THE MINISTRY OF
SOCIAL POLICY
Te Manatū mō ngā Kaupapa Oranga Tangata

The Long Road To Knowledge

Longitudinal Research and Social Policy

2001 Seminar Series

April 2001

2001 Seminar Series

The Long Road to Knowledge:
Longitudinal Research and Social Policy

Key Speakers

Professor Stephen P Jenkins
Stephen Jenkins (born 1956, New Zealand) has been Professor of Applied Economics at the Institute for Social and Economic Research at the University of Essex since 1994. He was previously Professor of Applied Economics at the University of Wales Swansea (1991-94), Lecturer in the School of Social Sciences at the University of Bath (1983-91), Research Fellow, University of York (1979, 1981-83), Junior Lecturer in Economics, Massey University (1978). Stephen's first published papers were about the intergenerational inheritance of income and the economics of English provincial repertory theatre, but most subsequent ones have been about inequality and poverty measurement issues and applications using British data. His current research focuses on income and poverty dynamics and uses the British Household Panel
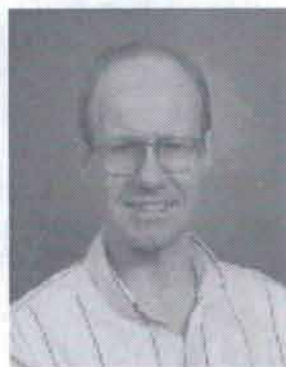
Dr Richie Poulton
Dr Poulton first worked on the Dunedin Multidisciplinary Health and Development Research (DMHDS) as an interviewer in 1985-6 when he was studying clinical psychology at the University of Otago. He then went on to complete his PhD at the University of New South Wales in 1995 from which he then returned to Dunedin to become the Deputy Director of the DMHDS. Dr Poulton has been director of the study since January 2000. His research interests include developmental psychopathology, behavioural determinants of physical health, genetic epidemiology and longitudinal research methodology.

Moira Wilson
Moira Wilson is a Senior Researcher/Analyst in the Knowledge Management Group of the Ministry of Social Policy. She has a background in social policy research and policy analysis, specialising in microsimulation modeling of tax benefit systems and social assistance and labour market issues. Moira first became involved in the Ministry's benefit dynamics project in 1998. She has lead the development and analysis of the revised and updated benefit dynamics data set.

Dr Cathy Wylie

Cathy Wylie is the leader of the Competent Children project, working with the statistician Jean Thompson. She is a senior researcher at the NZ Council for Educational Research. Cathy has been involved in education research since 1987, specialising in policy related research including the relations of home and education resources. Her research on the implementation of the Tomorrow's Schools reforms, which decentralised education, is well regarded and often quoted. Other research includes a study of sole parents and a literature review of the effects for children of parental welfare receipt. She recently undertook the government's review of special education policy.

Professor Mason H Durie

Professor Mason H Durie (Rangitane, Ngati Kauwhata, Ngati Raukawa) is head of the School of Maori Studies, Te Putahi-a-Toi, Massey University. He is the chair of the Maori Health Committee, Ministry of health, and former director of Te Pumanawa Hauora Maori Health Research Unit. In recognition of Professor Durie's contribution to research, health and social policy he was awarded a Fellow of the Royal Society of NZ in 1995 (FRSNZ) and a Companion of the NZ Order of Merit (CNZM) in 2001.

Professor David Fergusson

Professor Fergusson is the Executive Director and founder of the Christchurch Health and Development Study (CHDS). The CHDS is a longitudinal study of a birth cohort of 1,265 children who have been studied from birth to 21 years. He is the author of over 200 scientific papers, books and report in the areas of child health and development. He is also actively involved in the development and evaluation of the Christchurch based Early Start programme.

Diane Ramsay

Diane Ramsay is Project Manager for the Longitudinal Survey of Income, Employment and Family Dynamics being developed by Statistics New Zealand. Diane has been with Statistics New Zealand since 1986 and has been Project Manager for this development since March 2000. She is a statistician with a background in sample design.

Max Wigbout is a Senior Mathematical Statistician with the Analytical Support Division of Statistics New Zealand. Max is responsible for statistical analysis of SNZ data, and has a particular interest in multivariate analysis. He is currently conducting research into techniques for analysis of longitudinal data.

Janette Briggs is an Economic Statistician with the Labour Market & Household Economics Division of Statistics New Zealand. She has worked on the Longitudinal Survey of Income, Employment and Family Dynamics project since it's beginning in 1997 and has been responsible for developing the outputs from the survey

Why are child poverty rates higher in Britain than in Germany?
A longitudinal perspective

by

Stephen P. Jenkins (University of Essex, DIW Berlin, IZA Bonn, and CHILD Turin)
Christian Schluter (University of Bristol and CASE, LSE)

Revised draft, 12 February 2001

JEL classifications: I31, D31, I38, J13

Correspondence

S.P. Jenkins, Institute for Social and Economic Research, University of Essex, Colchester CO4 3SQ, UK. Email: stephenj@essex.ac.uk. Fax: +44 1206 873151.

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Abstract

We analyse why child poverty rates were much higher in Britain than in Western Germany during the 1990s, using a framework that focuses on poverty transition rates. Child poverty exit rates were significantly lower, and poverty entry rates significantly higher, in Britain. We decompose these cross-national differences into differences in the prevalence of 'trigger events' (changes from one year to the next in household composition, household labour market attachment, and labour earnings), and differences in the chances of making a poverty transition conditional on experiencing a trigger event. It is the latter which are most important in accounting for the cross-national differences in poverty exit and entry rates.

1. Introduction

Germany and the UK are the two largest and most economically successful nations in the European Union, but Germany does better in protecting children from low income. For example, according to the Statistical Office of the European Community, in 1993, 13 percent of German children lived in households with incomes below half the national average income, but in Britain the proportion was more than double this figure, 32 percent (Eurostat, 1997; the 12 country EU-average was 20 percent). The cross-national differences in child poverty rates have been reflected in differences in political interest in the topic in the two countries. The current UK government has pledged to halve the number of poor children within ten years and to eliminate child poverty altogether within 20 years (United Kingdom 1999). By contrast, children's poverty is much less of a political issue in Germany at present. In this paper we address the question of why child poverty rates differ between Britain and Germany using analysis of differences in rates of movement into and out of poverty, and decomposing differences in poverty transition rates into differences in the prevalence of 'trigger events' precipitating poverty transitions and differences in the chances of making a poverty transition conditional on experiencing a trigger event.

The distinctive contributions of our analytical approach are, first, its cross-national comparisons and, second, the focus on transition rates and their systematic decomposition. Although our application is to two specific countries and to children, the analytical framework is one that can also be straightforwardly used for comparisons between alternative sets of countries or to examinations of poverty trends within countries over time, and for other groups in the population. The first feature of our approach is motivated by the large cross-national differences in child poverty rates: they suggest that Britain has something to learn from Germany about how to protect children from low income. And arguably Britain's experience also provides cautionary lessons for Germany as pressure grows to increase labour market flexibility and to introduce reforms to the welfare state similar to those instituted in Britain over the last two decades. The lessons to be learned depend on how differences in German and British poverty patterns relate to differences in labour markets, marriage markets and welfare states. We shed light on these issues using the decompositions of transition rates – the second feature of our approach.

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Why take a longitudinal perspective to explaining child poverty rates? If one uses a cross-section perspective, the natural temptation is to explain cross-national poverty differences in terms of differences in the prevalence of 'problem groups' such as lone parent families or workless households, etc., and differences in the risk of poverty for each group. This strategy is problematic because there are substantial movements into and out of problem groups between one year and the next – households form and split; people gain and lose jobs – so the policy target is a moving one. When constructing explanations of poverty patterns it is more natural to relate behaviour to transition probabilities rather than to the (state) probability of being poor, particularly since the factors which determine entry (or re-entry) to the ranks of the poor differ from the factors determining escape from poverty (as we show below). Recognising the relevance of the dynamic dimension to explanations of poverty also has implications for anti-poverty policy, changing its emphasis from supplementing incomes towards providing routes out of poverty and preventing falls into poverty (Ellwood 1998: 49, HM Treasury 1999: 5).

The relevance of a longitudinal perspective can also be seen from consideration of the identity summarising the evolution of the poverty rate: this year's child poverty rate (h_t) is equal to last year's child poverty rate times the retention rate (one minus the exit rate, x_t), plus the entry rate (e_t) times one minus the proportion of children not poor last year. If the poverty rate is constant at some steady-state level, then it equals the entry rate divided by the sum of the exit and entry rates:

$$h_t = e_t/(e_t + x_t).$$ (1)

Thus cross-national differences in poverty rates depend only on cross-national differences in poverty entry and exit rates if there is no trend in poverty rates in either country.

The relevance of (1) as an organising principle for analysis is underscored by the fact that cross-sectional child poverty rates were stable during the 1990s in both Britain and (Western) Germany. This is demonstrated in Figure 1 which shows that the trends in child poverty rates for each country were flat, for both a relative and an absolute poverty standard. (More precise definitions are provided later.) The greatest deviations from the flat trend occurred in the mid-1990s in each country, but one should be cautious of reading too much into these variations, as they are within the bounds of sampling variation. A 95 percent confidence band for each annual poverty rate covers about 5 percentage points for Britain and slightly more in Western Germany.

<Figure 1 near here>

We therefore rephrase the question in the title into one focusing on differences in poverty transition rates: why does Britain have a higher child poverty entry rate and lower child poverty exit rate than Western Germany? To pinpoint the sources of these differences in transition rates, the key idea that we employ is that

- household income changes between one year and the next, and poverty transitions in particular, are precipitated by 'trigger events' such as changes in household members' labour market attachment and earnings, or changes in their household composition; and

- these events have different impacts on the risk of a poverty transition.

It is these two dimensions that we isolate in our decompositions. We relate differences between Britain and Western Germany in child poverty transition rates to cross-national differences in probabilities of trigger events, and differences in probabilities of a poverty transition conditional on event occurrence.[1] The trigger events considered are:

- changes in the number of workers in a child's household (working full-time and in total);

- changes in an child's household labour earnings, holding the number of workers fixed;

- movements into and out of a single-adult household; and

- changes in the number of household members, holding household type fixed.

We find that it is cross-national differences in the chances of making a poverty transition conditional on experiencing a trigger event, rather than differences in the prevalence of trigger events *per se*, which explain why child poverty exit rates in Britain are lower and poverty entry rates are higher than in Western Germany. The results point to the importance of the welfare-state-related differences as the principal source of Anglo-German differences in child poverty rates. In particular, relative to British children, German children are better protected against the consequences of adverse labour market events, and positive labour market events are reinforced to a greater extent.

The rest of the paper is structured as follows. In Section 2 we set out our analytical framework. We briefly discuss in Section 3 what existing evidence suggests are the main sources of Anglo-German differences in child poverty transition rates, considering differences in labour and marriage markets and the welfare state. In Section 4, we introduce our cross-

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[1] Other papers using the trigger event concept include Bane and Ellwood (1986), DiPrete and McManus (2000), Duncan (1993), Jenkins (2000), and Picot *et al.* (1999). Gottschalk and Danziger (2001) provide some decompositions of child poverty exit probabilities.

nationally comparable data sets, sub-files from the British Household Panel Survey and German Socio-Economic Panel, and explain key definitions such as the poverty line and trigger events. Child poverty transition rates for Britain and Western Germany in the 1990s are reported and discussed in Section 5. The decomposition and analysis of child poverty transition rates follows in Sections 6 (poverty exits) and 7 (poverty entries). Section 8 provides concluding comments.

2. A framework for examining cross-national differences in poverty transition rates

To fix ideas, suppose that there is a set of mutually-exclusive events $j = 1,..., J$, which trigger exits from poverty. Then, among those children in a given country at risk of exit from poverty between one year and the next, the probability of exit is given by the sum of the probabilities for children that exit by each of the different events:

$$\text{pr(exit poverty)} = \sum_{j=1}^{J} \text{pr(exit poverty via event } j). \tag{2}$$

Each term on the right hand side can be written as the product of the probability of each event and the probability of exit conditional on event occurrence:

$$\text{pr(exit poverty)} = \sum_{j=1}^{J} \text{pr(exit poverty} \mid \text{event } j).\text{pr(event } j). \tag{3}$$

By similar arguments, one can relate the probability that an at-risk child will enter poverty due to a set of mutually-exclusive trigger events $k = 1,..., K$, to the probabilities of each event and the probability of poverty entry conditional on event occurrence:

$$\text{pr(enter poverty)} = \sum_{k=1}^{K} \text{pr(enter poverty} \mid \text{event } k).\text{pr(event } k). \tag{4}$$

It follows that the cross-national differences in child poverty exit rates can be decomposed into a weighted sum of cross-national differences in event prevalence probabilities and cross-national differences in event-conditioned poverty transition probabilities:

$$\Delta\text{pr(exit poverty)} = \sum_{j=1}^{J} \Delta\text{pr(exit poverty} \mid \text{event } j).w_j + \sum_{j=1}^{J} \Delta\text{pr(event } j).z_j \tag{5}$$

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where Δ is the cross-national difference operator, $w_j = \theta.\text{pr}(\text{event } j)_{\text{WG}} + (1-\theta).\text{pr}(\text{event } j)_{\text{GB}}$, z_j = $(1-\theta).\text{pr}(\text{exit poverty}|\text{event } j)_{\text{WG}} + \theta.\text{pr}(\text{exit poverty}|\text{event } j)_{\text{GB}}$, and $0 \leq \theta \leq 1$. A similar expression can be derived for cross-national differences in poverty entry rates.

In our empirical application we focus our discussion on the various Δ terms *per se*, rather than provide exact numerical disaggregations using (5) and its poverty entry rate counterpart. There are three reasons for this. The first is that it is difficult to compile an exhaustive set of mutually-exclusive trigger events. A number of events may occur simultaneously and, although one could treat each joint occurrence as a separate event, there are practical limits to implementing this. An alternative might be to define a set of mutually-exclusive events using a pre-defined hierarchy of event 'importance' (cf. Bane and Ellwood 1986), but the assumptions required are debatable. Our response to these issues is to focus on a subset of the most important events and to look at each of these one at a time, but also to examine an important joint event (changes in labour market attachment combined with household formation/dissolution). Second, and related, with this strategy we can also compare cross-national differences in probabilities that children are born poor – equation (3) only refers to the experience of existing children.

