mother's age – have higher probabilities of a number of negative outcomes. They include psycho-social distress and behavioural disorders at all ages, academic underachievement and early school-leaving, health problems, accidental injury, early transitions into adult behaviour (such as sexual activity, entering the workforce, leaving home, childbearing) and low income, lower occupational status and unemployment during adulthood (Baker, Pryor and Shirley 2000, Haveman and Wolfe 1993).

Moreover, remarriage (with one step-parent) does little to change children's school or behavioural outcomes, compared to being in a lone parent family (despite home environments in step-families being similar to those where two biological parents are present) (Baker *et al* 2000, Nechyba *et al* 1999). Children whose biological mother is cohabiting with a non-biological father do worse on average than children in lone parent families in terms of cognitive, behavioural and psychological outcomes (McLanahan 1997). Conversely, children with a widowed parent do as well on average as children brought up with two biological parents although they tend to share some of the same material disadvantages as children in other lone parent families (McLanahan and Sandefur 1994, Rodgers and Pryor 1998).

Data from the CHDS shows that children reared in lone parent families due to separation or divorce are at risk of greater health, educational and adjustment difficulties, but much of the risk reflects not the absence of a parent, but rather a series of social and contextual features that are more common in disrupted families and often present before separation rather than being a consequence of separation (Fergusson 1998, Fergusson, Lynskey and Horwood 1994d).

A mounting body of research suggests that the relationship between lone parenthood and adverse outcomes is not primarily a direct causal one, and that much of the increased risk

¹⁸ The Peabody Picture Vocabulary Test (PPVT), the Peabody Individual Achievement Test Reading Recognition subtest (PIAT-R) and Mathematics subtest (PIAT-M). The first was administered at age 3 and 4, and the latter two at age 5 and 6.

of poor outcomes amongst children in lone parent families is explained by other factors associated with, but not exclusive to, lone parenthood (Baker *et al* 2000, Landy and Kwan Tam 1998). In general, factors that have an influence on the probability of divorce, lone parenthood, cohabitation and remarriage may independently have an effect on children's outcomes. Analyses that do not control for these factors will produce biased estimates of the effect of family structure on outcomes.

Many international reviews and meta-analyses have shown that there are negative consequences for children from parental separation that endure into adulthood (Amato 2000, 2001, Amato and Keith 1991). These adverse impacts appear whether family disruptions occur at birth, in early childhood or in adolescence (McLanahan and Sandefur 1994). Short-term distress at the time of separation is common, but this usually fades with time. Long-term adverse outcomes typically apply only to a minority of children experiencing the separation of their parents (Rodgers and Pryor 1998).

Much of the increased risk of poor outcomes associated with separation and divorce may be due to disruption in children's living arrangements, involving, for instance, loss of social networks and change in school, often in more disadvantaged neighbourhoods (Nechyba *et al* 1999). These disruptions help explain why children in step-families are at similar risk of adverse outcomes as children in lone parent families after divorce.

A study using data from the DMHDS found children exposed to parental disagreement about discipline, a number of residence changes and changes in step-parents during the primary school years, are more likely to become antisocial and delinquent in adolescence (and that this relationship is not a result of earlier behavioural problems causing parental disagreement, and changes in parents) (Henry, Caspi, Moffitt and Silva 1996). Children in foster care, particularly multiple successive placements, are also likely to be further at risk of adverse outcomes, as a result of disruption to social relations and schooling.

Overall, disrupted family structures are not themselves a problem – there are many diverse family structures that can function well for parents and children alike – but the instability of relationships, households and families that accompanies change is a great threat to the well-being of children Pryor and Rodgers (1998).

Several studies present a pessimistic picture of the likelihood of positive adult outcomes for the children of teenage mothers. Pregnancies to teenagers carry a higher frequency of miscarriage, stillbirth, prematurity, antenatal complications and neonatal death than pregnancies in the general population (Fergusson *et al* 2001, Wolfe, Wilson and Haveman 2001). Pre-school age children of teenage mothers tend to show more behaviour problems, including higher levels of aggression and lower impulse control, than their peers born to older mothers and in adolescence experience higher rates of delinquency, grade failure, early school leaving and unemployment than their peers born to older mothers (Coley and Chase-Lansdale 1997). The children of women who have their first child as a teenager are 2.6 times more likely themselves to become parents as teenagers than the children of older mothers (Jaffee, Caspi, Moffitt, Belsky and Silva 2001).

However, most children born to teenage mothers do well (Jaffee *et al* 2001). The key question is whether negative child outcomes occur because of factors resulting from early parenthood *per se* or whether they can be attributed to the pre-pregnancy characteristics associated with the young mother (Fergusson *et al* 2001).

A study using the DMHDS found that once maternal characteristics and family circumstances were controlled, the effect of teen childbearing *per se* on outcomes was statistically insignificant (Jaffee *et al* 2001). Analysis based on the CHDS suggests that poor outcomes for children are likely to be not so much a reflection of the youth of the

mother, but the product of a selective process whereby the women who are least well-equipped tend to give birth at a younger age (Fergusson and Woodward 1999). A study using data from the NLSY in the USA found that the negative effect of early motherhood on the academic performance of their children was almost entirely explained by pre-birth individual and family background factors of teen mothers themselves (Levine, Pollack and Comfort 2000).

A number of studies have attempted to overcome problems of the overestimation of the negative effects of teenage childbearing arising from unmeasured effects that jointly determine poor outcomes in adulthood and teenage pregnancy by comparing sisters' outcomes, cousins' outcomes and the outcomes of teenagers who miscarry with those who do not (see for example Hotz, Williams McElroy and Sanders 1999). They suggest substantially smaller effects of teenage childbearing *per se* on outcomes for mothers and their children than do more typical studies. Also, due to the early onset of health problems and restricted economic opportunities, teenage pregnancies may be desirable in some sub-populations, and indeed may be a rational choice for some, typically poor minority, girls (Geronimus 1997).

There is a lively debate on the consequences of early childbearing. Overall, the evidence indicates that growing up with a mother who first gave birth as a teenager can be a risk factor for a range of negative child and adult outcomes. However, the impact of teenage pregnancy as a *cause* of subsequent poor outcomes is more modest than simple correlations suggest. Although most of the problems experienced by teenage mothers can be attributed to pre-existing factors, there is still a substantial degree of disadvantage attributable to having given birth as a teenager (UNICEF 2002).

There is evidence that children from difficult or severely dysfunctional families disproportionately suffer severe substance abuse, high levels of depression and anxiety and suicide and run away from home (CSR Incorporated 1997, Hider 1998).

Some studies suggest a low association between parenting practices and child outcomes, while others have identified that positive parenting practices can significantly reduce the odds of poor outcomes such as emotional disorders and aggressive behaviour (Pryor and Rodgers 2001). Although there is general consensus that authoritative (high control/high warmth), parenting is optimal for facilitating positive child development, there is a debate in the literature regarding the culture-specific and context-specific nature of parenting styles. Poor parental supervision, and the parents' rejection of the child are moderately strong predictors of subsequent delinquency by the child.

The maltreatment of children in the form of sexual or physical abuse and neglect can have short and long-term consequences for well-being. Children who suffer maltreatment during infancy and early childhood can develop emotional, behavioural and cognitive problems that have repercussions throughout their lives.

New Zealand research, replicated in many international studies, suggests that children who experienced severe or harsh parental punishment practices had one-and-a-half to four times higher rates of conduct problems, substance abuse, depression, anxiety and violent crime in early adulthood, than those whose parents did not use physical punishment (Fergusson 1998, Jenkins and Keating 1998, Kelley, Thornberry and Smith 1997). The higher rates of problems among abused children appear to reflect the consequences of generally compromised childhoods rather than the specific effects of the abusive treatment (Fergusson 1998).

Children who have been sexually abused exhibit a variety of problems both in the short term and later on as adults (Briere and Elliott 1994, Oddone, Genuis and Violato n.d.).

The CHDS findings on sexual abuse suggest that, independently of the socio-economic context, exposure to child sexual abuse is causally linked to later mental health and adjustment problems in some children (Fergusson 1998). This conclusion accords with recent research in basic brain science that brains are sculpted by experiences (Teicher 2002).

Although maltreatment is a serious threat to the short and long term well-being and development of children and adolescents, in some cases children do not appear to suffer significant effects (Masten and Coatsworth 1998).

4.3 Community influences

Poor families and those from particular ethnic groups may face limitations on the communities which they can easily choose to live in. Communities, which differ in terms of social capital, economic conditions, material resources and infrastructure, social norms and peers may create an avenue through which parental socio-economic characteristics affect child outcomes (Brooks-Gunn and Duncan 1997, Corak and Heisz 1998, McCulloch and Joshi 2000, Phipps 1999). However, most of the studies on community influences emanate from the United States, and may have limited application in New Zealand, where neighbourhoods may be less distinct from one another.

Community and neighbourhood effects on outcomes are hard to isolate and measure, but are typically modest, and appear to relate most directly to antisocial behaviour and crime rather than educational attainment outcomes (Burgess *et al* 2001, Nechyba *et al* 1999).. They are probably less important than family effects, which are, in turn, less important than individual effects. For young children, wider social influences such as neighbourhood effects operate through their impact on the family (Zuckerman and Kahn 2000). However, neighbourhood effects become more important as the child gets older (Nechyba *et al* 1999).

The most important contribution an older child may make to his or her own well-being is through his or her choice of peers (Nechyba *et al* 1999). Once in school, peer groups may matter more than family for child development (Harris 1995). Peer groups are particularly influential in adolescence (Hawkins, Herrenkohl, Farrington, Brewer, Catalano, Harachi and Cothorn 2000). Many studies have shown that antisocial peer groups play an important part in the development of deviancy and violence (US Surgeon General 2001). However, the evidence of peer effects is difficult to interpret because of unobserved variables and the number of different peer groups – such as school, class, and friends – that may be relevant to children’s outcomes. Poor parenting may lead children to associate with a negative peer group, rather than the peer group itself leading a child into problematic and antisocial behaviour (Eccles 1999).

Individual and community levels of education have a strong association with a range of indicators of adult well-being (Treasury 2001a).¹⁹ The effectiveness of schooling in raising skills and capabilities may therefore be particularly important in improving adult well-being. Schools may account for between 8% and 19% of the variation in cognitive and educational outcomes for pupils (Cuttance 1998). New Zealand research gives a much lower estimation of the extent to which schools account for the variation in individual

¹⁹ Such an association does not necessarily imply a causal relationship. In identifying correlations between education and particular outcomes, many studies control for other factors such as family income and parental education. But it is possible that other variables, which are either omitted or not controlled for, are strongly associated with higher levels of education and may explain the impact of education on outcomes.

achievement levels (Harker and Nash 1996).²⁰ Teacher quality may be at least as important as schools for improving achievement.

The evidence that schools affect outcomes appears fairly unequivocal. The key question is why they do so. It is difficult to give an adequate account of the skills that schools produce and the way in which these skills are rewarded in the labour market, and contribute to outcomes in other areas.

Schools play an important part in the development of cognitive skills such as literacy and numeracy that are important for a range of outcomes (Bowles, Gintis and Osborne 2001, Machin 2001). New Zealand analysis of data from the International Adult Literacy Study shows that literacy and numeracy skills appear to have an additional effect on other outcomes (Maré and Chapple 1999). There also appears to be a two-way relationship between behaviour and reading ability in childhood (Rowe 2002). Findings from the DMHDS suggest that behavioural problems pre-date reading problems, and that reading failure exacerbates problem behaviour (McGee, Williams, Share, Anderson and Silva 1986).

In addition to cognitive skills, schooling may also influence other traits of pupils that have independent effects on earnings (Bowles *et al* 2001). However, the relationship between traits and labour market outcomes is complex, and may not be casual.

Wider features of the socio-economic environment such as the degree of income inequality in a society are correlated with the average level of outcomes such as health (Keating and Hertzman 1999, Kennedy, Kawachi, Glass and Prothrow-Smith 1998, Taylor and Smith 1997, Wilkinson 1996).

However, recent research indicates that this association is unlikely to be causal. The relationship tends to disappear in studies that control for a fuller range of individual characteristics associated with the outcome of interest (Judge and Paterson 2001, Sturm and Gresnez 2002). Recent research in the USA confirms the same, well-known income-health gradient, but finds that differences in mortality are associated with high school educational attainment rather than regional income inequality (Muller 2002). There is similar doubt about the assumed relations between average educational outcomes and the degree of socio-economic dispersion in a country (OECD 2001a).

The level of social capital has also been found to be correlated with a number of negative outcomes (Kawachi, Kennedy, Lochner and Prothrow-Smith 1997, Runyan, Hunter, Socolar, Amaya-Jackson, English, Landsverk, Dubowitz, Browne, Bangdiwala and Matthew 1998). However, the effects on outcomes attributable to social capital disappear once a full range of individual family characteristics were controlled for in a multi-variate model (Fields and Smith 1998).

²⁰ The researchers acknowledged that particular aspects of their study design (eg, the relatively small sample size) meant that their data almost certainly under-estimated the size of the “school effects” on student achievement variance.

5 Investing in the social sector

Social interventions cover a wide range of initiatives from regulation to the provision and funding of services to individuals. While there are many potential social initiatives that could contribute to well-being, resources are limited and costly, and choices must be made between them. Allocating expenditure on social policy and services is thus an economic problem, since it competes with other activities for scarce resources. The essence of the analytical framework is to consider social expenditure as an investment designed to improve aggregate and population sub-group well-being, with current costs and uncertain future benefits (Ministry of Social Development 2001). Viewing social expenditures as investments allows all the overall costs to be arrayed against the all the benefits over time so they can be compared in terms of cost-effectiveness, allowing resources to be shifted between them at the margin.

The design and delivery of effective interventions requires sound theory about the causal linkages between childhood and well-being in adulthood and an understanding of the impact of environmental influences on well-being. Good information is also needed about the nature, extent and cost of poor outcomes in childhood and adulthood. Evidence on the nature, size, distribution and timing of the effects of interventions and their overall costs is essential to determining the net benefits of social investments.