The third reason for focusing on decomposition components is that it is important to calculate these separately for different groups of children at risk of a poverty transition. (For example the outcomes and processes affecting exits from poverty by children in lone parent households differ from those for children in married couple households – (re)marriage is a potential route out of poverty for the former group but not the latter.) Aggregation of within-group differences over at-risk subgroups would be possible in principle, but the value-added is relatively low. The strengths of our analytical approach derive from its transparent focus on the sources of the differences within each group.

The decompositions help to uncover the relative importance of the three key types of institution – labour market, marriage market, and welfare state – in explaining cross-national poverty differences.[2] The effects of differences in labour market or marriage market institutions (e.g. differences in the nature and extent of active labour market policies, or differences in matrimonial law) will be revealed most obviously through differences in the probabilities of the relevant trigger events. By contrast, differences in welfare states will be

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[2] Arguably differences in the health of the national macro-economy are another potential source of poverty differences. Our prior, however, is that macroeconomic differences reveal themselves primarily through labour

most obviously revealed by cross-national differences in income changes among those experiencing particular event. The primary goal of western welfare states is to directly modify the outcomes associated with various events using cash transfers (social assistance and social insurance benefits, and taxes).[3]

3. Anglo-German differences in child poverty transition rates: some priors

Existing evidence provides mixed suggestions about why Britain has lower child poverty exit rates and higher child poverty entry rates than Germany does. The reasons are that some factors offset each other, the sources of the stylised facts are diverse, and the information does not necessarily refer to families with children.

Differences in the prevalence of labour market and demographic trigger events

Consider first the relative prevalence of labour market and demographic trigger events. Britain is typically cited as having a more 'flexible' labour market than Germany, and greater turnover between employment and unemployment. See for example Nickell (1997). On this basis one might expect that earnings mobility among persons not changing jobs to be greater in Britain than Germany, but this may not be so: it is now well-established that Germany has higher earnings mobility than the USA (Burkhauser *et al.*, 1998; Schluter and Trede, 1999). One expects higher rates of both job loss and job gain in Britain than Germany, but this has ambiguous implications for poverty. Higher risks of job loss lead to higher poverty entry rates, other things equal, but higher risks of job gain lead to higher poverty exit rates.

A similar argument applies to marriage market events – again existing evidence suggests that turnover is higher in Britain.[4] But higher risks of divorce and separation are consistent with a higher child poverty entry rate, whereas a higher marriage risk is consistent with a higher child poverty exit rate. Fertility rates are lower in Germany than in Britain (Eurostat, 2000), a factor contributing to a smaller proportion of children born into poverty.

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market differences (which we do examine).

[3] Of course the different incentive structures arising from a particular welfare state may also lead to differences in the likelihood of trigger events.

[4] The number of legal marriages per 1000 people in 1995 was 5.3 in Germany (East and West) but 5.5 in the

The expected Anglo-German contrast is more clear cut if one considers the financial consequences associated with trigger events, but here too there are factors that complicate conclusions. The standard view is that the German welfare state provides a better financial cushion against adverse events such as job loss than the British welfare state (at least over the short-term). For instance Germany provides earnings-related unemployment insurance and unemployment assistance whereas in the UK unemployment insurance is flat-rate.

Estimated income replacement rates vary, depending on assumptions about, for instance, household composition, work record and earnings levels. The OECD recently calculated that in 1997 an unemployed married couple with two children would receive, if on unemployment insurance, a net income out of work that was 73 percent of net income at work (assuming average earnings), whereas the replacement rate for the corresponding UK family would be 64 percent (OECD, 1999). Ditch *et al.* (1996: 74) estimate the net replacement rate in 1995 for a couple at half average earnings with one child aged two to be 93 percent in Germany and 62 percent in the UK. For a couple with two children, the corresponding ratios were 101 percent and 69 percent.

Just as a high replacement ratio may be taken as evidence that one country provides a better cushion against adverse events such as unemployment, a high ratio also suggests that the financial returns to the average unemployed person from taking a job are lower. If this disincentive effect is sufficiently effective, then the only people who take jobs will be those with sufficiently high financial gains from taking a job. In this case the probability of moving out of poverty conditional on taking on more work is likely to be higher in the high replacement ratio country (Germany rather than Britain in this case).

Large negative income changes associated with divorce and separation have been documented for a range of countries. Burkhauser *et al.* (1990, 1991) drew attention to similar impacts in Germany and the USA, and Jarvis and Jenkins (1997) reported findings for Britain that were in the same range. The most plausible explanation for cross-national similarities is that gender inequalities in the labour market and home that are common across countries are more important than differences in structure and coverage of the welfare state (see Holden and

UK, and the number of divorces per 1000 people were 2.1 and 2.9 respectively (Eurostat, 2000).

Smock 1991 for elaboration). Whether the positive income effects associated with (re)partnering by a lone mother are larger in Germany or Britain is also not clear. On the one hand, the German tax system provides strong financial rewards to marriage especially through its income-splitting rules (the UK has independent taxation of men and women). On the other hand, these rewards also provide an incentive for a married woman not to work. If (re)partnering is with someone with low labour attachment (and who remains so), then the reduction in the risk of poverty associated with (re)partnering may be relatively low.

In sum, the most clear cut hypotheses about Anglo-German differences are:

- the probability of job gain, and the associated conditional probability of exiting poverty, are each higher in Britain than Germany (having offsetting impacts on differences in the overall poverty exit rate).

- the probability of job loss, and the associated conditional probability of entering poverty, are each higher in Britain than Germany (having reinforcing impacts on differences in the overall poverty exit rate).

- the probability of household formation is higher in Britain than Germany (contributing to a higher poverty exit rate), but

- the probability of household dissolution is also higher in Britain (contributing to a lower poverty exit rate).

The evidence concerning Anglo-German differences in the conditional probabilities of poverty transition associated with demographic changes is less clear cut. Overall, the fact that there are many factors potentially at work, some of which may offset others, underlines the need for a systematic disaggregated analysis.

4. Data and definitions

The BHPS and GSOEP, and sample numbers

We use eight waves of data, survey years 1991–8, of the British Household Panel Survey (BHPS) and the German Socio-Economic Panel (GSOEP). Both surveys are of similar design. The first wave of each survey (1991 for the BHPS, 1984 for the GSOEP) was a nationally representative sample of the population living in private households, in the German case also

including an over-sample of 'guest workers' (foreign-born residents and their children) recruited abroad during the economic booms of the 1960s. Original sample respondents have been followed and they (and co-resident adults) have been interviewed at approximately one year intervals subsequently. Children in original sample households have also been interviewed in their own right when they became adults. We use survey weights in our analysis in order to account for differential non-response and attrition (and the differential sampling probabilities of GSOEP guest worker sample members).

We focus on the period 1991–8 because the BHPS does not cover the 1980s as the GSOEP does. Our German sample for each year consists of the adults and children residing in the Länder (provinces) that comprised the former West Germany, 'Western Germany' for short.[5] We do not consider those living in the former East Germany: the huge changes in the region's economy and institutions over the 1990s after re-unification would muddy the cross-national comparison with Britain. In any case, we calculate that child poverty rates in eastern Germany fell significantly over this period, whereas they changed relatively little in both Britain and Western Germany (Figure 1).

Our analysis sub-samples consist of those individuals in households with non-missing data on income and household composition. For Britain there is information over the eight waves for some 18,731 different individuals of whom some 4,819 are children – defined by us to be those individuals aged under 17 years – resulting in 99,876 person-year observations (23,169 for children, 76,707 for adults). For Western Germany, there is information for some 16,450 individuals (4,494 children), resulting in 95,023 person-year observations (20,988 for children, 74,035 for adults). We have unbalanced panels for each country. Only about one third of all the children ever present in each panel were present in all eight waves, the main reason being that a significant number of them were born after 1991. Taking each cross-section of data separately there are approximately 2,500 children in Western Germany and approximately 2,800 in Britain. Although these are relatively large samples when all children are considered together, the numbers in some subgroups (notably lone parent and 'other' households – defined below) are quite small in any given year: some 200–300 children or fewer (with the number of households smaller still!). Hence most analysis of subgroups is based on data pooled from all eight waves. Two factors reduce sample sizes a little further in

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[5] More specifically, we use persons from GSOEP samples A-D if they satisfy the condition about current residence. We do not use new supplementary sample E (the 1998 Ergänzung sample).

some calculations (and are reflected in larger standard errors). First, variables summarising the total number of workers in a household (defined below) have missing values for households in which there was at least one adult that did not provide an interview.[6] Second, in our analyses of poverty entries and exits we restrict analysis to those individuals who were children at two consecutive waves (before and after the relevant transition).

The definition of income and the poverty line

We count an individual as being poor if the needs-adjusted real net annual income of the household to which he or she belongs –'income' for short – is less than the poverty line. Household net income is the sum across all household members of cash income from all sources (income from employment and self-employment, investments and savings, private and occupational pensions, and other market income, plus cash social security and social assistance receipts), minus direct taxes. The needs adjustment is done using an equivalence scale according to which each household income was deflated by a

$$\text{household equivalence factor} = [(\text{number of adults}) + \alpha*(\text{number of children})]^{\beta}, \qquad (6)$$

$$\text{where } \alpha = 0.7, \beta = 0.75.$$

This scale is the one of the two-parameter ones recommended by the US National Research Council Panel on Poverty and Family Assistance (Citro and Michael, 1995). In order to consider the sensitivity of results to changes in the equivalence scale, we repeated our analyses using three other scales: $(\alpha, \beta) = (0.7, 0.5), (0.5, 0.75), (0.5, 0.5)$.[7] The effects of changing the scale were minor and so are not discussed. (See Appendix A for details.) Incomes were deflated to 1998 prices using a national price index (source: IMF *Financial Statistics*). Household income measures are based on variables available in the 2001 edition of the Cross-National Equivalent File, a derived variable subfile of comparable cross-national data from the GSOEP and the BHPS (and the US PSID and Canadian SLID): see Burkhauser *et al.* (2000) and Bardasi *et al* (1999) for further details.

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[6] The household income data includes imputed values, so there are non-missing values as long as not all adults were non-respondents.

[7] See Jenkins and Cowell (1994) for analysis of the sensitivity of poverty and inequality indices to changes in α and β. They show that the scale with $(\alpha, \beta) = (0.5, 0.75)$ corresponds to the semi-official British equivalence scale (the so-called 'McClements before housing costs' one).

The poverty line we use in most of the analysis is 60 percent of contemporary national median income, a threshold recommended by the Eurostat Task Force (1998) for cross-national poverty comparisons. For Britain, this corresponds to a 1991 poverty line of £4,665 per annum, slightly higher cut-offs in each successive year, with a 1998 poverty line of £5,166, some 11 percent higher than the 1991 one. These changes reflect the economic growth over the decade as the economy came out of recession after 1991. Germany's recession came later, starting around 1992–3, with recovery not until the end of the period that we consider. As a result, median income, and hence the poverty line we use, followed a relatively flat trend over time. The poverty lines are DM 15,195 for survey year 1991 and DM 15,008 for 1998 (about 1 percent lower than the 1991 level), varying in between by at most 5 percent.

Our use of a poverty line that varies in value according to the distribution being considered – a 'relative' poverty line by contrast with an 'absolute' poverty line which is fixed in real terms across years and countries – is potentially controversial. Measures of relative poverty are sensitive to differences in inequality as well as the incidence of low income *per se* (and relative poverty rates may rise even if all incomes have risen). But this is a property of relative measures, rather than a fundamental criticism. Relative poverty lines of the type that we employ are widely accepted in Europe. It is a specification reflecting the European Union's definition of poverty.[8] Moreover the UK government has officially adopted this relative poverty definition for monitoring progress towards its goal of eradicating child poverty (United Kingdom, 1999). The report of the US Research Council Panel on Poverty and Family Assistance also suggested that the US official poverty line should be updated in line with secular income growth (Citro and Michael, 1995).

We repeated all our analysis using an absolute poverty line set equal to 60 percent of the 1991 British median income (£4,665, or DM 15,355 when converted at the 1991 OECD purchasing power parity). Our results changed little. The reason is that, over the 1990s, not only was secular growth in median income relatively small, but also the shape of the income distribution changed hardly at all, in both countries.

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[8] The EU Council of Ministers defined people to be poor if their 'resources (material, cutural, and social) are so limited as to exclude them from the minimum acceptable way of life in the Member State in which they live' (Council Decision, 19 December 1984, quoted by Atkinson 1998: 2). A 'half national average income' poverty line has been the concrete implementation of this definition in a large number of official Eurostat and other studies. See Atkinson (1998) for extensive discussion of European poverty lines, and official poverty lines in general.

For both fraction-of-median-based absolute and relative poverty lines, child poverty rates are higher in Britain than Germany – i.e. the poverty line corresponds to a higher percentile of the income distribution in Britain than Germany. One might therefore argue in this case that the nature of the population at risk of a poverty transition is rather different in each country, thereby introducing non-comparability into the analysis. To address this concern we also repeated our analysis using a low-income threshold equal to the twentieth percentile of the all-persons income distribution in each country in each year, thus ensuring that exactly 20 percent of persons were poor. The effect was to narrow estimated cross-national differentials in many decomposition estimates, but the general tenor of our conclusions was not altered. (See Appendix B for details.)

Given a definition of the poverty line, we define a poverty entry as a change in income from being above the line in one year to below the line in the subsequent year. A poverty exit is a change in income from below the line to above the line. Arguably these definitions are over-sensitive to small changes in income for individuals close to the poverty line, and may pick up 'non-genuine' poverty transitions. To check the robustness of our results, we redefined poverty exits as an income increase from below the poverty line to at least 10 percent above the poverty line, and a poverty entry as an income fall from above the poverty line to at least 10 percent below the poverty line. The change in definition reduced the estimated magnitude of each poverty transition statistic, for both countries, but did not change the cross-national pattern of differences and thence our conclusions. (See Appendix B for details.)

The definition of demographic and labour market variables, and trigger events

We classified children in several ways according to the type of household they lived in and by household labour market attachment. Changes in classifications between one year and the next were used to define trigger events.

We defined a 'lone parent household' to be a household containing one adult plus one or more children. A 'married couple household' is a household containing two or more adults with or without children, where the spouse of the head of household is present. ('Married' refers to both legal marriages and cohabiting unions.) Some 15 percent of British children and 9 percent of Western German children live in lone parent households (pooled data for 1991–

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8). About 80 percent of all children lived in married couple households in Britain and 90 percent in Western Germany. The remaining group of 'other' households comprised two or more adults living together with or without children and where the household head has no spouse present. Included under this heading may have been a lone parent and her children sharing the household with unrelated adults (for example another lone parent family) or the lone parent's own parents. Thus our 'lone parent household' group does not include all lone parents and their children. On the other hand, the fraction of all children in the 'other' group is small: 4 percent in Britain, 2 percent in Western Germany.

We defined an adult household member to be a 'worker' if his or her annual labour earnings were positive, and he or she worked at least 52 hours over the reference year (defined below). Full-time workers were those who worked 1,500 or more hours per annum. For each child we calculated the number of workers and the number of full-time workers in his or her household.

Trigger events were identified from year-on-year changes in demographic and labour market characteristics of each child's household. For example, 'demographic' events include a change in household size (conditioning on no change in household type), and entry to and departure from a lone parent household. 'Labour market' events include a change in the number of workers (full-time and in total), and a change in real (unequivalised) household labour earnings of at least 20 percent conditioned on there being no change in the total number of workers in the household.[9] Our aim was to distinguish between job gains and losses and 'pure' earnings changes, where the latter are driven primarily by changes in the annual work hours of household members that did not involve job change(s). The threshold of 20 percent was chosen to ensure that transitory earnings variations were not counted as events. Each event is considered independently, one at a time, though we also consider some jointly occurring events.

The reference periods for income, household characteristics, and trigger events

Age, sex, and thence household type and composition, are variables measured at the date of interview in each survey year, i.e. typically in the Autumn for BHPS respondents (October is

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[9] The distinction between 'demographic' and 'labour market' events should not be pushed too far. Since our labour market measures are defined at the level of the household (to match the definition of income), changes in

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the modal interview month) and in the Spring for GSOEP respondents (March is the modal interview month). The reference period over which annual household income (and labour earnings) are calculated is, for the BHPS, the 12 months up to the 1st of September of the survey year (e.g. from 01.09.96 to 31.08.97 for survey year 1997) and, for the GSOEP, the reference period is the calendar year prior to the survey year. In both surveys, household incomes are derived by aggregating the incomes of all the household members present at the time of the interview (incomes of members who left during the year are not counted).

There is therefore a potential mismatch in timing between demographic events over the year $t-1$ to t and changes in annual income.[10] In particular the reference period for annual income for households surveyed in year t partially overlaps the survey date at year $t-1$. As a result, authors such as Burkhauser *et al.* (1986), Burkhauser *et al.* (1990, 1991), and DiPrete and McManus (2000), have taken events measured between interviews at $t-1$ and t and compared them with annual household incomes at years $t-1$ and $t+1$. The problem with this convention is that calculations of incomes at $t+1$ may be based on a different set of individuals than those present at t – there is substantial flux in household membership over time. Hence the income change calculation may reflect this subsequent change rather than the trigger event of interest.[11] Observe too that trigger events relating to arrivals and departures of household members already have some impact on year t income, because household incomes are calculated only for the individuals forming the household at the year t interview.

In our view, therefore, the appropriate choice of observation window width for income changes is not clear cut (and may depend on the particular event under consideration). In order to check the robustness of results, we considered income changes both between years $t-1$ and t, and between years $t-1$ and $t+1$. The largest differences between corresponding statistics are likely to arise in the changes in poverty risks estimated to be associated with significant changes in household composition, as with a household split forming a lone parent

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household composition may also effect the number of workers.

[10] This potential mismatch problem is endemic in panel comparisons based on annual income measures. An alternative would be to use current income measures (income round about the time of the interview) as there would then be a close correspondence between the income reference period and household composition. Current income measures are not available for the full 1991-8 period for the GSOEP.

[11] Of course these adjustments (and subsequent ones) and their associated income outcomes are of also of interest, but that is a separate issue from the one addressed here – which concerns the income change associated with a given trigger event. Whatever the case, income changes between $t-1$ and t or between $t-1$ and $t+1$ are short-term changes rather than longer-term ones. Cf. DiPrete and McManus who also consider cross-national differences in 'the rate of subsequent events that cause the original effect to intensify or decay' (2000: 3) in their US-Germany comparison of income mobility. They used observation window widths of two, three, five and

household. In this case, the very immediate income change – typically precipitate – is likely to differ from the net change in circumstances over even a slightly longer period (during which eligibility for government transfers or child support is established). By contrast changes in income between t and $t-1$ are better matched with the changes between t and $t-1$ in household labour earnings or the number of workers in the household – these variables have the same reference period, by construction.

5. Anglo-German differences in child poverty transition rates

Before proceeding to the decomposition analysis, we summarise the cross-national differences in annual poverty exit and entry rates for children that are to be examined. The poverty line is 60 percent of contemporary national median income. Table 1 displays the transition rates broken down by child's household type in the year prior to the potential transition.[12] Also shown are the pooled cross-sectional poverty rates for each group (cf. Figure 1).

The estimates in the first row of Table 1, for all children, are the basis of our earlier claim that child poverty exit rates are lower and child poverty entry rates are higher in Britain than in Western Germany. (Both differences are statistically significant at the 95 percent level.) The difference in exit rates (25 percent compared to 36 percent) is much larger in absolute terms than the difference in entry rates (11 percent compared to 7 percent), but in proportionate terms the differentials is larger for the entry rate (and more than four-tenths in both cases).

<Table 1 near here>

The all-children differentials in transition rates are echoed when one considers children in each of the three household type subgroups separately (though observe that the

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seven years.

[12] All estimates of standard errors of probabilities and rates account for the clustering that arises when there are repeated observations per household in each wave. We took no account of the complex survey design in the BHPS and GSOEP (but information is not available to do this in the same way for both surveys), nor did we account for repeated observations on the same person across waves (in the pooled analyses). For this reason, our estimates may be under-estimates. Also we did not account for the sampling error associated with the poverty line itself. However Preston (1995) shows that this may lead to under- or over-estimates of the true standard error for the poverty rate. His simulations indicate that ignoring the endogeneity of the relative poverty line will be of little practical consequence in our case.

differences in entry rates have large confidence intervals). At the same time there are some cross-national similarities. For example, in both Britain and Western Germany, children from lone parent households have below (national) average poverty exit rates and above average poverty entry rates. Children from married couple households in both countries below average poverty entry rates (poverty exit rates are about average).

6. Trigger events and movements out of child poverty

We analyse exits from poverty by children in lone parent households separately from those by children in married couple households. The 'demographic' trigger events considered are a fall in the child's household size – this corresponds, for example, to an older sibling becoming non-dependent or leaving home – plus, for the former group, leaving a lone parent household (for example by (re)marriage of the custodial parent). The other trigger events analysed are labour market ones: an increase in the number of workers, full-time workers in particular, and increases in labour earnings with no change in the number of workers.

Exits from poverty by poor children in lone parent households

The estimates for poor children from lone parent households are shown in Table 2. The first row of the table shows the exit rates for this group as a whole over a one year interval (t–1 to t) – as shown earlier in Table 1 – whereas the second row shows the exit rate for the period t–1 to t+1.). With a longer observation window exit rates are slightly higher in both countries, but the cross-national differential persists. The remaining rows of Table 2 report the estimates of the two types of statistics for five trigger events: pr(event) defined over the period t–1 to t, and pr(poverty exit|event) for each of the two observation periods. Decreases in household size are very rare, so we do not consider this event further.

We look first at the cross-national differences in the probability of trigger events. Table 2 shows that the chances of moving out of a lone parent household over a one year interval are larger in Britain than Western Germany (17 percent compared to 13 percent). The cross-national relativity is reversed, however, for the chances of gaining a full-time worker.

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In Britain the probability is about 0.09 but almost 0.15 in Western Germany.[13] On the other hand, the probability of the joint occurrence of these two events is much the same in the two countries, 5–6 percent. Put another way, of those children with gains in the number of full-time workers, in Britain the majority also moved out of a lone parent household, whereas a minority did in Western Germany. The most striking cross-national difference in trigger event occurrence is in the prevalence of an increase in real household labour earnings, experienced by almost two-thirds of British children, but only about one half of Western German children. Both estimates are much larger than the probability of increases in the number of full-time workers. Thus it appears that, in both countries, increases in annual work hours (for already-working households) are more common among poor lone parent households than are moves into full-time work.

When we consider the probabilities of exit from poverty conditional on having experienced a trigger event, we find that cross-national differences are relatively small for departures from lone parenthood, though the estimates themselves are quite high in each country: just under one half. When the observation period is extended a further year, a cross-national differential appears, with the conditional poverty exit rate becoming markedly higher for Western Germany than Britain.

The size of these effects is, however, dwarfed by the reductions in poverty risk that are associated with an increase in the number of full-time workers: the conditional exit probability in this case is some 74 percent in Britain and even higher in Western Germany, 82 percent. Extension of the observation period moderates these estimates somewhat, to a probability of around two-thirds in both countries. Experience of both events increases the conditional poverty exit rates, as expected, though by less in Britain than Western Germany. By contrast, increases in household labour earnings have a much smaller association with poverty exits, particularly in Britain. About one third of the German children experiencing this event left poverty over the same period (almost one half if we look a year later), compared to only 11 percent of British children (or 17 percent a year later).

<Table 2 near here>

Assembling the evidence from the decompositions, we conclude that there are several related reasons why poverty exit rates for children in poor lone parent households are higher in Western Germany than Britain. In Germany the likelihood of a move into full-time work is higher, and when this does occur, it has a greater poverty reduction impact than in Britain. Increases in labour earnings due to increases in work hours among already-working households are relatively common in both countries (though more so in Britain than in Germany), but the associated poverty reduction is somewhat smaller in Britain. Thus the cross-national difference in child poverty exit rates appears to be explained more by the differences in what happens to income conditional on more work, rather than more work per se. Other factors such as the rate of departure from lone parenthood (higher in Britain) or the positive financial consequences of re-partnering – about the same in both countries – are less important.

This in turn suggests the key importance of the German tax and benefit system for reinforcing the income impact of more work – whether through longer hours for already-working parents, or by taking up a job. In this light, the results suggest that recent British active labour market policies such as the New Deal for Lone Parents, intended to increase employment rates, will indeed have an anti-poverty effect, particularly if they increase the proportion of lone parents working full-time, but these policies will be significantly reinforced if the rewards from working are also increased. Thus other recent British policy initiatives in the late 1990s that raised the benefits paid to parents working full-time (first via Family Credit and, since October 1999, the Working Family Tax Credit) are measures likely to reduce the cross-national differential in child poverty exit rates in future. The national minimum wage, introduced in October 1999, is likely to make a positive contribution as well but, given the relatively low rate at which it was set, the in-work benefit initiatives are likely to have a larger impact.[14]

Exits from poverty by poor children in married couple households

Anglo-German differences in poverty exit rates for poor children in married couple households are large: around 27 percent in Britain compared with about 36 percent in Western Germany. This differential remains if the observation period is extended a further

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[14] See Piachaud and Sutherland (2000).

year (the exit rates are then 36 percent and 42 percent respectively). See Table 3 which also displays probabilities broken down by types of trigger event.

Decreases in household size are again so rare that they can play virtually no role in explaining the cross-national poverty exit rate differential. The fraction of children in households with an increase in the number of workers is one third higher in Britain than in Western Germany (20 percent compared with 15 percent). There is an even larger differential in the prevalence of increases in the number of full-time workers: the rate in Britain is 15 percent, whereas it is one in ten in Western Germany, fifty percent smaller. Much more common in both countries are increases in household labour earnings among already-working households and, as for poor lone parent households (Table 2), the proportion is higher in Britain than in Western Germany, 41 percent compared with 32 percent. Other things equal, these differences would lead to higher poverty exit for Britain which of course is not the actual case. Working in the opposite direction are the cross-national differences in the financial consequences of the trigger events.

Among Western German children with an increase in the number of household members working, one half also exit poverty, but among British children experiencing the same event, the fraction is only 40 percent. The cross-national differential is similar when children with an increase in the number of full-time workers are considered. Some 57 percent of Western German children in this group also leave poverty, but only 50 percent of British children. As the observation window is extended one year further, these differentials increase: the British estimates remain much the same but the proportion of non-poor German children increases. The cross-national difference in the reduction in poverty rates associated with an increase in household labour earnings among already-working households is particularly striking. Almost two-thirds of German children experiencing this event leave poverty after a year (63 percent), but less than one third of British children (28 percent). Another year later the cross-national differential is smaller but still large (the proportions non-poor are 57 percent and 36 percent respectively).

<Table 3 near here>

Overall, the estimates shown in Table 3 suggest that, as was the case for children in lone parent households, Anglo-German differences in child poverty arise from differences in the financial consequences associated with events rather than differences in event prevalence. Indeed, by themselves the latter would imply higher exit rates in Britain. The potential

importance of policies recently introduced in Britain, such as the Working Family Tax Credit – available to all low-income working parents, not only lone parents – is again underlined.

7. Trigger events and movements into child poverty

We now turn to consider entries to poverty. We only analyse what happens to non-poor children from married couple households as sample numbers for non-poor children in other household types are small. The estimates are reported in Table 4. The first row shows that poverty entry rates among all children in the at-risk group are higher in Britain than Western Germany (10 percent compared with 6 percent) and this differential is slightly larger still if a two-year interval is used (12 per cent compared with 6 percent).

To what extent can cross-national differences in trigger event prevalence account for these differences? The probability of a decrease in household size (but no change in household type) – arising e.g. via birth of an additional sibling – is about one-twentieth in both countries. The chances of joining a lone parent household are very slightly higher in Britain than in Western Germany, but the probability is small in both cases (3 percent compared with 2 percent), so this factor cannot be responsible for the difference in poverty entry rates. Moreover the incidence of falls in household labour earnings (e.g. because of working hours reductions that do not involve job loss itself) is the same in both countries, 8 percent. But what does play a marked role are differences in job loss rates. In Britain almost one fifth (18 percent) of children experienced a decrease in the number of workers, and about the same proportion a decrease in the number of full-time workers (17 percent). These estimates are roughly twice the corresponding fractions for Western Germany, 9 percent and 8 percent respectively.