Understanding current and past initiatives can provide guidance when designing new ones. It is important not just to know if an intervention works, but also how and why it works and for whom. Knowing what actually happened in an intervention programme and under what conditions is vital to designing and adapting programmes to other contexts. Knowing why something works can also help in understanding the causal and mediating variables that contribute to an outcome (Boaz, Ashby and Young 2002). The causal nature of a targeted factor can be demonstrated through the intervention effect size (Huffman *et al* 2000b). The evaluation of interventions to determine their cost-effectiveness and the reasons underlying success or failure thus becomes an important part of managing the social investment portfolio.

The analysis can also be useful in designing strategies that achieve the desired goal at the least cost. It can highlight the extent to which alternative strategies can lead to savings. In this way, it can help decision makers to select among a range of effective interventions those that are the most cost-effective. For example, a study in Washington State involved the systematic analysis of a wide range of approaches to reduce crime, – from prevention programmes designed for young children to correctional interventions for juvenile and adult offenders – to help decision-makers allocate resources toward economically successful programmes and away from unsuccessful programmes, thereby producing savings (Aos, Phipps, Barnoski and Lieb 2001).

A portfolio approach could potentially be used to select an optimal suite of interventions in the social sector based on the quantification of the expected net present value (NPV) of the benefits, including estimates of the risk. In practice however, while quantification might be feasible for a subset of investments, it is unlikely to be applied across the whole sector. While some areas of investment might be amenable to quantification, the practical difficulties involved in quantifying in money terms the NPV of investments in other areas are likely to be formidable. A full cost-benefit analysis that also incorporated estimates of changes in the NPV or rate of return with changes in investment would be most useful in informing decisions about resource allocation. However, in practice data limitations may require other forms of evaluation to be used. Even so, the key to the investment approach

is that both benefits *and* costs should be included in assessing the effectiveness of interventions.

There is considerable uncertainty about how best to improve well-being. The underlying causal relationships are not always fully understood, there is uncertainty about targeting and initiatives may not be fully effective. Such uncertainty suggests that a range of different approaches, focused at different stages and including universal and more targeted interventions, is likely to be appropriate to address particular outcomes. Addressing a particular outcome might thus involve a portfolio of different interventions.

5.1 Timing

Social policies and services are directed at different stages of a person's life course, from pre-birth to adulthood. The opportunity to make investments at different stages raises a question about the optimal timing: is it better to provide services early or later in life?

Early interventions can be useful when the risk and protective factors are broadly understood, but there is limited understanding of the mechanisms by which these lead to particular outcomes (whether they are causal or not). By focusing on developing known protective factors (basic literacy skills, positive peer relations) or minimising known risk factors (child abuse), early interventions have a greater likelihood of being effective in reducing the probability of negative outcomes. Early interventions can prevent negative outcomes before they start to incur personal, social and economic costs and be more cost-effective because they can help prevent multiple negative outcomes.

However, the earlier the intervention, the looser the targeting is likely to be, the larger the potential target group and the greater the costs. Also, if the targeting is too precise, Type I errors (ie, missing those who should be targeted) are likely to be larger because problems may not be manifest at an early stage. It can be difficult to determine whether it was the provision of the intervention that helped prevent the negative outcome, whether the effect was a random one, or whether some individuals were exposed to factors other than the programme that may have improved their outcomes. There is also a risk that other intervening factors will undo the benefits of the early intervention (eg, poor quality schooling can undo the positive effects of early childhood programmes).

While it may seem sensible to intervene as early as possible to prevent the establishment of negative developmental pathways, there is some evidence to suggest that particular interventions work best when they are delivered at a critical point in time, such as a key developmental transition. Hence, decisions about the timing of interventions are not just a matter of early *versus* later. Rather it may be necessary to intervene at a point when they are most likely to be effective. Interventions before or after the sensitive period may be ineffective.

5.2 Success factors

Many factors influence the probability that an intervention will succeed or fail in improving well-being. One is the technical capability of the intervention to achieve the intended outcome. Technical feasibility is greater when the intervention is informed by evidence of causality, when the mediating factors being addressed affect the outcome of focus and when there is evidence of effectiveness. The quality of implementation is critical to the success of interventions (Derzon 1999).

Implementation issues include the quality of management, the clarity of aims and objectives, a receptive environment, effective leadership, the qualifications, training and sense of ownership amongst those delivering the programme and the level of resourcing. This indicates the importance of designing these factors into the intervention and of monitoring the progress and quality of implementation at the local level. A key issue in considering implementation is whether the government is better placed than other organisations to intervene, and if so, the best form the intervention might take.

Most of the empirical evidence is derived from the United States, Canada and the United Kingdom and a range of contextual factors needs to be taken into account in applying inferences from this evidence to New Zealand. While many elements of society, culture and the economy are broadly shared across developed countries, specifics can differ, for example in the extent to which disadvantaged families are concentrated in particular communities. Likewise, cultural values may differ across countries, and among different groups (for instance ethnic groups) within countries, and these values may have an important influence on mediating effects on children's outcomes. Programmes with an apparently similar design may be successful in some locations, but not in others (Scott 2000). Imported programmes need to be underpinned by a good grasp of the context in which the programme was initially developed, and how this differs from the context in which it is intended to introduce it.

5.3 Targeting

A key issue in the design of interventions is whether they should be universally available, available to a targeted group identified as at risk of negative outcomes or limited to those identified as already having demonstrated a negative outcome. Examples of universal interventions include legislation such as family law and the provision of services, such as child immunisation. Examples of targeted interventions include the provision of specific services to an identified group, such as counselling for teenagers with mental health disorders.

Targeting interventions can involve Type I and Type II errors, providing services to those who do not need them or failing to provide services to those who do need them. This suggests that the level of risk should be matched to the degree of targeting, so that universal interventions are provided where risk is low and a target population hard to identify, whereas more targeted approaches are appropriate when greater risks become apparent and at-risk individuals are easier and cheaper to identify (Andrews and Bonta 1998). The overall portfolio is therefore likely to include not only a mix of universal, targeted and indicated intervention, but also interventions that are designed for early and later stages.

Evidence that outcomes of children are influenced by the characteristics and circumstances of their parents and that circumstances and behaviours at different stages of development help in the prediction of subsequent outcomes suggests that early interventions targeted on children identified as most at risk can reach and help most children who would otherwise have difficulties later in life.

However, practical programme portfolio design is more complex. While intensive, risk-factor targeted, early interventions can reduce the incidence of later problems and improving long-term outcomes, they are likely to reach few of those who later have severe problems. At the same time, targeted interventions will be applied to many children who will not have problems in later life. More broadly-focused interventions are likely to be an

efficient addition to the portfolio of services available, particularly those which are grafted onto universal programmes. Later responses to problems as they emerge in later childhood and adolescence are likely to be needed.

For example, a study using data from the CHDS showed that a sub-group of individuals at high risk of problem behaviour at 15 were significantly more likely than the remainder of the sample to have experienced disadvantage throughout their earlier childhood (Fergusson, Horwood and Lynskey 1994b, Fergusson, Horwood and Lynskey 1994a). At the same time, only 40% of the most problematic teenagers had exhibited the highest level of risk in earlier childhood (Table 7).

Table 7 – Early childhood disadvantage and risk of multiple problems as teenagers

Earlier childhood disadvantage score	Percentage of sample	Number of multiple problem teenagers	Percentage of multiple problem teenagers	Rate (%) of multiple problem behaviour
0 – 6	54.5	1	3.7	0.2
7 – 12	29.8	7	25.9	2.5
13 – 18	10.3	8	29.6	8.3
19+	5.4	11	40.7	21.6
Total	100.0	27	100.0	2.9

Source: Fergusson (1994a)

Indeed, in order to reach 70% of the eventual multiple-problem group of 15-year olds, at least 16% of all children would have needed to be targeted for special attention. On the other hand, even a very tightly targeted strategy, focusing on the 5.4% of children with the highest scores, would involve intervening with a large proportion of children (80%) who do not need the intervention.

A more optimistic picture of the scope for early intervention with high-risk children (ie, up to age 14 years) to prevent later problem behaviour comes from the crime prevention field, where the small group of children and young people who are at high risk of becoming serious adult offenders can be identified with increasing certainty from birth to the beginning of their adult offending career (Moffitt and Caspi 2001). As a result, preventive policies have the potential to bring about larger reductions in crime and imprisonment rates than any other available strategy (Department of Corrections 2001). The focus on serious offending rather than the broader category of problem behaviour seems to make early targeting of at-risk individuals more efficient.

Table 8 summarises the estimated costs and benefits of a range of preventive interventions designed to interrupt the criminal trajectory of children and young people at four different points in the life cycle at which successful preventive interventions have been demonstrated in the literature (Department of Corrections 2001). Later interventions (after age 14 years) cost more and are less successful.

Table 8 – Summary of preventive options for reducing imprisonment

Intervention point	Description of service	Estimated cost per case	Estimated benefit/cost ratio
Before birth	Effective family planning advice to very high-risk young women in the youth justice, child protection and adult justice systems	\$500	50:1
At birth	Further expansion of the Family Start programme. Identify high-risk births and support mothers and families	\$3,000	25:1
At entry to primary school	Identify behaviour disorder and provide a behaviour change programme including support for family and school	\$5,000	51:1
Early youth offending`	Risk assess persistent early offenders (age 10-14 years). Provide intensive services directed to criminogenic needs for selected cases.	\$10,000	25:1

Note: The benefit-cost ratios given are an estimate of the crime prevention return per dollar spent on the intervention taking into account the costs to taxpayers and to victims of crime.

Source: Department of Corrections (2001)

Interventions are typically provided on a universal basis to prevent the onset of poor outcomes when it is difficult and costly to identify the at-risk population. They are provided on a targeted basis to prevent or ameliorate negative outcomes when it is possible to identify a population at-risk and on an indicated basis to prevent the worst effects of negative outcomes where high risk individuals can be identified.

Universal services can play a key role in facilitating the development of skills and abilities that mitigate the risk of negative outcomes. For example, empirical evidence suggests that education is a key protective factor. The longer children stay in education, the less likely they are to commit a crime, be unemployed, or have poor health outcomes. Some universal services can support the provision of more targeted services by identifying those at risk. Targeted services can also be nested in universal services, enabling them to be delivered in a more cost-effective manner. Examples include the provision of specialist education services within mainstream schooling. Other advantages from universal provision of services include inclusivity and lack of stigma for users (Offord, Kraemer, Kazdin, Jensen, Harrington and Gardner 1999).

There are disadvantages of universal provision of programmes and services. These include the high cost of provision, particularly for demand-driven services; potential inefficiencies and low cost-effectiveness, as services may be provided to those who do not need them; potential displacement of private investment in such services by individuals, families and communities; potential inequities, as they may accrue additional benefits to those who are already advantaged or direct resources away from those who are most in need. In addition, the benefits of universal programmes are difficult to evaluate because they are provided equally to everyone.

Most targeted services are aimed at developing and enhancing protective factors associated with positive outcomes, or preventing the emergence of behaviours or conditions associated with negative outcomes. The key benefit of targeted interventions is that they are focused on preventing the emergence of a negative outcome, thereby reducing the potential future social and economic cost that might be associated with that outcome. However, they are susceptible to Type I and Type II errors. Narrow targeting will increase the probability that some people who will have negative outcomes will not

receive services, while loose targeting may mean higher costs and more deadweight losses.

To be effective, targeted programmes need to be underpinned by a clear understanding of the risk factors that are implicated in particular negative outcomes and the causal pathways that exist between particular factors and outcomes, so that they tackle the right factors at the right time. Targeted interventions also depend on reliable and cost-effective screening mechanisms to identify those most at risk.

Targeted programmes may be provided where problems have already become apparent. These interventions usually aim to improve outcomes by treating the problem and preventing or minimising its recurrence. They may also focus on developing factors (such as the development of employment skills amongst young offenders) to protect against further negative outcomes. Well-designed services targeted on the basis of indicated risk are likely to be cost-effective because there is a greater probability that they are focused on the right population. On the other hand, they may be more costly and more likely to fail because they are trying to change established situations or behaviours.

Universal programmes typically focus on improving the well-being of the least well-off by raising the mean of the population distribution while targeted interventions tend to focus on directly raising the outcomes of those likely to do least well. Sometimes the focus of policy will be to raise the absolute level of performance of those at the bottom of the population distribution of outcomes rather than a concern with what happens to the mean.

6 What interventions work?: Selected case studies

The available evidence on effectiveness and cost-effectiveness is mixed. It is strong in some areas, where a number of methodologically sound systematic reviews or meta-analyses have been undertaken. These are often based on evidence from the USA, where the number and variety of interventions permits comparisons. In other areas the analysis is not robust and does not provide clear evidence of intervention effectiveness.

A number of general interventions focus on early childhood and have beneficial effects much later in life. There is evidence that some intensive early interventions, involving both the child and family, prevent later adverse outcomes from teenage pregnancy to youth offending. However, targeted interventions, at this early stage in particular, run a risk of Type I and Type II errors.

Health interventions cover the spectrum from before birth to young adulthood and include universal and targeted components. Child health services provide an opportunity for early identification of conditions and risk factors that put children at risk of adverse outcomes and for interventions to minimise their adverse consequences. More specific interventions are designed to reduce childhood accidents and youth suicide. The available evidence on youth suicide, a major concern in New Zealand, suggests that there is no single intervention that has been identified as effective, let alone cost-effective.

Education interventions are designed primarily to improve educational achievement. Because cognitive ability and education are factors that protect against other adverse outcomes, such as criminal behaviour, they have beneficial indirect effects on well-being.

Behavioural interventions are those that are specifically designed to reduce risk-taking behaviour among adolescents and young people in order to prevent adverse outcomes. The evidence suggests that the graduated drivers' licences are effective in reducing road fatalities among young drivers, and this is reflected in the New Zealand statistics. The evidence on the prevention of teenage pregnancy is much less clear, although it suggests that both sexual and non-sexual factors should be targeted, for example by improving access to, and knowledge of, contraception and improving economic opportunities for young women.

The remainder of this section summarises the available evidence on specific interventions to address selected adverse outcomes in New Zealand: youth suicide, teenage pregnancy, educational underachievement and youth inactivity.