<Table 4 near here>

Turning now to the poverty outcomes for children experiencing the various trigger events, we see that the choice of the observation period for income change now makes a noticeable difference to the conclusions that might be drawn (compared to the exit rate decompositions). For both countries, extension of the interval from one year to two leads to a reduction in the proportion entering poverty and for all the trigger events (with the exception of increases in household size, and newborn children – discussed below). Although the

conditional poverty entry rate associated with each trigger event is broadly similar in the two countries, the fall in entry rate with lengthening the observation period is greater for Germany, thereby revealing a cross-national differential in entry rates after two years.

Among children moving into a lone parent household between the interviews in years $t-1$ and t, for example, about 60 percent of children enter poverty between income years $t-1$ and t, in both countries. But the poverty entry rate for the interval $t-1$ to $t+1$ is about 48 percent for British children, twice the corresponding entry rate for German children (24 percent). It seems that there is a sharp short-term reduction in income associated with family dissolution in both countries, but after a period of adjustment in which circumstances improve, the net effect is that greater protection against poverty is provided to German children relative to British children. A similar pattern arises with the loss of one or more workers from the household (whether full-time or not), though the poverty risks involved are somewhat smaller. Approximately one fifth of children enter poverty in the short-run in both countries, but if the two-year observation window is used, the entry rate is around 13 percent in Western Germany but still one fifth in Britain. As expected, the interval-length effect is more muted for the estimates of poverty entry rates for children who experience decreases in household labour earnings, but it remains the case that protection against joining the ranks of 'working poor' households is less in Britain than in Western Germany.

The last two rows of Table 4 provide information about the contributions to the child poverty rate by children born into already poor households. (All the calculations reported so far were based on samples of children already present in the household at year $t-1$.) It appears that the proportion of households with a newborn child in an average year is rather higher in Britain than in Western Germany: just over 4 percent compared to just 1 percent. This is, however, an over-estimate of the true differential arising from the way these children are identified in the surveys.[15] In addition the proportion of newborn children that were born into poor households is much the same in both countries, about one quarter. Both sets of statistics suggest that differences in fertility and the experiences of newborn children contribute little to Anglo-German differences in child poverty rates.

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[15] Newborn children are those aged zero in year t. Age in the GSOEP is calculated as survey year minus birth year (birth month data is not available, as it is in the BHPS). But GSOEP interviews are typically occur in March each year, and BHPS interviews in October, so the chances of observing a newborn child (as defined) are lower in the GSOEP than in the BHPS.

Overall, the picture for child poverty entries is not symmetric to that of poverty exits. In particular the greater prevalence of trigger events in Britain relative to Western Germany (for most events) now contributes to the cross-national differential in the poverty transition rate rather than offsetting it. The other main difference from the exit rate analysis is that the largest conditional poverty entry rate is for the trigger event 'joining a lone parent household', whereas the largest conditional poverty exit rate is associated with increases in the number of full-time workers. These results are consistent with earlier research about the population as a whole for the USA (Bane and Ellwood 1986) and Britain (Jenkins 2000) showing that the impact of 'demographic' events was greater for poverty entries than for poverty exits.

What the entry rate decomposition analysis shares with the exit rate analysis, though, is the finding of the Anglo-German differential in the financial changes associated with given events, and this suggests once more the important role of the German welfare state. The German tax and benefit system provides better protection to children's incomes against adverse events than the British system does, not just better reinforcement of positive events. This is unsurprising given greater role played by social insurance rather than means-tested social assistance in the German welfare state.[16] The greater demographic and labour market turnover in Britain brings these effects more into play in the context of poverty entries – intensifying the effects of welfare state differences – rather than offsetting them as for exits. Recent British active labour market initiatives have concentrated on increasing movements from unemployment into work and making work pay (see earlier). Our results for poverty entries highlight a potential payoff to policies in Britain that prevent job loss and promote job retention rates for those individuals who already have or get a job.

8. Concluding comments

Our aim has been to provide a longitudinal perspective on why child poverty rates are higher in Britain than in Western Germany. We argued that it was important to rephrase the question

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[16] But the greater role of social insurance cannot be the full story. As DiPrete and McManus (2000) and others have pointed out, eligibility among lone parents is relatively low: means-tested social assistance is particularly important for this group (as in Britain). Generosity of payments aside, greater income protection for children in households that split in Germany also comes from larger child support payments from the non-coresident

in terms of poverty transition rates: why are child poverty exit rates lower, and child poverty entry rates higher, in Britain than in Western Germany? To address these issues we have used a form of decomposition analysis, comparing cross-nationally the prevalence of events that trigger poverty (changes in household composition and household labour market attachment or earnings) and the chances of making a poverty transition conditional on experiencing a trigger event. It turns out that is the latter type of difference that is the most important, for both poverty exits and poverty entries. Consistent with the arguments rehearsed in Section 2, these findings reflect differences between the German and British welfare states, in particular the German one providing a greater cushion against adverse events and better reinforcement of positive events. Differences in the prevalence rates of trigger events do, of course, also play a role; a notable example being the greater risk of job loss in Britain compared to Western Germany.

These conclusions are robust to adjustments for errors in measurement of poverty transitions, and changes in the definition of the poverty line and in the equivalence scale used to adjust income for differences in needs. We have also raised questions about the appropriate reference period over which to measure the income changes associated with trigger events, an issue that has received insufficient attention in previous work. As it happens, the choice does affect some estimates (notably those for lone parent households), but the patterns of Anglo-German differentials remain robust.

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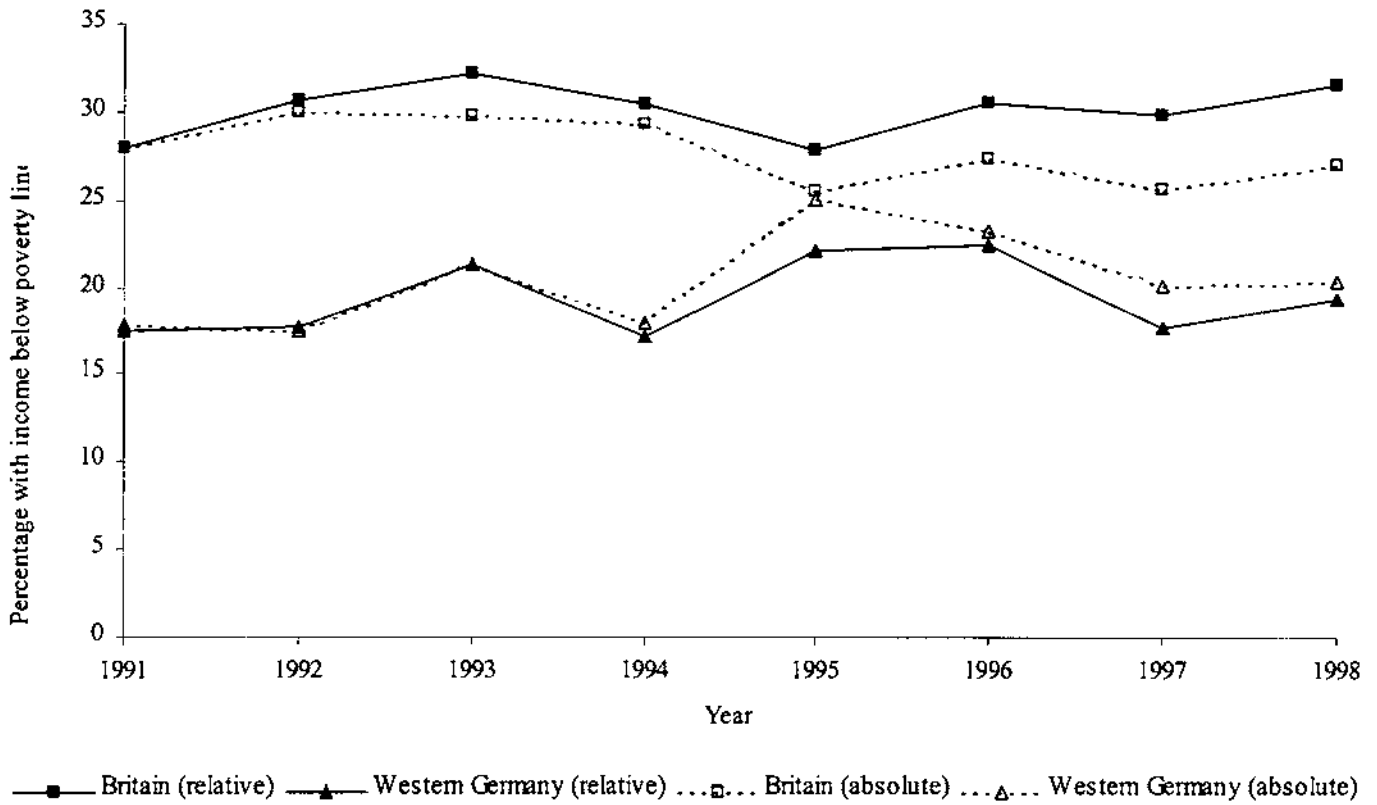
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Figure 1
Child poverty rates (%) in Britain and Western Germany, 1991–8,
by poverty line type

—■— Britain (relative) —▲— Western Germany (relative) ...□... Britain (absolute) ...△... Western Germany (absolute)

Source: authors' calculations from BHPS and GSOEP data. Definitions explained in Section 3. The relative poverty line is 60 percent of contemporary national median income. The absolute poverty line is 60 percent of 1991 median income in Britain.

Table 1
Annual poverty rates and poverty exit and entry rates for children
(pooled data, 1991–8)

Child's household type	Poverty rate (%)		Exit rate (%)		Entry rate (%)	
	Britain	Western Germany	Britain	Western Germany	Britain	Western Germany
All children	30.1	19.4	25.0	36.1	11.3	7.1
	(0.5)	(0.6)	(1.0)	(2.1)	(0.5)	(0.5)
Lone parent household	68.1	49.1	20.4	33.4	24.9	17.1
	(1.3)	(0.3)	(1.5)	(5.1)	(2.4)	(3.5)
Married couple household	22.4	16.3	27.3	36.2	9.9	6.4
	(0.5)	(0.6)	(1.3)	(2.3)	(2.4)	(0.5)
'Other' household	46.4	33.3	27.1	51.2	23.1	16.7
	(2.6)	(3.6)	(4.1)	(7.9)	(3.2)	(5.0)

Standard errors (adjusted for repeated observations per household per year) are shown in parentheses. Transition rates calculated as the number of poverty transitions between years $t-1$ and t, divided by the number of children at risk of a transition in year $t-1$ (sample restricted to individuals who are children at years $t-1$ and t; child's household type measured at $t-1$). Poverty line = 60% of contemporary national median income.

Table 2
Poverty exits by poor children in lone parent households
(pooled data, 1991–8)

	Britain %	(s.e.)	Western Germany %	(s.e.)
All children at $t-1$ at risk of poverty exit				
pr(not poor at t) [a]	20.4	(1.5)	33.4	(5.1)
pr(not poor at $t+1$) [b]	25.8	(1.9)	43.7	(6.0)
Household size fell				
pr(event)	1.3	(0.4)	0.0	(-)
pr(not poor at t|event)	3.1	(3.1)	-	(-)
pr(not poor at $t+1$|event)	17.7	(12.7)	-	(-)
Left lone parent household				
pr(event)	17.0	(1.5)	12.6	(2.4)
pr(not poor at t|event)	46.0	(4.7)	48.6	(9.1)
pr(not poor at $t+1$|event)	40.8	(5.2)	56.6	(9.0)
Gained full-time worker(s)				
pr(event)	8.9	(1.1)	14.6	(3.8)
pr(not poor at t|event)	74.1	(5.0)	82.2	(8.9)
pr(not poor at $t+1$|event)	65.3	(6.5)	68.1	(10.9)
Both of above				
pr(event)	6.0	(1.6)	5.3	(1.5)
pr(not poor at t|event)	83.5	(5.0)	91.7	(7.9)
pr(not poor at $t+1$|event)	65.3	(6.5)	75.6	(10.6)
Labour earnings increased by 20% or more (number of workers unchanged)				
pr(event)	65.2	(1.9)	50.0	(5.6)
pr(not poor at t|event)	11.1	(1.5)	32.3	(7.2)
pr(not poor at $t+1$|event)	17.3	(2.0)	48.0	(8.2)

Standard errors (adjusted for repeated observations per household per year) are shown in parentheses. Expressions pr(.) are defined in the main text. Events refer to changes between years $t-1$ and t. [a]: Poverty exit refers to change in poverty status between years $t-1$ and t. [b]: Poverty exit refers to change in poverty status between years $t-1$ and $t+1$. Sample restricted to individuals who were children at years $t-1$ and t, and poor children in lone parent households at year $t-1$. Total (unweighted) number of children at risk of poverty exit = 1668 (Britain), 394 (Western Germany). Poverty line = 60% of contemporary national median income.

Table 3
Poverty exits by poor children in married couple households
(pooled data, 1991–8)

	Britain		Western Germany	
	%	(s.e.)	%	(s.e.)
All children at $t-1$ at risk of poverty exit				
pr(not poor at t) [a]	27.3	(1.3)	36.2	(2.3)
pr(not poor at $t+1$) [b]	35.6	(1.6)	42.4	(2.6)
Household size fell (and remain in married couple household)				
pr(event)	1.7	(0.4)	2.2	(0.5)
pr(not poor at t|event)	34.2	(10.6)	37.9	(10.8)
pr(not poor at $t+1$|event)	75.0	(8.0)	55.7	(13.0)
Gained 1+ worker(s)				
pr(event)	20.1	(1.3)	15.1	(1.7)
pr(not poor at t|event)	41.0	(3.4)	50.0	(6.0)
pr(not poor at $t+1$|event)	42.5	(3.9)	62.7	(6.4)
Gained 1+ full-time worker				
pr(event)	15.4	(1.2)	10.9	(1.4)
pr(not poor at t|event)	50.0	(4.2)	56.5	(6.6)
pr(not poor at $t+1$|event)	51.8	(4.6)	63.0	(6.9)
Labour earnings increased by 20% or more (number of workers unchanged)				
pr(event)	40.8	(1.7)	32.0	(2.5)
pr(not poor at t|event)	28.3	(2.3)	62.9	(4.2)
pr(not poor at $t+1$|event)	36.2	(2.9)	56.8	(5.1)

Standard errors (adjusted for repeated observations per household per year) are shown in parentheses. Expressions pr(.) are defined in the main text. Events refer to changes between years $t-1$ and t. [a]: Poverty exit refers to change in poverty status between years $t-1$ and t. [b]: Poverty exit refers to change in poverty status between years $t-1$ and $t+1$. Sample restricted to individuals who were children at years $t-1$ and t, and poor children in married couple households at year $t-1$. Total (unweighted) number of poor children at risk of poverty exit = 3,410 (Britain), 2,464 (Western Germany). Poverty line = 60% of contemporary national median income.