6.1 Youth suicide

The causes of youth suicidal behaviour, like many other youth behaviours of concern, are complicated. Such behaviour arises through the dynamic interplay of individual, social and environmental factors. There seem to be two main models of suicide risk that imply different intervention strategies (Hider 1998). One model considers that risk is largely confined to young people with recognisable mental disorders, based on the strong association between mental disorder and suicidal behaviour. This model underpins the design of interventions based on the strengthening of health services and the targeting of individuals with psychiatric morbidity.

An alternative view is that suicide is a response to overwhelming and untenable life stresses that could happen to any adolescent and that mental illness is not the most important variable. This model implies that population-based interventions are needed to help young people to cope with stress and that, in particular, there is a need for more employment opportunities for young people. However, increasing scientific understanding of suicide, mental illness and substance abuse disorders indicates that suicide does not result from stress alone (US Surgeon General 1999b).

A review of studies on risk factors for suicides suggests that suicide is the endpoint of adverse life experiences in which multiple risk factors combine (Beautrais 2000). Young people at increased risk of attempting suicide often come from educationally and socially disadvantaged backgrounds; often have disturbed or unhappy family and childhood backgrounds; typically display mental health problems and immediately before the suicide attempt they may face some severe stress or life crisis (Beautrais 1998). The mental health problems most commonly associated with suicide are depression, substance abuse and behavioural difficulties.

The CHDS identified that mental health disorders, especially depression, were the most important predictors of suicide attempts. Adverse life events, and being raised in a family with low socio-economic status, were also associated with increased rates of suicide attempts, even when other confounding and intervening factors were taken into account (Fergusson *et al* 2000). Such research provides some support for both the main models of youth suicide discussed above.

Protective factors against suicide include individual characteristics, such as a person's neurobiological makeup, attitudes or behaviours and skills in areas such as problem solving and conflict resolution. They also include family factors such as warm and supportive relationships, high but realistic expectations on the part of parents, clear and reasonable limits and religious and cultural beliefs that discourage suicide. School and community influences can also confer resilience, including the development of warm and supportive relationships, conventional peers and involvement in school activities.

The risk factors that lead to suicide (especially mental and substance abuse disorders) and the protective factors that confer resilience and safeguard against it can provide the basis for the design of appropriate and effective interventions (White 1998). Since one of the strongest indicators of suicidal behaviour is a mental health disorder (including substance abuse and antisocial behaviour) effective policies focus on the identification, prevention, treatment and management of these disorders (Beautrais 1998). Policies that provide support to high-risk families in which children might be at risk of developing a range of adjustment problems may reduce the number of children exposed to adverse family environments and *inter alia* reduce the risk suicide.

The meta-analysis undertaken in New Zealand identifies a number of limitations in the published literature that examined the effectiveness of interventions (Hider 1998). In particular, many studies do not exclude chance, bias, or the possibility of alternative explanations for their findings or rely on expert opinion.

The study considers the prevention of suicidal behaviour in terms of universal interventions applied to young people in general and designed to prevent the development of suicidal behaviour (ie, before the fact prevention); and targeted interventions applied to individuals established at being at high risk of suicide and aimed at preventing suicidal behaviour (ie, after the fact intervention) (see Table 9). The study uses a structured approach to critically appraising the literature, grading the level of evidence from I

(randomised control trials and meta-analyses) to V (opinions of respected authorities or reports of expert committees).

No single intervention was been found to prevent suicide in well-conducted randomised control trials. Programmes that targeted at-risk groups seem most promising in reducing suicidal behaviour among young people. There is some uncertainty about the effectiveness of school-based programmes that are popular in the USA.

Restricting the means of suicide is also a promising intervention. Barriers at jumping sites can be effective (Beautrais 2001). Reducing the lethal emissions in car exhausts appears to have some potential (Gunnell and Frankel 1994). The potential for reductions in the availability of means of committing suicide is confirmed by an early report of an in-depth review (Fonagy 2000). Marked reductions in suicide attempts were found, not specifically in young people, from restricting handguns in the USA and domestic gas in the UK.

The main focus of the meta-analysis was on suicide prevention by primary health practitioners. The study reveals little evidence on the effectiveness of psychological or psychosocial treatments or pharmacological therapies. However, group support and cognitive behaviour therapy are probably effective in reducing suicidal behaviour. The evidence on family therapy, crisis intervention and psychoanalysis is less promising.

There is a dearth of research on the effectiveness of pharmacological treatments for reducing suicidal thoughts and behaviours in young people. Most of the research has been conducted on adults (US Surgeon General 1999a). While medication (using selective serotonin re-uptake inhibitors) appears to be effective in treating mental illness, it is less effective in preventing suicidal behaviour. Office-based interventions by GPs, and education programmes to help them recognise and treat mental illness, appeared to be effective.

Table 9 – The effectiveness of interventions for the prevention of youth suicidal behaviour

Intervention	Effectiveness	Level of evidence of main study/s
Primary interventions		
School prevention programmes	Possible	II-2
School-based programmes for targeted youth	Probable	II-1
Restriction of means of suicide	Possible	II-2
Restrict media presentation of suicide to reduce imitation	Possible	II-2
Office based preventive health by primary care practitioners	Possible	V
Educate GP to improve recognition of suicidal behaviour and psychiatric illness	Possible (but not based on young people alone)	II-2
Primary care practitioners in youth clinics	Possible	IV
Secondary interventions		
Direct effect on suicidal behaviour		
Cognitive behavioural therapy	Probable	II-1
Dialectic behavioural therapy	Possible	II-1 (one small study)
Family therapy	Possible	II-1 (poor quality)
Medication (SSRI)	Unlikely	II-1 (limited evidence with young people)
Psychoanalysis	Possible	V
Crisis intervention	Possible	II-1 (poor quality)
Group support	Probable	II-2
Tertiary interventions		
Postvention	Probable	IV
The effectiveness of service-based interventions in the management of suicidal behaviour among young people		
Aggressive follow-up is better than usual care	Possible	II-1 (poor quality)
GP care is superior to hospital out-patient based care	Possible	II-1 (poor quality)
Outpatient (instead of in-patient) care is appropriate for selected groups	Probable	II-1
Suicide contract	Possible	IV
Methods to improve compliance	Possible	V
Ideal follow-up frequency	Possible	IV
Planning prior to hospital discharge	Possible	III-2
Close follow-up after discharge	Probable	II-1

Key: (Note: the effectiveness and the level of evidence need to be read together)

Probable = Reasonable evidence from at least one good quality study or established consensus from several studies

Possible = Evidence from study/s that may have methodological limitations

Unlikely = Results from several currently available studies that generally suggest that the intervention is ineffective, although further research is needed to enable a definitive conclusion

I = evidence obtained from at least one meta-analysis

II-1 = evidence obtained from at least one randomised controlled trial

II-2 = evidence obtained from at least one controlled trial without randomisation

III-1 = evidence obtained from at least one cohort analytical study, preferably based in more than one centre or research group

III-2 = evidence obtained from at least one case control analytical study, preferably based in more than one centre or research group

IV = evidence obtained from at least one study that has used a primarily descriptive study design such as a cross sectional, ecological or time series methodology

V = opinions of respected authorities based on clinical experience, or reports of expert committees.

Source: Hider (1998) Table 38

Postvention refers to interventions after the suicide of family members or close associates and is in part designed to prevent imitative suicide. Very little research is available to assess these strategies, but experts seem to agree that it is a potentially valuable means of preventing further suicides.

It is possible that using a range of interventions is the most effective way of addressing the challenge of reducing suicidal behaviours and suicides. Prevention and treatment are not competing strategies. Rather, they complement one another, offering both broad-based strategies designed to reduce the risk of suicidal behaviours and individually focused treatments for individuals identified as being at risk of suicide.

6.2 Teenage pregnancy

Teenage mothers vary considerably in their circumstances, behaviour and well-being, although numerous studies have found that early child-bearing is predicted by early school failure, early behavioural problems, family dysfunction and poverty (Moore, Sugland, Blumenthal, Gleib and Snyder 1995). Young women from disadvantaged backgrounds with low aspirations appear to be particularly vulnerable, and raising female aspirations from a very young age has a direct effect on their reducing chances of becoming a teenage mother (Cheesbrough, Ingham and Massey 2002). Because of these underlying problems, and because of motherhood itself, teenage mothers experience greater social and economic problems than older, two-parent families.

Teenage parenthood is both an outcome and a risk factor for other negative outcomes. Teenage pregnancy is also associated with other risk factors, including sexual abuse, rape, the risk of HIV/AIDS and other sexually transmitted diseases; and a wide range of other high-risk behaviours including drug abuse. However, the likelihood is that the increased risk is causally related not to early pregnancy, but to prior adverse circumstances and personal characteristics.

Research suggests that teenage pregnancy is important more as a marker of pre-existing problems than of the problems directly caused by the timing of birth *per se* (Kalil and Kunz 2001). Many of the difficulties faced by teenage mothers are a function of their disadvantaged backgrounds rather than the difficulty of bringing up a child at a young age. Simply changing a woman's age at first birth would not necessarily change these prior conditions (Hoffman, Foster and Furstenberg Jr 1993, Hotz *et al* 1999). Other factors, especially family and individual characteristics that are difficult to measure contribute to the poorer than average outcomes of teenage mothers. The effects of teenage pregnancy alone may be over-emphasised if these factors are overlooked.

A number of reviews have been undertaken on the evidence on preventing and reducing unintended teenage pregnancies (see for example Cheesbrough *et al* 2002, Corcoran, O'Dell Miller and Bultman 1997, DiCenso, Guyatt and Willan 1999, Kane and Wellings 1999, Kirby 2001, Kirby and Coyle 1997, NHS Centre for Reviews and Dissemination 1997). A wide range of programmes has been used, differing in approach, components, duration, intensity and target population. Addressing both sexual and non-sexual risk factors is seen as critical in reducing levels of unintended teenage conceptions. Some aspects of behaviour can be addressed through risk-reduction interventions, but other less direct influences, such as socio-economic disadvantage and educational aspirations and levels, may be less tractable.

The most recent systematic reviews have concluded that the studies are not methodologically strong. Many suffer from the lack of a control group and the lack of pre-

and post-intervention data. Nevertheless some interventions have been found to be effective in preventing teenage pregnancies. A strong conclusion of the meta-analyses is the failure of abstinence-only programmes to delay the initiation of sexual intercourse or the level of sexual activity amongst teenagers (Cheesbrough *et al* 2002, DiCenso *et al* 1999, Kirby 2001, Tepperman, Davila, McClendon and Werner 1998). A review of twenty randomised control trails found that sex education programmes do not increase sexual activity (DiCenso *et al* 1999). This finding is confirmed by a methodical review of teenage pregnancy and interventions in the USA, Canada, Australia and New Zealand (Cheesbrough *et al* 2002). It found that sex education can increase the use of contraceptives amongst sexually active teenagers and that intensive community-based education and contraceptive services can reduce the rate of teenage conceptions.

A meta-analysis of programmes designed to prevent teenage pregnancy found that effective programmes reduced the risk of pregnancy, reduced unprotected intercourse and increased the frequency of contraceptive use, but did not fundamentally alter adolescent sexual behaviour (Tepperman *et al* 1998). They did not delay initiation of intercourse, reduce the frequency of intercourse or influence teenagers to use contraception when they were starting intercourse. Programmes that did succeed in preventing and reducing teenage pregnancy actively encouraged the correct use of contraception, provided non-judgemental access to contraceptives, discussed how to avoid pregnancy or sexual activity, discussed alternatives to sexual activity, and life options and choices within a context of age-specific interventions. A recent meta-analysis of evaluations of teenage pregnancy programmes in the USA and Canada updating previous work suggests sex education and improved access to contraceptives can reduce sexual risk-taking, pregnancy and childbearing among teenagers (Kirby 2001).

International comparisons reveal great variation in pregnancies in young women. A recent large-scale investigation examined the reasons for the wide variation in teenage pregnancy and birth rates among five developed countries: Canada, France, Great Britain, Sweden and the USA (Darroch, Singh and Frost 2001a, b, Singh, Darroch and Frost 2001). Although all five countries have a high *per capita* income and are highly developed and industrialised, they differ in many ways that have a potential impact on rates of teenage sexual behaviour. They differ in the extent of social and economic inequality, health care systems, the provision of services to teenagers and in societal attitudes to teenage sexual activity. Despite recent declines in rates of teenage pregnancy in the USA, the rate is currently two to four times that of the four other developed countries studied. The study found that variation in sexual behaviour is not an important contributor to explaining the differences in pregnancy levels between the countries studied.

However, differences in the use and effectiveness of contraception are likely to contribute substantially to differences in pregnancy rates. Differences in societal attitudes to teenage sexuality may influence the incidence of contraception. Contraceptive services and supplies are available to teenagers free or at low cost in all of the countries studied except the USA, and efforts are made to facilitate easy access to these services. There may also be differences in teenagers' attitudes to and knowledge of contraception, the level of confidentiality and parental support or opposition.

Even so, sexual activity and contraceptive use are themselves influenced by a large number of social, economic and cultural factors. Comparatively widespread disadvantage in the USA may help explain why USA teenagers have higher birthrates and pregnancy rates than those in other developed countries (Singh *et al* 2001). Although Cheesbrough *et al* (2002) do not draw causal inferences, they note that both New Zealand and the USA experienced growing inequality and rates of teenage pregnancy in the 1980s.

Falling rates of teenage pregnancy in the industrialised world over the past 25 years suggests widespread underlying causes, including the increased importance of education, increased educational aspirations and widening horizons for young women beyond motherhood and family formation (Singh and Darroch 2000).

The emerging view is that risk reduction measures which address sexual behaviour, and which are designed to improve sexual knowledge or the social skills required to implement that knowledge, can be effective in reducing unintended teenage pregnancies, although they may not reduce the level of sexual activity. Non-sexual risk factors, including economic and social disadvantage and poor educational achievement may be more difficult to address, but are important policy targets because they shape the incentives of teenagers to become pregnant.

6.3 Educational underachievement

The evidence suggests that schooling (and formal education more broadly) can make a difference to many aspects of adult well-being. While mechanisms through which schooling affects adult outcomes are not fully understood, they involve the acquisition of basic skills such as literacy and numeracy, the positive effect of education on measured cognitive ability, and of wider behaviours, traits and social skills that are taught and reinforced through participation in schooling.

There is good (though incomplete) evidence for the effectiveness of schooling. This suggests that raising the performance of the school system is one of the less risky and less complex interventions to improve outcomes for children and young people.

Strategies that are likely to lead to learning gains for all students include improving school readiness, teacher quality, and school improvement. Given the importance of education and qualifications as correlates of adult well-being, raising the educational achievement of those with the fewest skills is a priority. The most effective approach is likely to be through early interventions to raise literacy and numeracy. There is some evidence that such interventions may also have a positive effect on behavioural outcomes, though the direction of the relationship between reading and behavioural difficulties is not well understood. Early interventions to address problem behaviours may also improve educational outcomes.

A synthesis of the research on the impact of school resources on student attainment concludes that the most cost-effective strategies for raising student achievement in areas of low socio-economic status are expanding pre-kindergarten participation; providing teachers with more resources; and implementing targeted pupil-teacher ratio reductions (Grissmer, Flanagan, Kawata and Williamson 2000). However, this finding may be specific to the time and place studied and not directly applicable in the New Zealand context.

If children begin school inadequately prepared, it is likely that they will fall behind from the start. A bad start is likely to carry through into the later years of schooling and involve increased risk of delinquent and antisocial behaviour (Doherty 1997, Yoshikawa 1995). Educators see the behavioural aspects of school readiness as being at least as important as academic readiness (Currie 2000). The most important elements of school readiness have been identified as: age-appropriate language; general knowledge; cognitive skills; enthusiasm; curiosity; physical health, being rested and well-nourished; being able to take turns and knowing how to sit and pay attention (Doherty 1997, Lewit and Baker 1995).

Parents can and do provide many of the foundations for school readiness by providing cognitive stimulation and a secure stable and caring home environment. However, paid work can reduce the time available to parents for interacting with their children. In addition, many parents lack the time, skills and other resources needed to provide the optimum level of stimulation for infants and toddlers. Early childhood education or childcare can complement parenting in helping to prepare children for school.

A number of studies indicate that early childhood education leads to improved school readiness (Boocock and Lerner 1998, Cleveland and Krashinsky 1998, Doherty 1996). Newman *et al* (2000) argue that there are significant savings from quality childcare due to reduced crime and delinquency. However, because of the lack of random control groups, it is difficult to control for all the household factors that could plausibly also have an effect such as the likelihood that parents with a greater interest in their children's education will choose to place their children in early education (Fergusson, Horwood and Lynskey 1994c).

Additional evidence is available from targeted early childhood programmes, where subsidised early childhood education is available to families on the basis of assessed need. The US Head Start programme, which provides early education to 3 and 4 year olds in families assessed as being below the official poverty line, has been evaluated a number of times, although there have been no control-group studies. Some evaluations found that gains in test scores in the earlier years of school for Head Start participants tended to fade later on. However, a recent study found that Head Start appeared to have a positive effect on a variety of long-term outcomes, including completing high school and reduced involvement in crime (Garces, Thomas and Currie 2000).

School readiness can be enhanced by childcare subsidies that aim to help mothers remain in or enter the paid workforce. Childcare subsidies may be cost-effective in the short term as they help low income families move off and stay off benefits, and enable them to access higher quality childcare (Rohacek 1998). Both these outcomes may have benefits for children's school readiness. Improved outcomes for young children resulting from such programmes may result from better access to quality childcare rather than from increased family income *per se* (Duncan and Chase-Lansdale 2000, Huston 2000).

A number of studies find that childcare quality has an effect on measured outcomes for young children, such as performance on tests administered at age 5 and older (Cleveland and Krashinsky 1998, Doherty 1996, NICHD 1999). The three factors most commonly associated with quality are staff-child ratio, group size, and staff training (Smith, Grima, Gaffney and Powell 2000). However, it is not clear to what extent these factors actually measure the relevant dimensions of the quality of early education (Besharov and Samari 2000). Studies showing a link between childcare quality and outcomes may therefore be doing no more than reflecting differences in parental characteristics such as parenting style. A study based in NLSY data found that quality of childcare, based on input measures, makes little difference to outcomes when family characteristics are controlled for (Blau 1999). The impact of childcare quality appears to be more important for children from disadvantaged families than for other families (Currie 2000, Peisner-Feinberg, Burchinal, Clifford, Yazejian, Culkin, Zelazo, Howes, Byler, Kagan and Rustici 1999).

It is likely that standards of pre-school childcare and education in the US are more variable than in most other OECD countries where regulation is greater and subsidies are higher. This may make generalising US results to other countries problematic. However, overall the evidence indicates that childcare quality does make a difference, although

some proxies commonly used for quality, such as staff-child ratios and staff pay rates, may be inadequate.

A vast body of literature attempts to explain precisely what it is that schools do that makes a difference to the outcomes of students, and why some schools are more effective than others in developing the cognitive and other abilities of their students. Even so, there remains uncertainty about the precise characteristics, inputs, and processes that operate within schools and the way in which they affect student outcomes.

The evidence indicates that the quality of teachers (as indicated by measures of teacher ability) is strongly related to student achievement and accounts for up to 30% of the total variation in student achievement (Hanushek, Kain and Rivkin 1998, McBer 2000). Teacher in-service training has been associated with significantly increased pupil test scores (Booth, Norton, Sanderson and Stroombergen 2000). However, not all in-service training has an equal impact on student achievement. The efficacy and effectiveness of professional development programmes relies on the extent to which they are well designed and appropriately targeted.

Overall, the evidence suggests that class size influences student achievement (as measured by gains in test scores). The benefits of smaller class size seem to be greater in the first few years of schooling, especially for low achieving, low socio-economic and ethnic minority pupils, and when they are sustained for a period of time (Grissmer *et al* 2000). A study using data from the CHDS found that persistent class size reduction policies were associated with significant increases in reading performance from age 8 to 13. Lower class sizes were also associated with more completed education at age 21, lower incidence of unemployment spells, and, conditional on experiencing unemployment, shorter durations (Boozer and Maloney 2001). Remaining in a small class has detectable effects, whereas the educational gains of a short period in a small class soon wear off (Finn, Gerber, Achilles and Boyd-Zaharias 2001).

There is little consistent evidence of the effect of mixing students of differing abilities or socio-economic backgrounds within the overall roll of a school on student outcomes (Harker and Nash 1996, Nechyba *et al* 1999). However, the evidence suggests that organising children into small mixed-ability groups within classrooms has positive effects on the performance of low-SES children, to a greater extent than it has negative effects on high-SES children. However, the research does not explore the causal channel for these effects and does not control for unobserved variables (Nechyba *et al* 1999).

The best evidence suggests at least a moderate positive impact of parental involvement in schooling for their own children, but that such involvement accounts for only a small portion of the overall family effects on student outcomes (Nechyba *et al* 1999). Parents' direct involvement in school work is more beneficial than in extra-curricular activities (Reynolds and Teddlie 2000). In New Zealand, there is some evidence to suggest that cultural barriers may result in Maori and Pacific parents having a lower level of direct involvement in their children's schooling (Ministry of Education n.d.).

The literature indicates that the most effective approaches to tackling school truancy are comprehensive and collaborative, and target the reduction of risk factors associated with the incidence of truancy. The approaches showing the most promise, not only of reducing truancy, but also of affecting its risk factors, include parental involvement; meaningful sanctions or consequences for truancy; meaningful incentives for school attendance; ongoing school-based truancy reduction programmes; and the involvement of community resources (law enforcement) (Baker, Sigmon and Nugent 2001).

There is a large “school effectiveness” literature that seeks to identify the characteristics shared by schools that are successful in raising student achievement. This literature concludes that there is no one single factor that characterises effective schools, but that such schools have a combination of characteristics that interact to create a focus on learning, positive ethos, and strong goal orientation. Several of the qualitative features of effective schools do stand out. They include firm and purposeful leadership by the school principal, the sharing of decision-making and academic leadership; a positive school ethos; a clear, shared sense of common purpose for student learning and clear goal setting and achievement monitoring (Fullan and Mascall 2000, Rentoul and Rosanowski 2000).

Research in the UK has shown that after controlling for background factors and school effects, students who participate in study support (after hours learning) do significantly better in the national GCSE examinations than students who do not. One of the key reasons for the success of study support was an ethos that encouraged self-regulated learning (MacBeth, Kirwan and Myers 2001).

Alternative schools for disruptive youths are often presented as a solution to the problem of disruptive and disorderly students who are at risk of early school leaving through dropout or exclusion. There is little literature in this area, and a US review of an alternative education initiative concluded that the five alternative schools studied were far too variable in nature, student composition, structure, and purpose to warrant any blanket statement about their effectiveness (Gottfredson in press).

6.4 Economic inactivity

Early failure in schooling and prolonged spells of unemployment appear to be detrimental to long term employment and well-being. Long spells of unemployment may damage prospects either by allowing skills to decay or by sending unfavourable signals to prospective employers. The type of jobs that young adults enter on joining the workforce may affect their long-term earnings and employment outcomes.

However, evidence from the USA, UK and Australia on early labour market experience is mixed. Rapid job turnover and short spells of unemployment do not seem to be detrimental and may be beneficial (Savage 1999). Young people entering low paid jobs with higher qualifications are less likely to be trapped in these jobs. They may merely represent a transitional phase in their working careers. But for those with fewer qualifications there may be no real gains from low paying jobs. A number may drift between employment and welfare. Although participation in the labour market is viewed as an important mechanism for achieving further skill development and earnings growth, low paid work may do little to build skills and improve labour market outcomes.

The New Zealand evidence suggests that there may be two broad groups that warrant particular attention. One group suggested by the CHDS dataset is the nearly 14% of 16 to 20 year olds who spend around 70% of those years inactive. Some part of this group is likely to be young people characterised by multiple disadvantage. Another group are those early school leavers who find employment for longer periods, but in jobs that may be part-time, or offer little by way of career paths or earnings progression.

Through the late 1980s and 1990s there have been extensive cross-country comparisons of pathways from school to work to determine what makes some more effective than others. A detailed study of the school-to-work policies of 14 countries in the late 1990s identified five key features of successful transition systems (OECD 2000). They have well-

organised pathways from initial education through further study to work. These pathways display connectedness between stages, flexibility in career choice and adaptability of skills. They provide opportunities to combine workplace experience with education. They involve effective assistance with active career planning. Safety nets that assist early school leavers re-enter upper secondary school or to find work are characterised by overall policy coherence, local delivery mechanisms that coordinate and tailor support services, and entitlements that are linked to obligations. Countries achieving good transition outcomes are characterised by strong institutional frameworks, for example in the use of brokers to match employers and employees. Fewer of these characteristics are evident in countries where general education pathways dominate, such as New Zealand, compared to apprenticeship countries (like Germany) and where there is a mix of pathways (Austria, Norway) (OECD 1998). However, the German apprenticeship scheme may not be applicable in more decentralised labour markets (Ryan 2001).

School-to-work transitions can involve building work-related skills. Key questions are the relative merits, for the less academically inclined, of promoting general education rather than vocational training, and of part-time schooling, work and apprenticeships *versus* full time schooling. The empirical evidence is mixed. Furthermore, comparisons are difficult because less academically able students typically take vocational courses or apprenticeships (Ryan 2001).

The opportunities for improving the poor employment outcomes experienced by these groups appear to lie in providing a better mix of services, in a more integrated way, by providing more options for vocational or work-based training and increasing assistance with training through remaining longer at school, training during post-schooling and pre-employment, or industry training post employment.

7 Conclusion

There is increasing concern by governments that they should maximise the benefits arising from their expenditures. At present however, there is no systematic way of allocating scarce resources in a way that enhances overall well-being. Current allocations reflect implicit judgements about the expected value of the expenditures. However, there is no clear means of identifying the outcomes of interest, how interventions can contribute to the outcomes or how cost-effective they are. Identifying the outcomes that matter and the interventions that are most cost-effective in achieving them can provide information to decision-makers about the best ways to deliver results.

The central aim of this paper was to provide an empirically-robust framework that can be used to compare intervention across a range of social sectors. There are two key components to the framework.

The first is a life-course view of child development that emphasises that experiences and influences in childhood can affect well-being throughout life. This approach involves investigating which factors contribute most to well-being, and which factors lead to negative outcomes. Understanding the underlying causes of good and bad outcomes can be helpful in designing effective interventions that enhance well-being.

The second component involves viewing social expenditures as investments addressed at achieving particular outcomes, typically directed at enhancing well-being. This approach provides a means of comparing the costs and benefits of interventions of different types directed at specific outcomes. A social investment perspective, whether quantitative or qualitative, involves linking interventions to their intended outcomes by seeing how well they modify the causes of poor adult well-being; considering the size and distribution (across people and time) of the costs and benefits; and assessing the extent to which the potential benefits can realistically be achieved.

The evidence indicates that child development is the consequence of a large number of different influences, each of which, with the exception of individual heritable factors, plays a relatively small part in the eventual level and pattern of adult outcomes. This suggests that programmes and policies that attempt to target a single adverse influence or risk factor are unlikely to be effective. As Fergusson (1998, p 171) comments:

What the CHDS findings clearly suggest is the need for policies that are targeted at meeting the needs of at-risk families and at-risk children. This theme has clearly emerged in the analyses of multiple-problem adolescents and suicidal youth that showed both of these endpoints were determined by combinations of risk factors that conspired over the individual's life course to increase the risks of personal maladjustment or suicidal behaviour.

Furthermore, the evidence shows that a considerable part of the variation in child and adult outcomes cannot currently be explained in a secure causal sense. There is considerable remaining uncertainty about the nature and strength of the causal linkages that act through time and no overarching theory to tie together the research findings. This suggests that it would be extremely unwise to place undue reliance on any one form of intervention or response to poor childhood and early adult outcomes or to put too much emphasis on any one stage in the developmental path between conception and mature adulthood.