Table 4
Poverty entries by non-poor children in married couple households
(pooled data, 1991–8)

	Britain		Western Germany	
	%	(s.e.)	%	(s.e.)
All children at $t-1$ at risk of poverty entry				
pr(poor at t) [a]	9.9	(0.5)	6.4	(0.5)
pr(poor at $t+1$) [b]	11.7	(0.5)	6.3	(0.5)
Household size rose (but remained in married couple household)				
pr(event)	6.0	(0.3)	4.8	(0.3)
pr(poor at t|event)	18.0	(2.4)	9.0	(1.6)
pr(poor at $t+1$|event)	20.2	(2.6)	11.0	(2.3)
Joined lone parent household				
pr(event)	3.2	(0.3)	1.6	(0.2)
pr(poor at t|event)	61.8	(4.1)	58.9	(7.2)
pr(poor at $t+1$|event)	48.4	(4.7)	23.6	(5.9)
Lost 1+ worker(s)				
pr(event)	18.0	(0.6)	8.7	(0.5)
pr(poor at t|event)	23.0	(1.6)	20.0	(2.5)
pr(poor at $t+1$|event)	21.9	(1.7)	12.7	(1.8)
Both of above				
pr(event)	1.9	(0.2)	1.4	(0.2)
pr(poor at t|event)	64.7	(5.0)	65.1	(6.9)
pr(poor at $t+1$|event)	49.4	(5.7)	23.8	(6.3)
Lost 1+ full-time worker(s)				
pr(event)	17.0	(0.6)	8.3	(0.5)
pr(poor at t|event)	22.0	(1.6)	21.5	(2.6)
pr(poor at $t+1$|event)	20.5	(1.8)	12.8	(1.5)
Labour earnings fell by 20% or more (number of workers unchanged)				
pr(event)	8.4	(0.4)	8.0	(0.5)
pr(poor at t|event)	27.7	(2.5)	19.3	(2.6)
pr(poor at $t+1$|event)	27.1	(2.7)	12.7	(1.8)
Children newborn at t				
pr(household with newborn) [c]	4.3	(0.1)	1.0	(0.1)
pr(poor at t|newborn child) [d]	27.2	(1.5)	25.9	(5.9)

Standard errors (adjusted for repeated observations per household per year) are shown in parentheses. Expressions pr(.) are defined in the main text. Events refer to changes between years $t-1$ and t. [a]: Poverty exit refers to change in poverty status between years $t-1$ and t. [b]: Poverty exit refers to change in poverty status between years $t-1$ and $t+1$. Sample restricted to individuals who were children at years $t-1$ and t and non-poor children in married couple households at year $t-1$. Total (unweighted) number of non-poor children at $t-1$ at risk of poverty entry = 11,630 (Britain), 12,682 (Western Germany). [c]: Proportion of married couple households at t containing a newborn child. (The German figure is an under-estimate – see text.) [d]: Proportion of newborn children at t who were poor at t. Poverty line = 60% of contemporary national median income.

Appendix A. Sensitivity analysis: how pr(poverty transition|event) varies with changes to the equivalence scale

Table A2
Poverty exits by poor children in lone parent households
(pooled data, 1991–8) , by equivalence scale

pr(not poor at *t*|event), by event	Britain		Western Germany	
	%	(s.e.)	%	(s.e.)
All children at *t*–1 at risk of poverty exit				
α = 0.7, β = 0.75	25.8	(1.9)	43.7	(6.0)
α = 0.7, β = 0.5	20.2	(1.5)	29.2	(4.4)
α = 0.5, β = 0.75	25.4	(1.7)	40.2	(5.8)
α = 0.5, β = 0.5	24.0	(1.6)	30.5	(4.6)
Household size fell				
α = 0.7, β = 0.75	3.1	(3.1)	-	(-)
α = 0.7, β = 0.5	6.5	(4.8)	-	(-)
α = 0.5, β = 0.75	3.4	(3.5)	-	(-)
α = 0.5, β = 0.5	3.4	(3.5)	-	(-)
Left lone parent household				
α = 0.7, β = 0.75	46.0	(4.7)	48.6	(9.1)
α = 0.7, β = 0.5	55.3	(4.6)	48.4	(8.9)
α = 0.5, β = 0.75	52.5	(5.0)	50.3	(9.8)
α = 0.5, β = 0.5	55.7	(4.7)	51.2	(9.6)
Gained full-time worker(s)				
α = 0.7, β = 0.75	74.1	(5.0)	82.2	(8.9)
α = 0.7, β = 0.5	75.5	(4.5)	81.9	(8.7)
α = 0.5, β = 0.75	77.3	(5.0)	87.4	(8.7)
α = 0.5, β = 0.5	76.2	(4.7)	83.7	(8.9)
Both of above				
α = 0.7, β = 0.75	83.5	(5.0)	91.7	(7.9)
α = 0.7, β = 0.5	86.8	(3.9)	91.7	(7.9)
α = 0.5, β = 0.75	86.6	(4.4)	100.0	(-)
α = 0.5, β = 0.5	87.2	(4.0)	100.0	(-)
Labour earnings increased by 20% or more (number of workers unchanged)				
α = 0.7, β = 0.75	11.1	(1.5)	32.3	(7.2)
α = 0.7, β = 0.5	10.2	(1.4)	31.1	(7.0)
α = 0.5, β = 0.75	14.5	(1.8)	41.9	(8.7)
α = 0.5, β = 0.5	15.0	(1.9)	32.7	(7.3)

Standard errors (adjusted for repeated observations per household per year) are shown in parentheses. Events and poverty exits refer to changes between years *t*–1 and *t*; pr(event) estimates as in Table 2. Equivalence scale = [(number of adults) + α*(number of children)]^β. Poverty line = 60% of contemporary national median income.

Table A3
Poverty exits by poor children in married couple households
(pooled data, 1991–8), by equivalence scale

pr(not poor at *t*|event), by event	Britain		Western Germany	
	%	(s.e.)	%	(s.e.)
All children at *t*–1 at risk of poverty exit				
$\alpha = 0.7, \beta = 0.75$	27.3	(1.3)	36.2	(2.3)
$\alpha = 0.7, \beta = 0.5$	31.6	(1.5)	35.1	(2.7)
$\alpha = 0.5, \beta = 0.75$	31.1	(1.5)	35.1	(2.5)
$\alpha = 0.5, \beta = 0.5$	34.5	(1.7)	35.6	(2.8)
Household size fell (and remain in married couple household)				
$\alpha = 0.7, \beta = 0.75$	34.2	(10.6)	37.9	(10.8)
$\alpha = 0.7, \beta = 0.5$	34.8	(11.2)	20.4	(7.8)
$\alpha = 0.5, \beta = 0.75$	34.2	(10.6)	37.8	(11.1)
$\alpha = 0.5, \beta = 0.5$	31.3	(10.4)	27.5	(11.2)
Gained 1+ worker(s)				
$\alpha = 0.7, \beta = 0.75$	41.0	(3.4)	50.0	(6.0)
$\alpha = 0.7, \beta = 0.5$	46.4	(3.7)	54.2	(6.9)
$\alpha = 0.5, \beta = 0.75$	46.1	(3.6)	48.6	(6.4)
$\alpha = 0.5, \beta = 0.5$	48.0	(3.9)	56.7	(7.1)
Gained 1+ full-time worker				
$\alpha = 0.7, \beta = 0.75$	50.0	(4.2)	56.5	(6.6)
$\alpha = 0.7, \beta = 0.5$	55.3	(4.5)	74.7	(6.6)
$\alpha = 0.5, \beta = 0.75$	55.0	(4.3)	62.2	(7.1)
$\alpha = 0.5, \beta = 0.5$	60.5	(4.5)	75.5	(7.1)
Labour earnings increased by 20% or more (number of workers unchanged)				
$\alpha = 0.7, \beta = 0.75$	28.3	(2.3)	62.9	(4.2)
$\alpha = 0.7, \beta = 0.5$	28.0	(2.4)	60.0	(4.4)
$\alpha = 0.5, \beta = 0.75$	27.9	(2.4)	59.0	(4.2)
$\alpha = 0.5, \beta = 0.5$	32.5	(2.3)	59.3	(4.6)

Standard errors (adjusted for repeated observations per household per year) are shown in parentheses. Events and poverty exits refer to changes between years *t*–1 and *t*; pr(event) estimates as in Table 3. Equivalence scale = [(number of adults) + α*(number of children)]$^\beta$. :Poverty line = 60% of contemporary national median income.

Table A4
Poverty entries by non-poor children in married couple households
(pooled data, 1991–8), by equivalence scale

pr(poor at t|event), by event	Britain		Western Germany	
	%	(s.e.)	%	(s.e.)
All children at $t-1$ at risk of poverty entry				
$\alpha = 0.7, \beta = 0.75$	11.7	(0.5)	6.3	(0.5)
$\alpha = 0.7, \beta = 0.5$	9.5	(0.4)	4.8	(0.4)
$\alpha = 0.5, \beta = 0.75$	9.6	(0.4)	5.3	(0.4)
$\alpha = 0.5, \beta = 0.5$	8.9	(0.4)	4.4	(0.4)
Household size rose (but remained in married couple household)				
$\alpha = 0.7, \beta = 0.75$	18.0	(2.4)	9.0	(1.6)
$\alpha = 0.7, \beta = 0.5$	15.9	(2.4)	6.9	(1.4)
$\alpha = 0.5, \beta = 0.75$	17.6	(2.5)	5.9	(1.4)
$\alpha = 0.5, \beta = 0.5$	12.3	(2.0)	5.9	(1.3)
Joined lone parent household				
$\alpha = 0.7, \beta = 0.75$	61.8	(4.1)	58.9	(7.2)
$\alpha = 0.7, \beta = 0.5$	67.7	(3.9)	60.7	(6.9)
$\alpha = 0.5, \beta = 0.75$	58.9	(4.0)	56.5	(7.1)
$\alpha = 0.5, \beta = 0.5$	64.0	(3.9)	57.5	(7.1)
Lost 1+ worker(s)				
$\alpha = 0.7, \beta = 0.75$	23.0	(1.6)	20.0	(2.5)
$\alpha = 0.7, \beta = 0.5$	22.9	(1.6)	18.1	(2.4)
$\alpha = 0.5, \beta = 0.75$	22.0	(1.6)	17.6	(2.4)
$\alpha = 0.5, \beta = 0.5$	22.0	(1.5)	17.9	(2.4)
Both of above				
$\alpha = 0.7, \beta = 0.75$	64.7	(5.0)	65.1	(6.9)
$\alpha = 0.7, \beta = 0.5$	71.8	(4.7)	66.9	(6.7)
$\alpha = 0.5, \beta = 0.75$	60.1	(5.1)	61.9	(7.2)
$\alpha = 0.5, \beta = 0.5$	66.8	(4.8)	65.6	(6.8)
Lost 1+ full-time worker(s)				
$\alpha = 0.7, \beta = 0.75$	22.0	(1.6)	21.5	(2.6)
$\alpha = 0.7, \beta = 0.5$	22.3	(1.6)	20.5	(2.5)
$\alpha = 0.5, \beta = 0.75$	20.9	(1.6)	20.3	(2.6)
$\alpha = 0.5, \beta = 0.5$	20.5	(1.6)	20.7	(2.6)
Labour earnings fell by 20% or more (number of workers unchanged)				
$\alpha = 0.7, \beta = 0.75$	27.7	(2.5)	19.3	(2.6)
$\alpha = 0.7, \beta = 0.5$	26.4	(2.5)	14.4	(2.0)
$\alpha = 0.5, \beta = 0.75$	26.1	(2.4)	16.2	(2.1)
$\alpha = 0.5, \beta = 0.5$	24.8	(2.4)	12.1	(1.7)
Children newborn at t				
$\alpha = 0.7, \beta = 0.75$	27.2	(1.5)	25.9	(5.9)
$\alpha = 0.7, \beta = 0.5$	24.3	(1.4)	22.2	(6.0)
$\alpha = 0.5, \beta = 0.75$	25.5	(1.5)	22.8	(6.0)

$\alpha = 0.5$, $\beta = 0.5$	22.9	(1.4)	20.6	(6.0)

Standard errors (adjusted for repeated observations per household per year) are shown in parentheses. Events and poverty entries refer to changes between years $t-1$ and t; pr(event) estimates as in Table 4. Equivalence scale = [(number of adults) + α*(number of children)]$^\beta$. Poverty line = 60% of contemporary national median income.

Appendix B. Sensitivity analysis: how pr(poverty transition|event) varies with alternative definitions of the poverty line and of a poverty transition

Table B2
Poverty exits by poor children in lone parent households
(pooled data, 1991–8), by poverty line type

pr(not poor at *t*|event), by event	Britain %	Britain (s.e.)	Western Germany %	Western Germany (s.e.)
All children at *t*–1 at risk of poverty exit				
Relative poverty line[a]	25.8	(1.9)	43.7	(6.0)
Relative line, transitions adjusted[b]	15.4	(1.3)	25.7	(4.5)
Absolute poverty line[c]	24.0	(1.6)	29.8	(4.5)
Poorest quintile line[d]	20.3	(1.5)	25.4	(3.9)
Household size fell				
Relative poverty line[a]	3.1	(3.1)	-	(-)
Relative line, transitions adjusted[b]	3.1	(3.1)	-	(-)
Absolute poverty line[c]	3.1	(3.1)	-	(-)
Poorest quintile line[d]	3.1	(3.1)	-	(-)
Left lone parent household				
Relative poverty line[a]	46.0	(4.7)	48.6	(9.1)
Relative line, transitions adjusted[b]	40.5	(4.6)	41.2	(8.8)
Absolute poverty line[c]	51.9	(4.9)	47.2	(9.1)
Poorest quintile line[d]	48.4	(4.8)	36.4	(7.9)
Gained full-time worker(s)				
Relative poverty line[a]	74.1	(5.0)	82.2	(8.9)
Relative line, transitions adjusted[b]	68.0	(5.4)	71.3	(10.5)
Absolute poverty line[c]	79.8	(4.6)	82.2	(8.9)
Poorest quintile line[d]	74.6	(5.0)	70.9	(9.7)
Both of above				
Relative poverty line[a]	83.5	(5.0)	91.7	(7.9)
Relative line, transitions adjusted[b]	77.6	(5.7)	79.1	(10.9)
Absolute poverty line[c]	90.7	(3.7)	91.7	(7.9)
Poorest quintile line[d]	84.3	(4.7)	73.9	(10.8)
Labour earnings increased by 20% or more (number of workers unchanged)				
Relative poverty line[a]	11.1	(1.5)	32.3	(7.2)
Relative line, transitions adjusted[b]	7.6	(1.3)	27.5	(7.1)
Absolute poverty line[c]	13.2	(1.7)	31.1	(7.0)
Poorest quintile line[d]	10.7	(1.5)	26.8	(5.9)

Standard errors (adjusted for repeated observations per household per year) are shown in parentheses. Events and poverty exits refer to changes between years *t*–1 and *t*; pr(event) estimates as in Table 2. [a]: Poverty line = 60% of contemporary national median income (as in Table 2). [b]: As (a), except poverty exit requires income to rise at least 10 percent above the poverty line. [c]: Poverty line = 60% of 1991 British median income. [d]: Poverty line = twentieth percentile of contemporary national income distribution for all persons.

Table B3
Poverty exits by poor children in married couple households
(pooled data, 1991–8), by poverty line type

pr(not poor at t|event), by event	Britain		Western Germany	
	%	(s.e.)	%	(s.e.)
All children at t–1 at risk of poverty exit				
Relative poverty line[a]	27.3	(1.3)	36.2	(2.3)
Relative line, transitions adjusted[b]	19.9	(1.2)	22.9	(2.0)
Absolute poverty line[c]	30.2	(1.4)	35.9	(2.4)
Poorest quintile line[d]	28.1	(1.4)	29.0	(1.8)
Household size fell (and remain in married couple household)				
Relative poverty line	34.2	(10.6)	37.9	(10.8)
Relative line, transitions adjusted	32.7	(10.6)	26.1	(9.7)
Absolute poverty line	40.6	(10.8)	36.5	(10.3)
Poorest quintile line	35.5	(10.4)	36.2	(8.4)
Gained 1+ worker(s)				
Relative poverty line	41.0	(3.4)	50.0	(6.0)
Relative line, transitions adjusted	31.2	(10.6)	36.0	(5.8)
Absolute poverty line	45.0	(10.8)	53.5	(5.7)
Poorest quintile line	42.0	(10.4)	41.4	(4.8)
Gained 1+ full-time worker				
Relative poverty line	50.0	(4.2)	56.5	(6.6)
Relative line, transitions adjusted	39.8	(4.0)	44.9	(6.6)
Absolute poverty line	53.8	(4.3)	56.2	(6.4)
Poorest quintile line	51.1	(4.2)	55.5	(5.5)
Labour earnings increased by 20% or more (number of workers unchanged)				
Relative poverty line	28.3	(2.3)	62.9	(4.2)
Relative line, transitions adjusted	21.9	(2.1)	45.4	(4.9)
Absolute poverty line	29.3	(2.4)	63.7	(4.7)
Poorest quintile line	28.8	(2.3)	57.8	(4.1)

Standard errors (adjusted for repeated observations per household per year) are shown in parentheses. Events and poverty exits refer to changes between years t–1 and t; pr(event) estimates as in Table 3. [a]: Poverty line = 60% of contemporary national median income (as in Table 3). [b]: As (a), except poverty exit requires income to rise at least 10 percent above the poverty line. [c]: Poverty line = 60% of 1991 British median income. [d]: Poverty line = twentieth percentile of contemporary national income distribution for all persons.

Poverty entries by non-poor children in married couple households
(pooled data, 1991–8), by poverty line type

pr(poor at *t*|event), by event	Britain		Western Germany	
	%	(s.e.)	%	(s.e.)
All children at *t*–1 at risk of poverty entry				
Relative poverty line[a]	11.7	(0.5)	6.3	(0.5)
Relative line, transitions adjusted[b]	7.1	(0.4)	3.9	(0.4)
Absolute poverty line[c]	9.0	(0.4)	7.0	(0.5)
Poorest quintile line[d]	9.9	(0.5)	8.4	(0.6)
Household size rose (but remained in married couple household)				
Relative poverty line[a]	18.0	(2.4)	9.0	(1.6)
Relative line, transitions adjusted[b]	14.0	(2.4)	4.6	(1.2)
Absolute poverty line[c]	17.9	(2.4)	9.7	(1.6)
Poorest quintile line[d]	18.2	(2.4)	15.3	(2.3)
Joined lone parent household				
Relative poverty line[a]	61.8	(4.1)	58.9	(7.2)
Relative line, transitions adjusted[b]	55.5	(4.1)	54.4	(7.4)
Absolute poverty line[c]	59.0	(4.0)	60.9	(7.2)
Poorest quintile line[d]	62.5	(4.1)	59.1	(7.9)
Lost 1+ worker(s)				
Relative poverty line[a]	23.0	(1.6)	20.0	(2.5)
Relative line, transitions adjusted[b]	18.3	(1.5)	15.9	(2.4)
Absolute poverty line[c]	21.5	(1.5)	20.3	(2.5)
Poorest quintile line[d]	23.0	(1.6)	22.1	(2.6)
Both of above				
Relative poverty line[a]	64.7	(5.0)	65.1	(6.9)
Relative line, transitions adjusted[b]	59.1	(5.2)	60.0	(7.3)
Absolute poverty line[c]	62.7	(5.1)	67.0	(6.8)
Poorest quintile line[d]	65.8	(5.0)	66.0	(7.5)
Lost 1+ full-time worker(s)				
Relative poverty line[a]	22.0	(1.6)	21.5	(2.6)
Relative line, transitions adjusted[b]	17.9	(1.5)	18.0	(2.6)
Absolute poverty line[c]	20.4	(1.6)	22.5	(2.6)
Poorest quintile line[d]	22.1	(1.6)	23.3	(2.8)
Labour earnings fell by 20% or more (number of workers unchanged)				
Relative poverty line[a]	27.7	(2.5)	19.3	(2.6)
Relative line, transitions adjusted[b]	20.0	(2.3)	11.1	(1.7)
Absolute poverty line[c]	25.2	(2.4)	21.1	(2.7)
Poorest quintile line[d]	28.0	(2.5)	25.5	(2.9)
Children newborn at *t*				
Relative poverty line[a]	27.2	(1.5)	25.9	(5.9)
Relative line, transitions adjusted[b]	27.2	(1.5)	25.9	(5.9)
Absolute poverty line[c]	26.0	(1.5)	26.1	(5.9)
Poorest quintile line[d]	27.5	(1.5)	33.4	(5.7)

Standard errors (adjusted for repeated observations per household per year) are shown in parentheses. Events and poverty entries refer to changes between years $t-1$ and t; pr(event) estimates as in Table 4. [a]: Poverty line = 60% of contemporary national median income (as in Table 4). [b]: As (a), except poverty entry requires income to fall at least 10 percent below the poverty line. [c]: Poverty line = 60% of 1991 British median income. [d]: Poverty line = twentieth percentile of contemporary national income distribution for all persons.

The history of the Study and its design features have been described in detail in a book prepared by the team of investigators (Silva & Stanton, 1996). Briefly, the Study is a longitudinal investigation of the health, development and behaviour of a complete cohort of births between 1 April 1972 and 31 March 1973 in Dunedin, a provincial city of 120,000 situated in New Zealand's South Island. Perinatal data were obtained at delivery and, when the children were later traced for follow-up at age three, 1037 (91% of the eligible births, of whom 52% were boys and 48% were girls) participated in the assessment, forming the base sample for the longitudinal study.

With regard to social origins, the children's fathers were representative of the social class distribution in the general population of similar age in New Zealand's South island. With regard to racial distribution, the Study members are of predominantly white European ancestry, which matches the ethnic distribution of New Zealand's South Island. When the Study members were born, fewer than 2% of their mothers identified their babies as Maori or Pacific Islander, while 18 years later, fewer than 7% of the Study members identified themselves as having Maori or Pacific Islander ancestry. Less than half of the Study members still live in or near their birth city, Dunedin (population 120,000). The rest have primarily emigrated as young adults to other cities in New Zealand and Australia, and a minority are now living in Great Britain, North America and Asia.

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SLIDES OF STUDY MEMBERS 0-26 YEARS,
AND RESEARCH TOPICS
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The hallmark of good longitudinal research is the repeated use of the same measure over time. For example, in our Study, core anthropometric measures (eg BMI) have been obtained since birth according to standard protocols.

There are several exceptions to this general rule. The first is the need to administer age-appropriate assessments as, for example, in the case of cognitive functioning and, secondly, to continually update assessment technology as seen in the case of respiratory function.

STUDY MEMBERS SEEN AT EACH PHASE

Year	Cohort Age	N. Eligible	N. Seen	% Seen
1972-73	Birth			
1975-76	3	1,139	1,037	91
1977-78	5	1,037	991	96
1979-80	7	1,035	954	92
1981-82	9	1,035	955	92
1983-84	11	1,033	925	90
1985-86	13	1,031	850	82
1987-88	15	1,029	976	95
1990-91	18	1,027	993	97
1993-94	21	1,020	992	97
1998-99	26*	1,019	980	96

*n deceased = 18

2

The above table provides a summary of the number of SMs involved in the DMHDS at each assessment phase, and the percentage participating in each assessment.

Of those who have died, approximately one-third died from accidents, and a similar percentage died from cancer.

07/16/96

##

The Dunedin Study is ideally suited for four types of research.

USES OF THE DUNEDIN STUDY DESIGN
FOR HEALTH RESEARCH

1. *Prediction studies* of the childhood correlates of later health and behaviour outcomes;

2. *Developmental studies* of continuity and change in health and behaviour;

3. *Epidemiological studies* of the prevalence and incidence of health and behavior problems, and associations among problem types;

4. *Methodological studies* of reliability, sampling biases.

The Dunedin Study's design is correlational, which by definition precludes *decisive* cause inference. However, it is generally accepted that there are a number of methodological features that help researchers to examine causal factors and the Dunedin Study's design incorporates many of these.

**STEPS IN ASSESSING CAUSAL RELATIONS IN THE
DUNEDIN STUDY'S CORRELATIONAL DESIGN:**

1. *Document a basic association* between two constructs.

2. *Document temporal sequence* in which a putative causal variable preceeds the putative outcome variable.

3. *Document a dose-response contingency* between the putative causal and outcome variables.

---

1. The Dunedin Study epidemiological sample allows accurate estimation of the population effect sizes for associations between variables, and the Study's low attrition rate prevents the biased estimates that arise when individuals with health and behaviour problems are lost from the sample.

2. The life-time longitudinal design of the Dunedin Study allows us to ascertain child and adolescent antecedents of adult behavioural and health outcomes.

3. Dunedin Study researchers facilitate this analysis by measuring all health and behaviour constructs as continuous distributions. For example, you make categorical psychiatric diagnoses but also use quantitative symptom scales. The same applies, for example, to studies of blood pressure and respiratory function. Because the Dunedin cohort is broadly representative, the strength of the dose-response relations can be measured accurately.

> **4.** ***Rule out (all) rival causal explanations*** by introducing control variables to analyses.
>
> **5.** Test whether putative causal experiences are associated with ***within-individual change***.
>
> **6.** ***A plausible explanatory process*** that can be shown with mediation analyses.

4. The unique breadth of the Dunedin data archive generally (though not always) makes it possible to introduce control variables that are needed.

5. The Study currently has 11 repeated measures of health, problem behaviours and life events from age 3 to 26. It is well suited to testing whether putative etiological events (eg perinatal insult, school failure) exacerbate problem behaviour and/or contribute to poor health, or whether protective experiences (eg a good relationship or good job) ameliorate these problematic outcomes.

6. For example, the fetal origins of adult disease hypothesis suggests that liability to adult disease is programmed in utero. With appropriate mediational analysis, the exact role and importance of fetal events for adult disease can be determined.

NB: None of these steps is sufficient to document causality, but all of them are necessary and by incorporating them, the Dunedin Study provides the basis for strong scientific inference.

Accurate estimates of association rely on accurate measurement, and the Dunedin Study design seeks to reduce measurement error in two ways:

SOME UNUSUAL FEATURES OF THE DUNEDIN STUDY THAT SUPPORT SCIENTIFIC INFERENCE....

1. Low attrition:
  – Enhances accuracy of estimated effects

2. Supplementary data sources:
  – Replication checks across sources;
  – Multiple-indicator measurement models

---

1. First, non-random attrition can seriously compromise studies aimed at understanding the etiology or causes of diseases, hence the importance of maintaining the cohort as intact as possible.

2. Second, using multiple data sources allows us to build multiple-indicator measurement models of constructs that are less prone to measurement error.

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3. Long history of confidentiality and non-intervention:
   - Enhances frank reports on delicate topics

4. A day at the Unit:
   - Insures privacy;
   - Avoids data falsification;
   - Reduces nay-saying to hasten the process;
   - Facilitates data breadth (e.g. biological data)

---

3. The long history of unviolated confidentiality now allows Study members to report socially unacceptable behaviours in trust (eg abusing their children, experiencing hallucinations, stealing from work).

4. The procedure for assessing the Dunedin Study members differs from that of other studies. Other studies generally assess behaviour problems by administering questionnaires in the classroom, or through the mail, by conducting telephone interviews, or by sending interviewers to the home. In the Dunedin Study, members are invited to spend a day at the Research Unit. The Unit assumes Study members costs to remove all barriers to participation (eg travel costs, accommodation costs, child care, etc.).

Study members know that the time for each module's session is pre-established, and they plan to spend the full-day at the Unit so there is little motivation to hasten the end of the assessment by giving answers of "no".

5. Face to face interviewers:
- Avoid problems of literacy and comprehension

6. Counter-balanced modules:
- Avoid order effects and fatigue effects

7. Blind interviewers:
- Reduce inflated associations due to method variance

5. Interviewers hold tertiary degrees and generally they have experience in related fields, such as social work, nursing or teaching. Although the assessments are standardised, the interviewers are skilled in matching the questions to each Study member's vocabulary to diminish the effects of poor comprehension on data quality.