This paper has reviewed the available evidence on the effectiveness of interventions to address selected outcomes: youth suicide, teenage pregnancy, educational underachievement and youth inactivity. Most of the evaluative evidence comes from the USA and relates to discrete programmes and interventions, usually targeted at children or young people defined as at-risk in some way, or focused on the needs of individuals who have already demonstrated problematic behaviour or experienced poor outcomes previously. Even then, the evidence is very patchy. Some areas have a large number of high-quality studies and have good meta-analyses and systematic reviews; others have a far weaker empirical base. In other areas, there is evidence, but it fails to provide clear guidance for policy. For example, the evidence on effective programmes to reduce teenage pregnancy – of concern in New Zealand (though with less causal significance for later outcomes than often thought) – fails to give a clear indication of what works. The difficulty of establishing a clear sense of what might be effective may reflect the complexity of the underlying causes of teenage pregnancy. If causes operate at different levels, then the pattern of intervention should too. Studies of individual interventions cannot accommodate this easily.

It is also apparent that the number of good studies concerned with relative cost-effectiveness of different programmes and interventions is far smaller than those focused exclusively on effectiveness. Universal programmes, which consume the majority of public resources, are far less likely to be evaluated than targeted programmes, partly because they are much more difficult to study with a comparative or experimental design and partly because they are likely to be far more difficult to alter significantly than more marginal, selective programmes. Some types of intervention are rarely considered in evaluative research terms at all. Most legislation affecting children and families fits this category. Much more needs to be done to identify the potential consequences of legislation. This has not been possible in this paper.

A number of different types of general interventions that aim to enable children to deal with a wide range of adverse circumstances and are focused on at-risk families with young children have been shown to be effective at reducing the risk of serious problems arising in later life. In later childhood, interventions tend to be less concerned with health and general psycho-social development and more focused on reducing the risk of specific adverse outcomes. Interventions designed to reduce risk-taking behaviours among adolescents and young adults tend to focus on substance abuse, sexual activity and driving.

Given the importance of education as a protective factor against later adverse outcomes, such as criminal behaviour, raising the educational achievement of those who are likely otherwise to acquire the fewest skills is a priority. The most effective way of doing this appears to be through early interventions with at-risk children focused on school readiness, literacy and numeracy. There is also evidence for schooling interventions, both systemic and pedagogical, that are effective in raising cognitive skills and educational attainment.

The evidence on effectiveness and cost-effectiveness provides some guidance for implementing a cost-effective portfolio of policies designed to improve children's and young people's well-being. Interventions should be assessed, not in isolation, but as elements in a balanced portfolio of investments to improve well-being through the life-course. The portfolio should contain a number of different approaches to addressing the different outcomes given the uncertainty about causation; a mix of early and late interventions; targeted and universal programmes; and interventions focused on different outcome domains relevant to eventual adult well-being.

Given the existence of major universal programmes in areas such as health and education, improvements in outcomes are likely to be brought about at the margin by either making adjustments to these programmes with a small effect on a large number of people and/or by targeting individuals and groups particularly likely to experience poor outcomes in later life using relatively intensive interventions.

Particularly in the early years, a mix of universal and selective interventions is likely to be needed because poor outcomes are not always visible, early risk factors do not explain all later outcomes (Type I and Type II errors) and universal programmes can provide a basis for screening the population for more targeted interventions. Later on, more selective programmes are likely to be more effective for those at risk of poor outcomes, though this can come at greatly increased cost.

The design and selection of interventions should reflect the fact that many causal factors may have their effect by acting in combination, so that a portfolio of interventions that between them address multiple risk factors (ie, by acting at different levels such as the individual, family, school and community) is likely to be most effective.

The main drawback of preventive interventions is the likely long time-lag between the intervention and its effects in terms of outcomes such as reduced offending, though well-targeted early childhood home visiting programmes can be cost-saving to government when later delinquency and crime costs are computed. This suggests the need for a mix of early preventive programmes and later programmes with children who have already shown some signs of antisocial behaviour, both targeted on those most at risk.

It is important to base the resulting portfolio of investment in children and young people on secure evidence of what works, for whom, at what period of development, for how long and at what cost. However, implementation is a vital part of effective interventions and needs to reflect particular contexts and cultures. Simply copying interventions that may work overseas is not sufficient to ensure that they are effective in New Zealand. Also, it is important to consider not only when government intervention might be superior to alternatives, but also whether regulation, service provision or purchasing is the most appropriate form of intervention.

Effective interventions should be designed and selected cognisant of differences between age groups in patterns of development, the dimensions and causes of well-being and the need for different emphases and strategies at different ages. Some actions designed to improve well-being will address a specific age group while others may benefit the entire period from infancy to adulthood. Different groups need different degrees of intervention ranging from normal access to the “core” universal programmes (eg, compulsory schooling) to enrolment in targeted, comprehensive, long-term programmes.

This paper represents a preliminary overview of issues at the heart of the well-being of children and young adults in New Zealand. It has only begun to bring together the evidence and insights necessary to operationalise a social investment framework. Much remains to be done to strengthen and deepen understanding of the causal relationships between childhood and adulthood, and, in particular, the factors underlying poor states of well-being in New Zealand; and the evidence from both New Zealand and elsewhere of the effectiveness of interventions. The paper does not include the detailed description and understanding of the current New Zealand configuration of investment, which forms the point of departure for any analysis of the relative priority to be given to different sorts of investment in light of the evidence of the likely costs and benefits of different investments. This analysis forms a central part of future research.

References

- Alexander, W Robert J, Murat Genc and Mohammad Jaforullah (2000) "Maori disadvantage in the labour market." Dunedin, Department of Economics, University of Otago, Unpublished paper.
- Amato, Paul R (2000) "The consequences of divorce for adults and children." *Journal of Marriage and Family* 62(4): 1269-1287.
- Amato, Paul R (2001) "Children of divorce in the 1990s: An update of the Amato and Keith (1991) meta-analysis." *Journal of Family Psychology* 15(3): 355-370.
- Amato, Paul R and Bruce Keith (1991) "Parental divorce and the well-being of children: A meta-analysis." *Psychological Bulletin* 110(1): 26-46.
- Andrews, DA and James Bonta (1998) *The psychology of criminal conduct*. (Cincinnati OH: Anderson Publishing).
- Aos, Steve, Polly Phipps, Robert Barnoski and Roxanne Lieb (2001) "The comparative costs and benefits of programs to reduce crime." Olympia, WA, Washington State Institute for Public Policy, Document No 01-05-1201, December.
<<http://www.wsipp.wa.gov/crime/pdf/costbenefit.pdf>>
- Arnett, J (1992) "Reckless behavior in adolescence: A developmental perspective." *Developmental Review* 12: 339-373.
- Baker, Maureen, Jan Pryor and Ian Shirley (2000) "Lone parenthood and childhood outcomes. A review of the literature." Wellington, Ministry of Social Policy, May.
- Baker, Myriam L, Jane Nady Sigmon and M Elaine Nugent (2001) "Truancy reduction: Keeping students in school." Rockville MD, US Department of Justice, Office of Justice Programs, Office of Juvenile Justice and Delinquency Prevention, Juvenile Justice Bulletin September 2001.
- Barker, D (1992) *Fetal and infant origins of adult disease*. (London: British Medical Journal Books).
- Barker, George and Tim Maloney (1999) "Final regression results on the cognitive achievement of children in the Christchurch Health and Development Study with corrections for attrition from this longitudinal study." Wellington, Law and Economics Consulting Group, Report prepared for the New Zealand Treasury, August.
- Beaton, Albert E, Michael O Martin, Ina VS Mullis, Eugenio J Gonzalez, Teresa A Smith and Dana L Kelly (1997a) "Science achievement in the middle school years: IEA's third international mathematics and science report." Chestnut Hill, MA, Centre for the Study of Testing, Evaluation, and Educational Policy, Boston College.
<<http://isc.bc.edu/timss1995i/SciencB.html>>
- Beaton, Albert E, Ina VS Mullis, Michael O Martin, Eugenio J Gonzalez, Dana L Kelly and Teresa A Smith (1997b) "Mathematics achievement in the middle school years: IEA's third international mathematics and science report." Chestnut Hill, MA, Centre for the Study of Testing, Evaluation, and Educational Policy, Boston College. <<http://isc.bc.edu/timss1995i/MathB.html>>
- Beautrais, Annette (1998) "A review of evidence: In our hands - the New Zealand youth suicide prevention strategy." Wellington, Ministry of Health.
<<http://youthaffairs.webhostcontrol.com/pag.cfm?i=72>>
- Beautrais, Annette (2000) "Risk factors for suicide and attempted suicide among young people." *Australian and New Zealand Journal of Psychiatry* 34: 420-436.
- Beautrais, Annette (2001) "Effectiveness of barriers at suicide jumping sites: A case study." *Australian and New Zealand Journal of Psychiatry* 35: 557-562.

- Behrman, Jere R and Mark R Rosenzweig (2002) "Does increasing women's schooling raise the schooling of the next generation?" *American Economic Review* 92(1): 323-334.
- Belsky, Jay (2001) "Emanuel Miller lecture: Developmental risks (still) associated with early child care." *Journal of Child Psychology and Psychiatry* 42(7): 845-859.
- Besharov, Douglas J and Nazanin Samari (2000) "'quality' child care? Assessing the impact on child outcomes." Evanston and Chicago, Joint Center for Poverty Research, Northwestern University/University of Chicago. <<http://www.jcpr.org/conferences/oldbriefings/quality.pdf>>
- Blau, David M (1999) "The effect of child care characteristics on child development." *The Journal of Human Resources* 34(Fall): 786-822.
- Boaz, Annette, Deborah Ashby and Ken Young (2002) "Systematic reviews: What have they got to offer evidence based policy and practice." London, Economic and Social Research Council (ESRC) UK Centre for Evidence Based Policy and Practice, Queen Mary, University of London, Working Paper No 2, January. <<http://www.evidencenetwork.org/Documents/wp2.pdf>>
- Boggess, Scott, Mary Corcoran and Stephen P Jenkins (1999) *Cycles of disadvantage?* (Wellington: Institute of Policy Studies).
- Boocock, Sarane Spence and Mary B Lerner (1998) "Early care and education for children in poverty: Long-term outcomes in other nations." in W Steven Barnett and Sarane Spence Boocock eds *Early care and education for children in poverty: Promises, programs, and long term results* (Albany: State University of New York Press): 45-76.
- Booth, Tony, Peter Norton, Kel Sanderson and Adolf Stroombergen (2000) "A literature review of the effect of school resourcing on education outcomes." Wellington, Ministry of Education, March.
- Boozer, Michael A and Tim Maloney (2001) "The effects of class size on the long run growth in reading abilities and early adult outcomes in the Christchurch Health and Development Study." Wellington, New Zealand Treasury, Working Paper No 01/14. <<http://www.treasury.govt.nz/workingpapers/2001/twp01-14.pdf>>
- Borjas, George J (1992) "Ethnic capital and intergenerational mobility." *Quarterly Journal of Economics* 107(1): 123-150.
- Bowles, Samuel, Herbert Gintis and Melissa Osborne (2001) "The determinants of earnings: A behavioral approach." *Journal of Economic Literature* 39(4): 1137-1176.
- Briere, John N and Diana M Elliott (1994) "Immediate and long-term impacts of child sexual abuse." *Future of Children* 4(2): 54-69. <http://www.futureofchildren.org/usr_doc/vol4no2ART3%2Epdf>
- Brook, JS, DW Brook, AS Gordon and M Whiteman (1990) "The psychosocial etiology of adolescent drug use: A family interactional approach." *Genetic, Social, and General Psychology Monographs* 116: 111-267.
- Brooks-Gunn, Jeanne and Greg J Duncan (1997) "The effects of poverty on children." *Future of Children* 7(2): 55-71. <http://www.futureofchildren.org/usr_doc/vol7no2ART4%2Epdf>
- Bruer, John T (1998) "Brain science, brain fiction." *Educational Leadership* 6(3): 14-18.
- Burgess, Simon, Karen Gardiner and Carol Propper (2001) "Growing up: School, family and area influences on adolescents' later life chances." London, Centre for Analysis of Social Exclusion, London School of Economics, CASE Paper No 49, February. <<http://sticerd.lse.ac.uk/dps/case/cp/CASEpaper49.pdf>>
- Bynner, John (1998a) "Poverty in the early years: Evidence from the 1958 and 1970 birth cohort studies." London, Centre for Longitudinal Studies, Institute of Education,

University of London, HM Treasury Workshop on Persistent Poverty and Life-time Inequality, 17-18 November.