6. The modules are presented in counter-balanced order across Study members to prevent precedence or fatigue effects.

7. On average, there are eight modules in the day. Passive interviews, active examinations, breaks for tea or lunch, and walks between buildings, are interspersed to help keep SMs alert and engaged. Each of the various research modules are presented in different rooms, by different interviewers who are blind to the SMs responses to other modules. This practice is designed to diminish the artefactual inflation of effect sizes by shared method variance that can affect studies using measures collected on the same questionnaire or in the same interview.

Finally, field interviews are available for SMs who are unable or unwilling to visit the Unit. At recent assessment phases, less than 5% requested a field interview.

CURRENT RESEARCH ACTIVITIES INCLUDE STUDIES OF:

- Employment
- SES inequalities - selection v causation
- Personality continuities across the life-course
- Antisocial behaviour, domestic violence
- Sun exposure & moles
- Violence & sexual abuse victimisation
- Road traffic/safety behaviour
- Dental health

- Mental health (including alcohol & drug issues)
- Self-hurt/suicide
- Sexual health & reproductive issues
- Intergenerational relations (Study members & their parents)
- Risk factors for health (CVD)
- Respiratory functioning
- Functional bowel complaints (eg Irritable Bowel Syndrome)
- Musculoskeletal pain

Currently, we are involved in writing up Phase 26 data. We have an interest in a broad range of research issues which is largely driven by approximately 15 principal investigators located in different parts of New Zealand and also overseas.

There is a strong emphasis on collaboration.

There is a data-sharing protocol developed over many years that all investigators adhere to.

Research issues of public health importance to New Zealanders are an important focus of our activities. We also continue to contribute to international literature and policies in other countries (eg see US Surgeon General's 2000 Report on Mental Health, and the 2001 Report on Violence).

CURRENT RESEARCH ACTIVITIES (contd)

- Blood based studies
    - H.pylori
    - Herpes immunity
    - Lipids and other cardiovascular disease risk factors
    - Serotonin and mental & physical (eg migraine) health

- Genetic studies
    - Mental health
    - Asthma/allergy
    - Cardiovascular risk factors
    - Periodontal disease
    - Type 1 Diabetes

- Methodological studies
    - Attrition analyses
    - Comparison of Dunedin sample with national data sets

At age 26, 90% of SMs who participated in the assessment Phase, agreed to venepuncture.

At age 26, 97% of SMs who participated in the assessment phase provided tissue for DNA studies (90% via blood, 7% via buccal smears).

Genetic studies of mental health problems are focussing on dopaminergic and serotinergic systems, and are based in London. [Note: No DNA provided by SMs who identified as Maori has been sent overseas for analysis.]

Asthma, allergy, cardiovascular and periodontal genetic studies will be conducted in Dunedin.

Type 1 Diabetes HLA genotyping of the DMHDS sample is being done to provide controls for a large case-control study.

Study members in New Zealand at 26

Auckland 60

46 Wellington

84 Canterbury

441 Dunedin

Southland 11

15%
North
Island

65%
South
Island

Although the DMHDS cohort were born in Dunedin, the majority have now moved away, either to other parts of the South Island or to the North Island, or....

20% of Dunedin study members all over the world at age 26

...have moved overseas, the majority across the ditch to Australia.

This has implications for:

1. The generalisability of findings from the DMHDS to the rest of New Zealand; and

2. Cost implications, ie bringing people back from various parts of New Zealand and overseas is expensive (cohort retention issues are relevant here).

DMHDS vs NATIONAL HEALTH AND NUTRITION SURVEYS

- No difference in employment status (yes/no).

- Self-reported health same except DMHDS reported less impairment in everyday functioning as a result of a physical or emotional problem.

- Body mass index and waist-hip ratio virtually the same.

- No significant difference in proportion of current or ex-smokers.

- Two samples spent approximately the same time in vigorous physical activities (7 day period).

- No significant differences between samples in terms of 12-month service use, i.e. GP's, medical specialist or hospital admission.

To address the issue of generalisability, we sought to compare data obtained within the DMHDS at age 26 to the same data that was collected in two national samples, the NZ Health Survey - Taking the Pulse, and the National Nutrition Survey.

Data were obtained at similar times among the DMHDS (1998/99) and national studies (1996/97 - data were obtained for 25- and 26-year-olds only).

In general, the findings indicate that on comparable measures, the DMHDS SMs looked very similar to their peers from the national samples, suggesting that our findings can be generalised to other young New Zealanders.

There is one important caveat - the DMHDS is under-representative of Maori and Polynesian New Zealanders compared to the national average.

THE 20% OF THE SAMPLE WHO WERE THE MOST DIFFICULT TO GET HAD:

- A greater proportion of smokers.

- Worse self-reported health.

- Worse dental health.

- Fewer qualifications and low-paying jobs.

- Poorer cardio-respiratory health.

- Poorer mental health

It is generally believed that sample loss is non-random. We sought to quantify the impact of non-random attrition at Phase 26 on prevalence rates for various outcomes.

We did this by comparing the most difficult to recruit 20% of SMs with the remaining 80% of Study participants.

The findings point quite clearly to the differences that can be expected when follow-up is less than desired.

Arseneault, L., Caspi, A., Moffitt, T. E., Taylor, P. J., and Silva, P. A. (2000) Mental disorders and violence in a total birth cohort: Results from the Dunedin Study. *Archives of General Psychiatry*, 57; 979-986.

Age of Subjects: 21 (also 3-18)
In the age group committing most violent incidents, individuals with mental disorders account for a considerable amount of violence in the community. Different mental disorders are linked to violence via different core explanations, suggesting multiple-targeted prevention strategies.

Initially, this study looks like a cross-sectional study nested within a longitudinal cohort. However, the beauty of this paper was its ability to go beyond documenting mere associations between violence and mental health disorders and explore potential mechanisms to explain these associations. This was made possible by access to a rich developmental database, thereby nicely illustrating the value of the longitudinal cohort design.

Taylor, D. R., Poulton, R., Moffitt, T. E., Ramankutty, P., and Sears, M. R. (2000) The respiratory effects of cannabis dependence in young adults. *Addiction*, 95;(11) 1669-1677.

Age of Subjects: 21 (also 15 and 18)

Significant respiratory symptoms and changes in spirometry occur in cannabis-dependent individuals at age 21 years (controlling for tobacco use), even although the cannabis smoking history is of relatively short duration.

This particular study is a good example of the value in a truly multidisciplinary study, ie one "independent" programme of research on mental health and substance dependence is married with another programme of research on respiratory function to examine an important public health issue. It is also timely with respect to the current debate about the legal status of cannabis in New Zealand.

Alsop, J., Gafford, J. E., Langley, J. D., Begg, D. J., and Firth, H. (2000) Occupational injury in a cohort of young New Zealand adults. *Journal of Occupational Health and Safety*, 16; 107-116.

Age of Subjects: 21

To determine the incidence of occupational injury by industry and occupation, describe the nature and circumstances of serious occupational injury, and describe work-related safety practices in a cohort of young New Zealand adults.

This study is a good example of a descriptive, cross-sectional investigation of occupational exposures and their implications for health, as well as laying a baseline for future longitudinal studies of occupational health issues.

Poulton, R., Caspi, A., Moffitt, T. E., Cannon, M., Murray, R., and Harrington, H. L. (2000) Children's self-reported psychotic symptoms and adult schizophreniform disorder: A 15-year longitudinal study. *Archives of General Psychiatry*, 57; 1053-1058.

Age of Subjects: 11, 26

Self-reported psychotic symptoms at age 11 predicted a very high risk of a schizophreniform diagnosis at age 26. (42% of those with this diagnosis reported one or more psychotic symptoms at age 11). Findings were specific to schizophreniform disorder. The link between child and adult psychotic symptoms was not simply the result of general psychopathology.

This study illustrates the value of using the most up-to-date assessment techniques, in this case the DISC Interview of 1982/83. In the early 80's, it was unusual to enquire about psychotic symptoms in children. The few studies examining the prognostic value of these symptoms were based on clinic samples, and concluded that psychotic symptoms in childhood carried no prognostic value. This study provides the first evidence of continuity between childhood and adulthood of psychotic symptoms, and opens up a number of important possibilities both for research and for early intervention.

Hashim, R., Thomson, W. M., and Pack, A. R. C. (2001) Smoking in adolescence as a predictor of early loss of periodontal attachment. *Community Dentistry and Oral Epidemiology, 29(2); 130-135.*

> **Age of Subjects:** 15, 18, 21, 26
> Young smokers are nearly three times as likely as their non-smoking peers to have gum disease by their mid-twenties. The adverse effects of tobacco smoking on gum disease begins even earlier than previously thought. (Periodontal loss of attachment refers to the bony and soft tissue support for the teeth and is a sign of chronic gum disease).

This particular study exemplifies the value of bringing people back to the Dunedin Unit. By so doing, the dental PI, Dr Murray Thomson, was able to do dental examinations as I've already shown you in the slides. For this particular study, the measure obtained was what is known as "probing depth".

Poulton, R., Waldie, K. E., Menzies, R. G., Craske, M. G., and Silva, P. A. (2001) Failure to overcome 'innate' fear: A developmental test of the non-associative model of fear acquisition. *Behaviour Research and Therapy*, 39;(1) 29-43.

Age of Subjects: 3, 5, 11, 18

The non-associative, Darwinian theory of fear acquisition proposes that some individuals fail to overcome biologically-relevant fears (e.g. height) because they (1) do not have sufficient safe exposure to the relevant stimuli early in life or (2) are poor habituators who have difficulty "learning not to fear". Supportive evidence was obtained for each hypothesis.

This study illustrates research concerned with theory development. Notwithstanding the theoretical focus, very practical treatment implications might flow from this work.

This study also indicates that it is possible to continue usefully working with data obtained in the earlier years, ie up to age 18.

Williams, S. M. (2001) Overweight at age 21: the association with body mass index in childhood and adolescence and parents' body mass index. A cohort study of New Zealanders born in 1972-73. *International Journal of Obesity*, 25; 158-163.

Age of Subjects: 3, 5, 7, 9, 11, 13, 15, 18, 21
Although a high BMI in childhood predicts being overweight at age 21, many of those who were overweight at age 21 had a BMI below the 75th centile or even the median in childhood and early adolescence. Population strategies, complemented by an individual approach for those above the 75th centile, are needed to reduce the average BMI of the population.

Finally, this study demonstrates how the whole database can be used to address issues of prediction, in this case for overweight and obesity.

THE FUTURE

- The Process of Ageing

- Genetic Studies

- Parenting Study (3rd Generation)

- Partners Study (Age 32)

- Intergenerational Studies

Where once we were a study of child and adolescent development, we are now embarking upon a study of the ageing process. Minimum criteria to be part of the future Dunedin Study are:

1. The research proposal is longitudinal (including baselines);
2. The research proposal has public health relevance/significance;
3. The proposed study does no harm to Study members;
4. There is no replication/duplication across research projects.

Genetic Studies: The DMHDS will be involved in replication/confirmation studies, not "gene discovery". The future has potential for gene X environment work.

Parenting Study: Currently we are assessing all first-born three-year-olds of SMs (n=180 so far). We plan to assess these same children again at age 11.

Partners' Study: There are two sides to every story!

Intergenerational Studies: These include studies of the relationship between SMs and their parents, and also possibly a more detailed health study of the SMs' parents as part of Phase 32.

ACKNOWLEDGEMENTS

US public health funding agencies have also contributed to the DMHDS, beginning at Phase 13 (approximately US$4 million to date).

LONGITUDINAL ANALYSIS OF ADMINISTRATIVE DATA: THE MINISTRY OF SOCIAL POLICY'S BENEFIT DYNAMICS PROJECT

Moira Wilson[1]
Ministry of Social Policy

1. INTRODUCTION

Over the decade of the 1990s, concern about the number of working-age people receiving benefits raised new and complex policy questions that the available cross-sectional data on benefit receipt were poorly equipped to answer: How big a proportion of the population was coming into contact with the benefit system? Did most of those coming into contact with the benefit system remain "benefit dependent" long-term? To what extent was long-term benefit dependency associated with intermittent rather than continuous benefit use? Who was most likely to be long-term benefit dependent? What was it about those people and their social and economic environment that explained their duration of receipt? And could changes in benefit policy make any difference?

As we enter the new decade, questions about the extent of poverty and its persistence have come to the fore. These questions have highlighted not only the range of possible approaches to measuring poverty at a point in time, but also the limited number of data sources that are currently able to inform on the question of persistence.

With advances in the capacity to store and access the administrative records of Government agencies, there has been growing recognition that assembling and analysing these data longitudinally can provide a new and valuable source of information on social and economic outcomes. Longitudinal analysis of benefit administration records, in particular, can fill some of the gaps in our understanding of the dynamics of benefit use. It also offers an indicative measure of the extent to which individuals experience persistent low income, and, to the extent that low income correlates with poverty, may offer some insights into the persistence of poverty.

In 1995, development of the Information Analysis Platform, the data warehouse of the then Department of Social Welfare, permitted the construction of a first longitudinal data set based on benefit administration records. This data set was constructed as part of a joint project undertaken by the Social Policy Agency and the Treasury and eventually covered all adults who came onto benefit over the four years from mid-1992 to mid-1996. A revised and updated version of the benefit dynamics data set now holds information on the individual benefit experiences over eight years of every adult and child who received or was included in one of the main working-age benefits between January 1993 and December 2000.

This paper discusses issues confronted in assembling this data set and some of the advantages and limitations of longitudinal data constructed from administrative records. It then reviews selected findings from the first descriptive work carried out on the revised and updated data set, highlighting the new information that we are able to bring to bear on the types of questions set out above. The paper concludes with an outline of directions for further work.

2. ASSEMBLING LONGITUDINAL DATA FROM BENEFIT ADMINISTRATION RECORDS

When a person applies to receive a benefit, they are asked to supply information needed to assess whether they qualify for support, and to establish the type of benefit they should receive, the level of payment they are entitled to, and any conditions of entitlement that should apply. Once granted benefit, they are required to provide information on any changes in circumstances that might affect their entitlement, and regular renewals of their benefit are carried out to check that the information previously supplied remains current. Finally, when the benefit is cancelled, a reason for cancellation is recorded.