- Bynner, John (1998b) "Risks and outcomes of social exclusion: Insights from longitudinal data." London, Centre for Longitudinal Studies, Institute of Education, University of London, OECD-CERI Project on Social Exclusion.
<<http://www1.oecd.org/els/pdfs/EDSCERIIEDOCA002.pdf>>
- Bynner, John (n.d.) "Risks and outcomes of social exclusion insights from longitudinal data." Paris, Organisation for Economic Cooperation and Development, OECD-CERI Project on Social Exclusion.
<<http://www1.oecd.org/els/pdfs/EDSCERIIEDOCA002.pdf>>
- Chapple, Simon (2000) "Maori socio-economic disparity." Wellington, Ministry of Social Policy, Paper for a Ministry of Social Policy Seminar, 15 September.
- Chase-Lansdale, P Lindsay (1998) "How developmental psychologists think about family process and child development in low income families." Chicago, The Irving B. Harris Graduate School of Public Policy Studies, University of Chicago, Working Paper Series: Supplement 06.
<http://www.harrisschool.uchicago.edu/pdf/wpsup_06.pdf>
- Cheesbrough, Sarah, Roger Ingham and Doreen Massey (2002) "Reducing the rate of teenage conceptions - A review of the international evidence on preventing and reducing teenage conceptions: The United States, Canada, Australia and New Zealand." London, Health Development Agency. <http://www.hda-online.org.uk/downloads/pdfs/Teenconcep_revise_v3.pdf>
- Cleveland, Gordon and Michael Krashinsky (1998) "The benefits and costs of good child care: The economic rationale for public investment in young children." Toronto, University of Toronto at Scarborough, Centre for Urban and Community Studies, Childcare Resource and Research Unit, March.
<<http://www.childcarecanada.org/download/bc.doc>>
- Coley, Rebekah Levine and P Lindsay Chase-Lansdale (1997) "Adolescent pregnancy and parenthood: Recent evidence and future directions." Evanston and Chicago, Joint Center for Poverty Research, Northwestern University/University of Chicago, JCPR Working Paper 17, October.
<<http://www.jcpr.org/wp/wpdownload.cfm?pdfink=wpfiles/teen.pdf>>
- Corak, Miles and Andrew Heisz (1998) "Neighbourhoods, social capital and the long-term prospects for children." Ottawa, Statistics Canada, Paper presented to CSLS Conference on the State of Living Standards and the Quality of Life in Canada, Ottawa, Ontario, 30-31 October. <<http://www.csls.ca/oct/corak.pdf>>
- Corcoran, Jacqueline, Pamela O'Dell Miller and Linda Bultman (1997) "Effectiveness of prevention programs for adolescent pregnancy: A meta-analysis." *Journal of Marriage and the Family* 59: 551 - 567.
- Crooks, Terry and Robyn Caygill (1999) "New Zealand's national education monitoring project: Maori student achievement, 1995-1998." Dunedin, University of Otago, Paper presented at the combined annual conference of the New Zealand Association for Research in Education and the Australian Association for Research in Education, Melbourne, November 29 - December 2.
- CSR Incorporated (1997) "Understanding youth development: Promoting positive pathways of growth." Family and Youth Services Bureau; Administration on Children, Youth and Families; Administration for Children and Families; US Department of Health and Human Services, January.
<<http://www.ncfy.com/pubs/undyouth.htm>>
- Currie, Janet (2000) "Early childhood intervention programs: What do we know?" Evanston and Chicago, Joint Center for Poverty Research, Northwestern University/University of Chicago, JCPR Working Paper 169, April.
<http://www.jcpr.org/wpfiles/currie_early_childhood.pdf>

- Currie, Janet and Rosemary Hyson (1999) "Is the impact of health shocks cushioned by socioeconomic status? The case of low birthweight." *American Economic Review* 89(2): 245-250.
- Curtain, Richard (2001) "How young people are faring: Key indicators 2001." Melbourne, Curtain Consulting, Report prepared for Dusseldorp Skills Forum, October. <http://dsf.org.au/papers/dl/hypaf01/hypaf01_curtain.doc>
- Cuttance, Peter (1998) "Quality assurance reviews as a catalyst for school improvement in Australia." in A Hargreaves, A Lieberman, M Fullan and D Hopkins eds *International handbook of educational change* (Hingham, MA: Kluwer Academic Publishers): 1135-1162.
- Darroch, Jacqueline E, Susheela Singh and Jennifer J Frost (2001a) "Differences in teenage pregnancy rates among five developed countries: The roles of sexual activity and contraceptive use." *Family Planning Perspectives* 33(6): 244-250 & 281. <<http://www.agi-usa.org/pubs/journals/3325101.pdf>>
- Darroch, Jacqueline E, Susheela Singh and Jennifer J Frost (2001b) "Teenage sexual and reproductive health in developed countries: Can more progress be made?" New York, Alan Guttmacher Institute, Occasional Report No 3, November. <http://www.guttmacher.org/pubs/eurosynth_rpt.pdf>
- Department of Corrections (2001) "About time: Turning people away from a life of crime and reducing reoffending." Wellington, Department of Corrections, Report to the Minister of Corrections. <<http://www.corrections.govt.nz/objects/ps/33/633.url.pdf>>
- Derzon, James H (1999) "The effectiveness of school-based interventions for preventing and reducing violence." Nashville TN, Center for Evaluation Research and Methodology, Vanderbilt Institute for Public Policy Studies. <<http://hamfish.org/pub/arss99sd.pdf>>
- DiCenso, Alba, Gordon Guyatt and Andy Willan (1999) "A systematic review of the effectiveness of adolescent pregnancy primary prevention programs." Toronto, Ontario Public Health Research, Education and Development Program, Effective Public Health Practice Project, March. <http://www.city.hamilton.on.ca/sphs/EPHPP/Reviews/Reviews98_99/Adolescent%20Pregnancy%20Prevention%20review.pdf>
- Dickson, Nigel, Charlotte Paul, Peter Herbison and Phil Silva (1998) "First sexual intercourse: Age, coercion, and later regrets reported by a birth cohort." *British Medical Journal* 316: 29-33. <<http://bmj.com/cgi/reprint/316/7124/29.pdf>>
- Dickson, Nigel, Christine Rimene and Charlotte Paul (2000) "Pregnancies among New Zealand teenagers: Trends, current status and international comparisons." *New Zealand Medical Journal* 113: 241-245.
- Doherty, Gillian (1996) "The great child care debate: The long-term effects of non-parental child care." Toronto, Childcare Resource and Research Unit, Centre for Urban and Community Studies, University of Toronto, Occasional Paper No 7, August. <<http://www.childcarecanada.org/download/7op.doc>>
- Doherty, Gillian (1997) "Zero to six: The basis for school readiness." Ottawa, Applied Research Branch, Human Resources Development Canada, Research paper R-97-8E, May. <<http://www.hrdc-drhc.gc.ca/arb/publications/research/r-97-8e.pdf>>
- Duncan, Greg J and P Lindsay Chase-Lansdale (2000) "Welfare reform and child well-being." Evanston IL, Institute for Policy Research, Northwestern University, December. <<http://www.olin.wustl.edu/macarthur/papers/wp-duncan-chaselansdale.pdf>>
- Durlak, Joseph A (1998) "Common risk and protective factors in successful prevention programs." *American Journal of Orthopsychiatry* 68(4): 512-521.

- Eccles, Jacquelynne S (1999) "The development of children ages 6 to 14." *Future of Children* 9(2): 30-45.
<http://www.futureofchildren.org/usr_doc/vol9no2Art3done.pdf>
- Ermisch, J and RE Wright (1996) "The economic determinants of young people's household formation." *Economica* 64: 627-644.
- Fergusson, David, John Horwood and Lianne J Woodward (2000) "Risk factors and life processes associated with the onset of suicidal behaviour during adolescence and early adulthood." *Psychological Medicine* 30: 23-39.
- Fergusson, David M (1998) "The Christchurch Health and Development Study: An overview and some key findings." *Social Policy Journal of New Zealand* 10: 154-176.
- Fergusson, David M and L John Horwood (1997) "Gender differences in educational achievement in a New Zealand birth cohort." *New Zealand Journal of Educational Studies* 32(1): 83-96.
- Fergusson, David M, L John Horwood and Michael T Lynskey (1997) "Childhood sexual abuse, adolescent sexual behaviours and sexual revictimisation." *Child Abuse and Neglect* 21(8): 789-803.
- Fergusson, David M, L John Horwood and Michael T Lynskey (1994a) "The comorbidities of adolescent problem behaviors: A latent class model." *Journal of Abnormal Child Psychology* 22(3): 339-354.
- Fergusson, David M, L John Horwood and Michael T Lynskey (1994b) "The childhoods of multiple problem adolescents: A 15-year longitudinal study." *Journal of Child Psychology and Psychiatry* 35(6): 1123-1140.
- Fergusson, David M, L John Horwood and Michael T Lynskey (1994c) "A longitudinal study of early childhood education and subsequent academic achievement." *Australian Psychologist* 29(2): 110-115.
- Fergusson, David M, L John Horwood and Lianne J Woodward (2001) "Teenage pregnancy: Cause for concern." *New Zealand Medical Journal* 114(1135): 301-303.
- Fergusson, David M, Michael T Lynskey and L John Horwood (1994d) "The effects of parental separation; the timing of separation and gender on children's performance on cognitive tests." *Journal of Child Psychology and Psychiatry* 35(6): 1077-1092.
- Fergusson, David M, NR Swain-Campbell and L John Horwood (in press) "Outcomes of leaving school without formal educational qualifications." *New Zealand Journal of Educational Studies*.
- Fergusson, David M and Lianne J Woodward (1999) "Maternal age and educational and psychosocial outcomes in early adulthood." *Journal of Child Psychology and Psychiatry* 43(3): 479-489.
- Fields, Jason M and Kristin E Smith (1998) *Poverty, family structure, and child well-being: Indicators from the SIPP*. (Washington DC: Population Division, US Bureau of the Census).
- Finn, Jeremy D, Susan B Gerber, Charles M Achilles and Jayne Boyd-Zaharias (2001) "The enduring effects of small classes." *Teachers College Record* 103(2): 145-183.
- Fischhoff, Baruch (1992) "Risk taking: A developmental perspective." in J Frank Yates ed *Risk taking* (New York: Wiley): 133-162.
- Flockton, Lester and Terry Crooks (1999) "New Zealand's national education monitoring project: The first four year cycle, 1995 – 1998." Dunedin, Educational Assessment Research Unit, University of Otago.
<http://nemp.otago.ac.nz/PDFs/other_studies/NEMP_The1st_4Years.pdf>

- Fonagy, Peter (2000) "Evidence based child mental health: The findings of a comprehensive review." London, Child and Family Center and Center for Outcomes Research and Effectiveness, Menninger Foundation, Paper presented to "Child mental health interventions: What works for whom?", Centre for Child and Adolescent Psychiatry, Oslo, Norway, 29 May.
<<http://www.psychol.ucl.ac.uk/psychoanalysis/zipped/oslotwopapers.rtf>>
- Fullan, Michael and Blair Mascall (2000) "Human resource issues in education: A literature review." Toronto, Ontario Institute for Studies in Education of the University of Toronto, Report to the Ministry of Education, Wellington, April.
- Garces, Eliana, Duncan Thomas and Janet Currie (2000) "Longer term effects of head start." Santa Monica CA, RAND Corporation, Labor and Population Program Working Paper Series 00–20, December.
<<http://www.rand.org/organization/drd/labor/DRU/DRU2439.pdf>>
- Geronimus, Arlene (1997) "Teenage childbearing and personal responsibility: An alternative view." *Political Science Quarterly* 112(3): 405-430.
- Gibson, John (2000) "Sheepskin effects in the returns to education in New Zealand: Do they differ by ethnic groups?" *New Zealand Economic Papers* 34(2): 201-220.
- Gottfredson, Denise C (in press) "School-based crime prevention." in B Welsh ed *Evidence-based crime prevention* (London: Harwood Academic Publishers): Chapter 5. <<http://www.ncjrs.org/works/chapter5.htm>>
- Grissmer, David W, Ann Flanagan, Jennifer Kawata and Stephanie Williamson (2000) *Improving student achievement: What state NAEP test scores tell us.* (Santa Monica CA: RAND Corporation). <<http://www.rand.org/publications/MR/MR924/>>
- Gruber, Jonathan (2000) "Risky behavior among youths: An economic analysis." Cambridge MA, National Bureau of Economic Research, Working Paper No 7781, July.
- Gunnell, David and S Frankel (1994) "Prevention of suicide: Aspirations and evidence." *British Medical Journal* 308(6938): 1227-1233.
<<http://bmj.com/cgi/content/full/308/6938/1227>>
- Hanushek, Eric, John Kain and Steven Rivkin (1998) "Teachers, schools and academic achievement." Cambridge MA, National Bureau of Economic Research, Working Paper 6691, August.
- Harker, Richard and Roy Nash (1996) "Academic outcomes and school effectiveness: Type "A" and type "B" effects." *New Zealand Journal of Educational Studies* 32(2): 143-170.
- Harris, JR (1995) "Where is the child's environment? A group socialization theory of development." *Psychological Review* 102(3): 458-489.
- Haveman, Robert and Barbara Wolfe (1993) "Children's prospects and children's policy." *Journal of Economic Perspectives* 7(4): 153 - 174.
- Haveman, Robert and Barbara Wolfe (1995) "The determinants of children's attainments: A review of methods and findings." *Journal of Economic Literature* 33(4): 1829-1878.
- Hawkins, J David , Todd I Herrenkohl, David P Farrington, Devon Brewer, Richard F Catalano, Tracy W Harachi and Lynn Cothorn (2000) "Predictors of youth violence." Rockville MD, US Department of Justice, Office of Justice Programs, Office of Juvenile Justice and Delinquency Prevention, April.
<http://www.ncjrs.org/html/ojjdp/jjbul2000_04_5/contents.html>
- Hema, Lisa (2000) "Risk and strength factors for children and young people who offend or re-offend: A summary of the literature." Wellington, Department of Child, Youth and Family Services, Unpublished paper, May.

- Henry, Bill, Avshalom Caspi, Terrie Moffitt and Phil Silva (1996) "Temperamental and familial predictors of violent and non-violent: Age 3 to age 18." *Developmental Psychology* 32(4): 616-623.
- Hider, P (1998) "Youth suicide prevention by primary healthcare professionals A critical appraisal of the literature." Christchurch, New Zealand Health Technology Assessment, Christchurch School of Medicine, NZHTA Report No 4, October. <<http://nzhta.chmeds.ac.nz/nzhtainfo/nzhta4.pdf>>
- Hodges, Ian, Caroline Maskill, Jill Coulson, Stephen Christie and Robert Quigley (1998) "Our children's health: Key findings on the health of New Zealand children." Wellington, Ministry of Health, June. <<http://www.moh.govt.nz/moh.nsf/49ba80c00757b8804c256673001d47d0/ea72c39ba892a43a4c25666d007d37c1?OpenDocument>>
- Hoffman, Saul D, E Michael Foster and Frank F Furstenberg Jr (1993) "Reevaluating the costs of teenage childbearing." *Demography* 30(1): 1-13.
- Hotz, V Joseph, Susan Williams McElroy and Seth G Sanders (1999) "Teenage childbearing and its life cycle consequences: Exploiting a natural experiment." Evanston and Chicago, Joint Center for Poverty Research, Northwestern University/University of Chicago, JCPR Working Paper 157, August. <http://www.jcpr.org/wp/wpdownload.cfm?pdfink=wpfiles/HOTZ_WPoriginal2-7-2000.pdf>
- Howden-Chapman, P and M Tobias (2000) "Social inequalities in health: New Zealand 1999." Wellington, Ministry of Health.
- Huffman, Lynne C, Sarah L Mehlinger and Amy S Kerivan (2000a) "Risk factors for academic and behavioral problems at the beginning of school." Chapel Hill, NC, University of North Carolina, FPG Child Development Center, Report Comissioned by the Child Mental Health Foundations and Agencies Network. <<http://www.nimh.nih.gov/childhp/huffman.pdf>>
- Huffman, Lynne C, Sarah L Mehlinger, Amy S Kerivan, Doreen A Cavanaugh, John Lippitt and Otrude Moyo (2000b) "Off to a good start." Chapel Hill, NC, University of North Carolina, FPG Child Development Center, Report Comissioned by the Child Mental Health Foundations and Agencies Network. <<http://www.nimh.nih.gov/childhp/goodstart.cfm>>
- Huizinga, D, R Loeber and T Thornberry (1995) "Recent findings from the program of research on the causes and correlates of delinquency." Washington DC, Office of Justice Programs, Office of Juvenile Justice and Delinquency Prevention, US Department of Justice, July.
- Huston, Aletha (2000) "The effects of the New Hope experiment on families and children." Austin TX, Department of Human Ecology, University of Texas at Austin, Presentation at "Children: Making Their Future?" Conference of Children 5-16 Research Programme London, October 20.
- Jaffee, Sara R, Avshalom Caspi, Terrie E Moffitt, Jay Belsky and Phil Silva (2001) "Why are children born to teen mothers at risk for adverse outcomes in young adulthood? Result from a 20-year longitudinal study." *Development and Psychopathology* 13: 377-397.
- Jenkins, Jenny and Daniel Keating (1998) "Risk and resilience in six and ten-year old children." Hull, Applied Research Branch, Strategic Policy, Human Resources Development Canada, Report No W-98-23E, October. <<http://www.hrdc-drhc.gc.ca/arb/publications/research/1999docs/w-98-23e.pdf>>
- Judge, Ken and Iain Paterson (2001) "Poverty, income inequality and health." Wellington, New Zealand Treasury, Working Paper No 01/29, December. <<http://www.treasury.govt.nz/workingpapers/2001/twp01-29.pdf>>

- Kalil, Ariel (2001) "A literature study on family resilience and good child outcomes." Wellington, New Zealand Ministry of Social Policy, December.
- Kalil, Ariel and James Kunz (2001) "Long-term effects of teenage childbearing on mental health in young adulthood." Evanston, Illinois, Northwestern University, Paper presented as part of the JCPR: Poverty Research Seminars 2000-2001, May 14. <http://www.jcpr.org/povsem/teenmoms_paper.pdf>
- Kane, Roslyn and Kaye Wellings (1999) "Reducing the rate of teenage conceptions. An international review of the evidence: Data from Europe." London, Health Education Authority. <http://www.hda-online.org.uk/downloads/pdfs/reducing_conceptions.pdf>
- Kawachi, Ichiro , Bruce P Kennedy, K Lochner and Deborah Prothrow-Smith (1997) "Social capital, income inequality and mortality." *American Journal of Public Health* 89: 1187-1193.
- Keating, Daniel P and Clyde Hertzman eds (1999) *Developmental health and the wealth of nations: Social, biological and educational dynamics*. (New York: Guilford Press).
- Kelley, BT, TP Thornberry and CA Smith (1997) "In the wake of childhood maltreatment." Rockville MD, US Department of Justice, Office of Justice Programs, Office of Juvenile Justice and Delinquency Prevention, Juvenile Justice Bulletin, August. <<http://www.ncjrs.org/pdffiles1/165257.pdf>>
- Kennedy, Bruce P, Ichiro Kawachi, Robert Glass and Deborah Prothrow-Smith (1998) "Income distribution, socioeconomic status, and self-rated health: A US multilevel analysis." *British Medical Journal* 317(7163): 917-921. <<http://bmj.com/cgi/reprint/321/7272/1311.pdf>>
- Kiernan, Kathleen E (1995) "Transition to parenthood: Young mothers, young fathers -- associated factors and later life experience." London, London School of Economics, STICERD, STICERD Discussion Paper WSP/113.
- Kirby, Douglas (2001) "Emerging answers: Research findings on programs to reduce teen pregnancy (summary)." Washington DC, The National Campaign to Prevent Teen Pregnancy, May. <<http://www.teenpregnancy.org/resources/data/pdf/emerswsum.pdf>>
- Kirby, Douglas and Karin Coyle (1997) "School-based programs to reduce sexual risk-taking behaviour." *Children and Youth Services Review* 19(5/6): 415-436.
- Landy, Sarah and Kwok Kwan Tam (1998) "Understanding the contribution of multiple risk factors on child development at various ages." Hull, Applied Research Branch, Strategic Policy, Human Resources Development Canada, Report No W-98-22E, October. <<http://www.hrdc-drhc.gc.ca/arb/publications/research/w-98-22e.pdf>>
- Lefebvre, Pierre and Philip Merrigan (1998) "Family background, family income, maternal work and child development." Hull, Human Resources Development Canada, Working Paper 98-12, October. <<http://www.hrdc-drhc.gc.ca/arb/publications/research/w-98-12e.pdf>>
- Levine, David I (1999) "Choosing the right parents: Changes in the intergenerational transmission of inequality between the 1970s and the early 1990s." Berkeley CA, Institute of Industrial Relations, University of California Berkeley, Working Paper No 72, November. <<http://ist-socrates.berkeley.edu/~iir/wpapers/pdf/72.pdf>>
- Levine, Judith, Harold Pollack and Maureen E Comfort (2000) "Academic and behavioral outcomes among the children of young mothers." Evanston and Chicago, Joint Center for Poverty Research, Northwestern University/University of Chicago, JCPR Working Paper 193, June. <http://www.jcpr.org/wp/wpdownload.cfm?pdflink=wpfiles/levine_pollack_comfort.PDF and http://www.jcpr.org/wpfiles/levine_tables.PDF>

- Lewit, Eugene M and Linda Schuurmann Baker (1995) "School readiness." *Future of Children* 5(2): 128-139.
<http://www.futureofchildren.org/usr_doc/vol5no2ART9%2Epdf>
- Lundberg, Shelly and Richard Startz (1998) "On the persistence of racial inequality." *Journal of Labour Economics* 16(2): 292-323.
- Lynskey, Michael and David Fergusson (1993) "Sexual activity and contraceptive use amongst teenagers under the age of 15 years." *New Zealand Medical Journal* 106: 511-514.
- Maani, Sholeh A (2000a) "School leaving, labour supply and tertiary education choices of young adults: An economic analysis utilising the 1977-1995 Christchurch Health and Development Surveys." Wellington, New Zealand Treasury, Working Paper No 00/03. <<http://www.treasury.govt.nz/workingpapers/2000/twp00-3.pdf>>
- Maani, Sholeh A (2000b) "Secondary and tertiary educational attainment and income levels for Maori and non-Maori over time." Wellington, New Zealand Treasury, Working Paper No 00/18.
<<http://www.treasury.govt.nz/workingpapers/2000/twp00-18.pdf>>
- Maani, Sholeh A (2002) "Education and Maori relative income levels over time: The mediating effect of occupation, industry, hours of work and locality." Wellington, New Zealand Treasury, Working Paper No 02/17, September.
<<http://www.treasury.govt.nz/workingpapers/2002/twp02-17.pdf>>
- MacBeth, J, T Kirwan and K Myers (2001) "The impact of study support: A report of a longitudinal study into the impact of participation in out-of-school-hours learning on the academic attainment, attitudes and school attendance of secondary school students." Department for Education and Skills, UK.
- Machin, Stephen, Steven McIntosh, Anna Vignoles and Tarja Viitanen (2001) "Basic skills, soft skills and labour market outcomes: Secondary analysis of the national child development study." Department for Education and Employment Research Centre, Centre for the Economics of Education, Research Report No 250, January.
<http://www.dfee.gov.uk/research/re_paper/RR250.doc>
- Maré, David and Simon Chapple (1999) "Literacy formation and its influence on earnings and jobs." Wellington, Department of Labour, Unpublished research paper, October.
- Marmot, Michael and Michael Wadsworth eds (1997) *Fetal and early childhood environment: Long term health implications*. (London: British Medical Bulletin).
- Martin, Michael O, Ina VS Mullis, Albert E Beaton, Eugenio J Gonzalez, Teresa A Smith and Dana L Kelly (1997) "Science achievement in the primary school years: IEA's third international mathematics and science report (TIMSS)." Chestnut Hill, MA, Centre for the Study of Testing, Evaluation, and Educational Policy, Boston College. <<http://isc.bc.edu/timss1995i/SciencA.html>>
- Martin, Michael O, Ina VS Mullis, Eugenio J Gonzalez, Kelvin D Gregory, Teresa A Smith, Steven J Chrostowski, Robert A Garden and Kathleen M O'Connor (2000) "TIMSS 1999 international science report: Findings from IEA's repeat of the third international science and science study at the eighth grade." Chestnut Hill, MA, International Study Centre, Lynch School of Education, Boston College.
<http://isc.bc.edu/timss1999i/science_achievement_report.html>
- Masten, Ann S (1994) "Resilience in individual development: Successful adaptation despite risk and adversity." in M Wang and E Gordon eds *Risk and resilience in inner city America: Challenges and prospects* (Hillsdale NJ: Erlbaum): 3-25.
- Masten, Ann S and J Douglas Coatsworth (1998) "The development of competence in favorable and unfavorable environments: Lessons from research on successful children." *American Psychologist* 53(2): 205-220.

- Mayer, Susan E (1997) *What money can't buy: Family income and children's life chances*. (Cambridge and London: Harvard University Press).
- Mayer, Susan E (2002) "Raising children in New Zealand: The influence of parental income on children's outcomes." Wellington, Ministry of Social Development. <<http://www.msd.govt.nz/publications/docs/raisingchildreninnz.pdf>>
- McBer, Hay (2000) "Research into teacher effectiveness: A model of teacher effectiveness." London, Department for Education and Employment, Research Report No 216, June. <http://www.teachernet.gov.uk/_doc/1487/haymber.doc>
- McCain, M and JF Mustard (1999) "Reversing the real brain drain: Early years study, final report." Toronto, Ontario Children's Secretariat, April. <http://www.childsec.gov.on.ca/3_resources/early_years_study/early_years_study.pdf>
- McCulloch, Andrew and Heather E Joshi (2000) "Neighbourhood and family influences on the cognitive ability of children in the British national child development study." Colchester, University of Essex, Institute for Social and Economic Research, Working Paper 2000-24, July. <<http://www.iser.essex.ac.uk/pubs/workpaps/pdf/2000-24.pdf>>
- McGee, Rob, Sheila Williams, David Share, Jessie Anderson and Phil Silva (1986) "The relationship between specific reading retardation, general reading backwardness and behavioral problems in a large sample of Dunedin boys: A longitudinal study from five to eleven years." *Journal of Child Psychology and Psychiatry* 27(5): 597-610.
- McLanahan, Sara S (1997) "Parent absence or poverty: Which matters more?" in Greg J Duncan and Jeanne Brooks-Gunn eds *Consequences of growing up poor* (New York: Russell Sage Foundation): 35-48.
- McLanahan, Sara and Gary Sandefur (1994) *Growing up with a single parent: What hurts, what helps*. (Cambridge and London: Harvard University Press).
- Ministry of Education (2002a) "School statistics 2001." Wellington, Ministry of Education.
- Ministry of Education (2002b) "School statistics time-series." Wellington, Ministry of Education.
- Ministry of Education (n.d.) "Maori education: Some suggestions from the literature." Wellington, The Research Division, Ministry of Education.
- Ministry of Social Development (2001) "The social development approach." Wellington, Ministry of Social Development, June. <<http://www.msd.govt.nz/publications/docs/socdevoverview.pdf> (Overview) <<http://www.msd.govt.nz/publications/docs/socdevframework.pdf> (Framework) <<http://www.msd.govt.nz/publications/docs/socdevstrategy.pdf> (Strategy)>
- Moffitt, Terrie E (1993) "Adolescence-limited and life-course persistent antisocial behavior: A developmental taxonomy." *Psychological Review* 100(4): 674-701.
- Moffitt, Terrie E and Avshalom Caspi (2001) "Childhood predictors differentiate life-course persistent and adolescence-limited antisocial pathways among males and females." *Development and Psychopathology* 13: 355-375.
- Moore, KA, BW Sugland, C Blumenthal, D Gleib and N Snyder (1995) "Adolescent pregnancy prevention programs: Interventions and evaluation." Washington DC, Child Trends Inc, February.
- Muller, Andreas (2002) "Education, income inequality, and mortality: A multiple regression analysis." *British Medical Journal* 324(7328): 1-4. <<http://bmj.com/cgi/reprint/324/7328/23.pdf>>
- Mullis, Ina VS, Michael O Martin, Albert E Beaton, Eugenio J Gonzalez, Dana L Kelly and Teresa A Smith (1997) "Mathematics achievement in the primary school years: IEA's third international mathematics and science report." Chestnut Hill, MA,

- Centre for the Study of Testing, Evaluation, and Educational Policy, Boston College. <<http://isc.bc.edu/timss1995i/TIMSSPDF/amtimss.pdf>>
- Mullis, Ina VS, Michael O Martin, Albert E Beaton, Eugenio J Gonzalez, Dana L Kelly and Teresa A Smith (1998) "Mathematics and science achievement in the final years of secondary school: IEA's third international mathematics and science report." Chestnut Hill, MA, Centre for the Study of Testing, Evaluation, and Educational Policy, Boston College. <http://isc.bc.edu/timss1995i/TIMSSPDF/C_full.pdf>
- Mullis, Ina VS, Michael O Martin, Eugenio J Gonzalez, Kelvin D Gregory, Robert A Garden, Kathleen M O'Connor, Steven J Chrostowski and Teresa A Smith (2000) "TIMSS 1999 international mathematics report: Findings from IEA's repeat of the third international mathematics and science study at the eighth grade." Chestnut Hill, MA, International Study Centre, Lynch School of Education, Boston College. <http://isc.bc.edu/timss1999i/pdf/T99i_Math_All.pdf>
- Murnane, Richard J, John B Willet and Frank Levy (1995) "The growing importance of cognitive skills in wage determination." *Review of Economics and Statistics* 77(2): 251-266.
- Mustard, JF (2000) "Early child development and the brain: The base for health, learning and behaviour throughout life." Washington DC, World Bank, Presented to the World Bank Conference on "Investing in our Children's Future" 10 April as "What Science Says About the Effects of Early Intervention".
- Nash, Roy (1997) "Is it class or ethnicity that 'makes the difference'?" *New Zealand Journal of Educational Studies*.
- Nechyba, Thomas, Patrick McEwan and Dina Older-Aguilar (1999) "The impact of family and community resources on student outcomes: An assessment of the international literature with implications for New Zealand." Wellington, Ministry of Education. <<http://www.minedu.govt.nz/index.cfm?id=5593&p=5871.5874> and http://www.minedu.govt.nz/web/downloadable/dl5593_v1/Family%20Community_tables.PDF>
- New Zealand Health Information Service (2001) "Suicide trends in New Zealand 1978-98." Wellington, Ministry of Health. <<http://www.nzhis.govt.nz/publications/suicide78-98.pdf>>
- Newman, Sanford, T Berry Brazelton, Edward Zigler, Lawrence W Sherman, William Bratton, Jerry Sanders and William Christeson (2000) "America's child care crisis: A crime prevention tragedy." Washington DC, Fight Crime: Invest in Kids, January. <<http://www.fightcrime.org/reports/childcarereport.pdf>>
- NHS Centre for Reviews and Dissemination (1997) "Preventing and reducing the adverse effects of unintended teenage pregnancies." York, NHS Centre for Reviews and Dissemination, University of York, *Effective Health Care* 3(1), February. <<http://www.york.ac.uk/inst/crd/ehc31.pdf>>
- NICHHD, Early Child Care Research Network (1999) "Child outcomes when child care center classes meet recommended standards for quality." *American Journal of Public Health* 89(7): 1072-1077.
- Oddone, Elizabeth, Mark L Genuis and Claudio Violato (n.d.) "A meta-analysis of the published research on the effects of child sexual abuse." Calgary, National Foundation for Family Research and Education, Mimeo. <http://www.nffre.com/html/documents/child_abuse/analysis_of_the_published_research_on_the_effects_of_child_sexual_abuse.html>
- OECD (1998) "Implementing the OECD jobs strategy: Assessing performance and policy." Paris, Organisation for Economic Co-operation and Development. <<http://www.mss.edus.si/eurydice/pub/oecd/jobs.pdf>>
- OECD (2000) "From initial education to working life: Making transitions work." Paris, Organisation for Economic Cooperation and Development.

- OECD (2001a) "Assessing knowledge and skills for life: NZ summary report." Paris, Organisation for Economic Cooperation and Development, Programme for International Student Assessment, December.
<http://www.minedu.govt.nz/web/downloadable/dl6489_v1/pisa%20nzsum.pdf>
- OECD (2001b) "Knowledge and skills for life: First results from PISA 2000 executive summary." Paris, Organisation for Economic Cooperation and Development, Programme for International Student Assessment, December.
<<http://www.pisa.oecd.org/Docs/Download/PISAExeSummary.pdf>>
- Offord, DR, HC Kraemer, AE Kazdin, PS Jensen, R Harrington and JS Gardner (1999) "Lowering the burden of suffering: Monitoring the benefits of clinical, targeted, and universal approaches." in Daniel P Keating and Clyde Hertzman eds *Developmental health and the wealth of nations: Social, biological, and educational dynamics* (New York: Guilford Press): 293-310.
- Peisner-Feinberg, Ellen S, Margaret R Burchinal, Richard M Clifford, Noreen Yazejian, Mary L Culkin, Janice Zelazo, Carollee Howes, Patricia Byler, Sharon Lynn Kagan and Jean Rustici (1999) "The children of the cost, quality, and outcomes study go to school." Chapel Hill NC, Frank Porter Graham Child Development Center, University of North Carolina, June. <<http://www.fpg.unc.edu/~ncedl/PDFs/CQO-tr.pdf>>
- Phipps, Shelley (1999) "Does policy affect outcomes for young children? An analysis with international microdata." Hull, Human Resources Development Canada, W-00-1E, August. <<http://www.hrdc-drhc.gc.ca/arb/publications/research/2000docs/w-00-1e.pdf>>
- Plomin, Robert and Stephen A Petrill (1997) "Genetics and intelligence: What's new?" *Intelligence* 24(1): 53-77.
- Pritchard, C (1992) "Youth suicide and gender in Australia and New Zealand compared with countries of the Western world 1973-1987." *Australian and New Zealand Journal of Psychiatry* 26(4): 609-617.
- Pryor, Jan and Barry Rodgers (1998) "Family dissolution: What about the children?" *Butterworths Family Law Journal* December: 310-315.
- Pryor, Jan and Bryan Rodgers (2001) *Children in changing families: Life after parental separation*. (Malden MA: Blackwell).
- Rentoul, John and John Rosanowski (2000) "The effects of school governance, ownership, organisation, and management on educational outcomes." Wellington, Ministry of Education, April.
- Reynolds, David and Charles Teddlie (2000) "The processes of school effectiveness." in Charles Teddlie and David Reynolds eds *The international handbook of school effectiveness research* (London: Falmer Press): 134-159.
- Rodgers, Bryan and Jan Pryor (1998) *Divorce and separation: The outcomes for children*. (York: Joseph Rowntree Foundation).
- Rohacek, Monica H and Russell, Susan D (1998) "Child care subsidy yields returns." *Young Children* 53(2): 68-71.
- Rowe, Ken (2002) "The importance of teacher quality." Melbourne, Centre for Independent Studies, Issue Analysis No 22.
<<http://www.cis.org.au/IssueAnalysis/IA22/IA22.htm>>
- Ruhm, Christopher J (2000) "Parental employment and child cognitive development." Cambridge MA, National Bureau of Economic Research, Working Paper No 7666, April.
- Runyan, Desmond K, Wanda M Hunter, Rebecca S Socolar, Lisa Amaya-Jackson, Diana English, John Landsverk, H Dubowitz, D Browne, S Bangdiwala and R Matthew

- (1998) "Children who prosper in unfavourable environments: The relationship to social capital." *Pediatrics* 101(1): 12-18.
- Ryan, Paul (2001) "The school-to-work transition: A cross-national perspective." *Journal of Economic Literature* 39(1): 34-92.
- Savage, John (1999) "The youth labour market and disadvantage: Issues and evidence." Wellington, Report prepared for the New Zealand Treasury, October.
- Scott, Dorothy (2000) "Building communities that strengthen families: Elements of effective approaches." Melbourne, School of Social Work, University of Melbourne, Presentation to a seminar at the Australian Institute of Family Studies, 16 November. <www.aifs.org.au/institute/seminars/scott.html>
- Singh, Susheela and Jacqueline E Darroch (2000) "Adolescent pregnancy and childbearing: Levels and trends in developed countries." *Family Planning Perspectives* 32(1): 14-23. <<http://www.agi-usa.org/pubs/journals/3201400.pdf>>
- Singh, Susheela, Jacqueline E Darroch and Jennifer J Frost (2001) "Socioeconomic disadvantage and adolescent women's sexual and reproductive behavior: The case of five developed countries." *Family Planning Perspectives* 33(6): 211-258 & 289. <<http://www.agi-usa.org/pubs/journals/3325101.pdf>>
- Skegg, Keren (1997) "Suicide and parasuicide." in Pete Ellis and Sunny Collings eds *Public health report number 3: Mental health in New Zealand from a public health perspective* (Wellington: Ministry of Health): 427-445. <[http://www.moh.govt.nz/moh.nsf/Files/chap23/\\$file/chap23.pdf](http://www.moh.govt.nz/moh.nsf/Files/chap23/$file/chap23.pdf)>
- Smith, Anne B, Grace Grima, Michael Gaffney and Kim Powell (2000) "Early childhood education: Literature review." Dunedin, Children's Issues Centre, University of Otago, Report to the Ministry of Education, March.
- Statistics New Zealand (1997) "National summary (Census 96)." Wellington, Statistics New Zealand. <[http://www.stats.govt.nz/domino/external/pasfull/pasfull.nsf/0/4c2567ef00247c6acc256b6d00046ad5/\\$FILE/natsum.pdf](http://www.stats.govt.nz/domino/external/pasfull/pasfull.nsf/0/4c2567ef00247c6acc256b6d00046ad5/$FILE/natsum.pdf)>
- Statistics New Zealand (1998) "New Zealand now: Young New Zealanders." Wellington, Statistics New Zealand. <<http://www.stats.govt.nz/domino/external/pasfull/pasfull.nsf/7cf46ae26dcb6800cc256a62000a2248/4c2567ef00247c6acc256b6d000a2275>>
- Statistics New Zealand (1999) "New Zealand now: Children." Wellington, Statistics New Zealand. <[http://www.stats.govt.nz/domino/external/PASFull/PASfull.nsf/2b48bfd772142a814c2567ed0009410f/4c2567ef00247c6acc256b03000f2c16/\\$FILE/children.pdf](http://www.stats.govt.nz/domino/external/PASFull/PASfull.nsf/2b48bfd772142a814c2567ed0009410f/4c2567ef00247c6acc256b03000f2c16/$FILE/children.pdf)>
- Statistics New Zealand (2001) "Demographic trends 2001." Wellington, Statistics New Zealand. <<http://www.stats.govt.nz/domino/external/pasfull/pasfull.nsf/web/Reference+Repor+Demographic+Trends+2001?open>>
- Sturm, Ronald and Carole Roan Gresnez (2002) "Relations of income inequality and family income to chronic medical conditions and mental health disorders: National survey." *British Medical Journal* 324(20): 1-5. <<http://bmj.com/cgi/reprint/324/7328/20.pdf>>
- Taylor, Nicola J and Anne B Smith (1997) "Enhancing children's potential: Minimising risk and maximising resiliency." Dunedin, Children's Issues Centre, University of Otago, Paper presented at the Children's Issues Centre Second Child and Family Policy Conference, 2-4 July.
- Teicher, Martin H (2002) "Scars that won't heal: The neurobiology of child abuse." *Scientific American* 286(3): 68-75.

- Tepperman, Barry S, Mila Davila, Jennifer McClendon and John H Werner (1998) "Preventing teen pregnancy: A culturally-competent teen pregnancy prevention model." Fort Lauderdale FL, Broward Regional Health Planning Council, Inc. <<http://www.brhpc.org/pages/projects/teenpreg/teenpreg.pdf>>
- Treasury (2001a) "Human capital and the inclusive economy." Wellington, New Zealand Treasury, Working Paper No 01/16. <www.treasury.govt.nz/workingpapers/2001/twp01-16.pdf>
- Treasury (2001b) "Reducing Maori and Pacific inequalities." Wellington, New Zealand Treasury, Working Paper No 01/30. <<http://www.treasury.govt.nz/workingpapers/2001/twp01-30.pdf>>
- Tremblay, Richard E (1999) "When children's social development fails." in D Keating and C Hertzman eds *Developmental health and the wealth of nations: Social, biological and educational dynamics* (New York: The Guilford Press): 55-71.
- UNICEF (2002) "A league table of teenage births in rich nations." Florence, UNICEF Innocenti Research Centre, Innocenti Report Card Issue 3, July. <<http://www.unicef-icdc.org/publications/pdf/repcard3e.pdf>>
- US Surgeon General (1999a) "Mental health." Rockville, MD, US Department of Health and Human Services, Substance Abuse and Mental Health Services Administration, Center for Mental Health Services, National Institutes of Health, A Report of the Surgeon General. <<http://www.surgeongeneral.gov/library/mentalhealth/home.html>>
- US Surgeon General (1999b) "The Surgeon General's call to action to prevent suicide." Washington DC, Department of Health and Human Services, US Public Health Service, July. <<http://www.surgeongeneral.gov/library/calltoaction/calltoaction.pdf>>
- US Surgeon General (2001) "Youth violence." Washington DC, Department of Health and Human Services, A Report of the Surgeon General, January. <<http://www.surgeongeneral.gov/library/youthviolence/youthvioreport.htm>>
- White, Jennifer (1998) "Youth suicide prevention: A framework for British Columbia." Vancouver, Suicide Prevention Information and Resource Centre of British Columbia, University of British Columbia, Report to the Ministry for Children and Families, October. <<http://www.mheccu.ubc.ca/publications/spirc/ysp.pdf>>
- Wilkinson, Bryce (2001) "Constraining government regulation." Wellington, New Zealand Business Roundtable, A Discussion Paper, November. <http://www.nzbr.org.nz/documents/publications/publications-2001/constraining_govt.pdf>
- Wilkinson, Richard G (1996) *Unhealthy societies: The afflictions of inequality*. (New York: Routledge).
- Wolfe, Barbara, Kathryn Wilson and Robert Haveman (2001) "The role of economic incentives in teenage nonmarital childbearing choices." *Journal of Public Economics* 81(3): 473-511.
- World Health Organisation (2001) "1997-1999 world health statistics annual." Geneva, World Health Organisation.
- Wylie, Cathy, Jean Thompson and Cathy Lythe (2001) "Competent children at 10: Families, early education and schools." Wellington, New Zealand Council for Educational Research. <http://www.minedu.govt.nz/web/downloadable/dl6402_v1/CompetentChildrenat10.doc>
- Yoshikawa, Hirokazu (1995) "Long-term effects of early childhood programs on social outcomes and delinquency." *Future of Children* 5(3): 51-75. <http://www.futureofchildren.org/usr_doc/vol5no3ART3.pdf>

- Zimmerman, Marc A and Revathy Arunkumar (1994) "Resiliency research: Implications for schools and policy." Ann Arbor, MI, Society for Research in Child Development, University of Michigan, Social Policy Report 8(4).
<<http://www.srcd.org/sprv8n4.pdf>>
- Zuckerman, Barry and Robert Kahn (2000) "Pathways to early child health and development." in Sheldon Danziger and Jane Waldfogel eds *Securing the future: Investing in children from birth to college* (New York: Russell Sage Foundation): 87-121.