Information collected at these various points is entered onto the benefit payments system (SWIFTT), together with the person's basic demographic details. SWIFTT also holds information generated in the administration of the benefit such as the date payment commenced and ceased, the district office through which it was paid, and the rate of benefit paid.

The Information and Analysis Platform (IAP) holds snapshots that record how the data in this "live" payments system appeared for each individual in receipt of benefit at regular intervals from mid 1992 onwards. This historical record provides the basis for the official counts of benefit numbers and recipient characteristics that are published in annual statistical reports.

Unfortunately these data do not readily permit longitudinal analysis. The variables of interest are distributed across a number of different files and complex matching routines are required to link them. In addition, the files are characterised by a considerable amount of "noise" - multiple records must be examined establish a chain of events for any individual, and retrospective action can mean that events cannot be established by working through records chronologically.

In order to carry out longitudinal analyses on an ongoing basis, therefore, it was necessary to assemble a dedicated research data set. This "benefit dynamics" research data set is held in the secure environment of the IAP, and does not hold name and address information that could be used to identify individuals. Figure 1 shows its relationship to the original SWIFTT benefit payments system.

Figure 1

SWIFTT Benefit Payments System
A "live" payments system that holds data input by District Office staff
and system generated data relating to benefit payments

↓

Historical snapshots of SWIFTT held on the IAP
Snapshots of SWIFTT data were taken at monthly intervals from mid 1992 up to June 1996
More frequent snapshots were taken from June 1996 onwards, narrowing to daily capture of
all change events from March 1998.
This is the data source for official counts.

↓

The benefit dynamics data set
Linked data that describes individual benefit histories.
Derived from historical snapshots.

In assembling the benefit dynamics data set, we sought to link over time information recorded in SWIFTT for the same individual, to strip away the "noise" in the original SWIFTT data, and to organise the data in a form amenable to longitudinal analysis.

This proved to be an extremely resource intensive endeavour. In this section I discuss some of the issues we confronted, both because they highlight some of the differences between this

and other sources of longitudinal data, and because the sharing of our experiences might assist others embarking on a similar task.

Choice of variables and organisation of data

The historical SWIFTT data held on the IAP provides a vast amount of information on individual benefit use. In deciding which variables to include in the benefit dynamics data set we balanced at least four considerations:

- The desire to include data on all benefit recipients so that tailored samples could be drawn at any time and small sub-populations could be examined.
- The desire to have a wide range of relevant variables available for longitudinal analysis.
- The desire to strike a good balance between the time required to extract, clean and organise the data and the time available to analyse the data.
- The need to limit the storage space required by the resulting data set.

Investigating the feasibility and data storage implications of including particular variables consumed a large amount of time in the early stages of the project.

The ultimate data set includes information on all people who received any income replacing working-age social welfare benefit in the period from 1 January 1993[2] to the date of the most recent update.[3] It provides basic information on their demographic characteristics, and traces their changing benefit status from the beginning of the study period (for benefits current at that date) or from the date they are first granted benefit in that period (for new grants). It also traces the benefit histories of partners and dependent children included in benefits.

Potentially valuable variables not included in the current version of the data set include those relating to use of supplementary assistance. In some instances these could enrich our picture of the circumstances of those receiving the main working age benefits – receipt of Disability Allowance, for example, would provide indicative information on the health and disability status of benefit recipients and the children in their care. In other instances information on supplementary assistance could enhance our understanding of what happens to people once they leave a main benefit – Accommodation Supplement data, for example, could provide information on the incomes of some, but not all, who leave benefit. To date, the time required to extract and organise these data has prohibited their inclusion.

Figure 2 shows a listing of the variables that are held. The hierachical file structure shown was devised to limit the size of the data set, but also to permits modular addition of further variables as the project evolves. Variables can be linked by the social welfare number of the primary benefit recipient and, where relevant, the spell number.

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[2] The first benefit dynamics data set included benefits granted in the period 1 July 1992 to 1 June 1996. 1992 data has been excluded from the current version because date of change information is especially patchy for child and partner details prior to 1993 - the files required to establish the identity of the partner and number and ages of children included in benefit, for example, are missing for more than half the month-ends between 1 July 1992 and 1 January 1993.
[3] The revised version of the data set can be updated with new data overnight and, once checked, is available for analysis in a short space of time.

Figure 2   Benefit Dynamics Data Set Files:

1. **SWN** holds personal details about the primary benefit recipients and partners included in the data set. Data in this file have a single value for each person

SWN	social welfare number (of primary recipient or partner)
ETHNC	ethnic origin
SEX	sex indicator
BTHDT	date of birth

2. **SPELL** holds details about spells on benefit and the individual characteristics of the primary benefit recipient for those spells. Data in this file have a single value for each spell on benefit

SWN	social welfare number
SPELL	spell number
APPDT	application date
REGDT	date application registered
COMDT	payment commencement date
OLDCOMDT	original payment commencement date (where spell has been modified)
EVENT	event which led to benefit
JOBCD	occupation code
LSTWKDT	last date worked
ERNLST	last weekly earnings
SRVST	status (current/suspended/cancelled) at end of study period
CHGDT	change of status date (date of suspend/cancel/decline)
RSNCD	reason for change of status
SERVF	benefit type
SRTET	rate code at beginning of spell
DIST	district code at beginning of spell
PREVPART	previous partnership indicator (if not currently partnered)

3. **PTNR** holds details of the partners included in a benefit and the periods for which they were included. Data in this file can have multiple values for each spell on benefit

SWN	social welfare number
SPELL	spell number
PNSWN	partner's social welfare number
PTNRFROM	date partner included in benefit from
PTNRTO	date partner included in benefit up to

4. **CHD** holds details of the children included in a benefit and the periods for which they were included. Data in this file can have multiple values for each spell on benefit

SWN	social welfare number
SPELL	spell number
CHSWN	child's social welfare number
CHDOB	child's date of birth
CHFROM	date child included in benefit from
CHTO	date child included in benefit up to

5. **INCM** holds income details of the primary recipient and partner for each spell on benefit. Data in this file can have multiple values for each spell on benefit

SWN	social welfare number
SPELL	spell number
INCFROM	date income information effective from
INCTO	date income information effective up to
PRIMEARN	person's earnings ($pw)
PRIMOTH	person's other income ($pw)
PNSWN	partner's social welfare number
PARTEARN	partner's earnings ($pw)
PARTOTH	partner's other income ($pw)

6. **INCAP** holds the incapacity reason code effective at the beginning of each spell on SB or IB.

SWN	social welfare number
SPELL	spell number
INCRSN	incapacity code at beginning of spell (pre-Sept 95 codes)
INCRSN95	highest ranked code at beginning of spell (post-Sept 95 codes)

Limits to a continuous account of benefit histories

One of the advantages of administrative data is that it holds the potential to provide a continuous record of change. Our view need not be limited to annual, quarterly or monthly snapshots, and this allows us to get a much better picture of transitions, like those on, off and between benefits, that can happen at short intervals.

For most of the key variables (such as the commencement and finish dates for spells on benefit and the dates children were included in benefit from and to) SWIFTT holds the dates at which status changed. These change dates allow us to construct a continuous history of contact with the benefit system.

However for some variables that are of interest (such as the indicator that benefit is payable in respect of a partner in addition to the primary recipient, and the indicator of the District Office through which the benefit is paid), there is no record of the date at which status changed. In these cases we are reliant on the frequency with which the historical snapshots of each individual's status in SWIFTT were taken. Up to June 1996 snapshots were taken at monthly intervals only, and this leads to some imprecision in the timing of some changes in status over that period.

Choice of view: "As at" versus the most recent account of benefit histories

A unique feature of administrative data when compared to survey data is that they can be revised. In SWIFTT, for example, start and finish dates for benefit payments can be revised when a benefit over- or under-payment is established. And in some cases the actual amount of income received in addition to benefit in the year is only entered retrospectively at the annual renewal of benefit.

Where a person's records have been retrospectively changed, should we use the most up to date account of their history? For the purposes of producing official counts of benefit numbers from SWIFTT, the answer is "no" and the agreed practise is to ignore retrospective action. Counts are based on benefit or income status as it was recorded on the date for which counts are drawn. If this were not done, official counts would have to be continually revised as retrospective action led to shifts in numbers.

In constructing the benefit dynamics data set, however, we use the most recently recorded version of events, as this is likely to give the most accurate account of individual benefit histories. As a result, cross sectional counts taken from the benefit dynamics data set will differ from official counts. In most cases the differences are slight. However, in the case of income received in addition to benefit, the differences can be more marked, with benefit dynamics data better able to reveal the timing of shifts for benefit types where retrospective reporting of income is common. Another consequence is that for small numbers of individuals successive versions of the data set will tell a different story of their benefit history, and analyses repeated on a later version of the data set may produce slightly different results.

Definition of a "spell" of benefit receipt

We are interested in benefit dynamics not only for the information this gives us about individual patterns of benefit receipt, but also for the indicative information they provide on underlying social and economic change in individuals' lives. One of the difficulties with administrative data for both these areas of interest is that in some instances what we see happening in the data has more to do with administrative practise than with real change in individuals' circumstances.

For example, we often see instances in which a benefit is cancelled because the recipient has failed to make contact when required, but is re-granted shortly after when contact is re-established. The individual's underlying state (unemployment, for example) may not have changed throughout. If we leave their SWIFTT record unmodified, we would understate their duration in that underlying state and overstate the frequency of their spells in that state. On the other hand, if we do modify their SWIFTT record, we risk mis-classifying periods that were

genuinely interrupted by a short period in another state. We attempt to minimise the impact of administratively generated benefit cancellations by adopting a rule of amalgamating spells on the same benefit that are separated by a period off benefit of less than 15 days. We assume that in most cases this moves us closer to the true underlying experience.[4]

Handling anomalous cases

Administrative data are often characterised as "dirty data", and SWIFTT data are no exception to this. When we link records for the same individual over time we see instances of simultaneous receipt of two different benefits, instances where the date benefit is cancelled precedes the date it started being paid, and individuals whose date of birth changes with successive grants of benefit. We also see children simultaneously included in more than one benefit and children included in benefit from before the date they were born. These apparent anomalies could have any number of causes, including coding errors, retrospective action applied to one part of the benefit history but not another, or benefit fraud.

It should be emphasised that such cases comprise a very small minority of the records we encounter. Devising and applying appropriate rules for handling them, however, occupied a significant proportion of the time invested in assembling benefit dynamics data.[5]

3.   LIMITATIONS AND STRENGTHS

Like other longitudinal data sets built from administrative data, the benefit dynamics data set has its limitations.[6] Most critically, the data is limited in scope to the information that is collected or generated in the process of administration. Figure 3 illustrates the manner in which, in the case of benefit administration data, this constrains the information available for analysis.

Figure 3

	PERSON A	PERSON B
Period 1	On benefit: Detailed, often continuous information on some changes in status Limited information on individual characteristics Some incomplete information on status before received benefit and reason for ending spell	Off benefit: No information
Period 2	Off benefit : No information	Off benefit No information

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[4] Another instance in which administrative practice can distort our view of benefit experiences relates to the use of suspension rather than cancellation of benefit where a person takes up temporary employment. This was common practice in the early part of the study period. We adopt a rule of treating as two spells any single spell on benefit that has within it a period of benefit suspension that exceeds 14 days.

[5] Usually the approach we took involved over-riding one piece of conflicting data by giving precedence to another (not allowing the commencement date of a second spell to precede the finish date of a first, or giving precedence to the first entered birth date for example).

[6] See De Raad (1997) for more full discussion of the merits and limitations of administrative records as a source of longitudinal data.

First, there is no information on an individual whom we never observe receiving benefit in our study period (Person B). While we can estimate the proportion of the population as a whole that comes into contact with the benefit system, we do not have the information required to examine the factors that make an individual more or less likely to have contact.

Second, for an individual whom we do observe receiving benefit in our study period (Person A), there are no robust measures of work status, income levels and family circumstances once off benefit. While we do have some, incomplete, information on reason for cancellation and status prior to a grant of benefit, it is indicative at best. This makes it difficult to talk comprehensively about destinations at the end of spells on benefit, and it prohibits analysis of the characteristics of periods off benefit associated with variations in the probability of returning to benefit.

Thirdly, information that is not relevant to the payment of benefits is often not collected (information on education and work history for example).[7] And for measures that are collected, the proportion of people for whom information is missing can be sizeable where collection of that information is not central to processing benefits (this was particularly problematic for ethnicity data early in the study period). These deficits are likely to make it difficult to gain a deep understanding of the factors associated with variations in patterns of receipt using these data alone.

In addition, the administrative nature of the data has implications for its quality. As noted above, sometimes changes in status that are recorded may be the result of administrative practices rather than genuine changes in recipient circumstances. In addition, the quality of the data is highly dependent on the accuracy of reporting of circumstances by clients and coding by staff, as well as the consistency with which available codes are used by different staff members, across different District Offices, and over time.

Against these limitations, the use of administrative data has some strengths. The frequency of information on changes in status while in receipt of benefit is much greater than could be achieved through a longitudinal survey. In addition, the data do not generally rely on respondents' recollection of events and so tend not to be subject to recall errors.

Perhaps most importantly, the large samples that can be attained using administrative data permit examination of the experiences of narrowly defined sub-groups. Increasing the size of the sample studied imposes no additional response burden, or additional costs to analysts aside from those associated with storing and processing the data. In the case of the benefit dynamics data set, this means that we can hold information on the entire population of people who received benefits over the period of study, avoiding entirely the usual problems arising from sampling error.

4.   SELECTED FINDINGS

Analysis of the revised and updated benefit dynamics data set is still in its early stages. This section reviews selected findings to date,[8] focussing on the new information that we are able to bring to bear on some key questions:

- How common is benefit receipt?
- How long do people receive benefit?
- How do experiences vary by age, sex and family ststus?
- How do experiences vary between ethnic groups?
- Do policy changes make a difference?

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[7] The unemployment dynamics data set, developed by the Labour Market Policy Group of the Department of Labour, holds information on education and work history collected as people enter the job seeker register. Prospects for including this information in the benefit dynamics data set are to be explored further.

[8] This review covers only work carried out on the current version of the benefit dynamics data set. For work on the first versions of the data set, see De Raad (1997) for findings on the dynamics of unemployment benefit spells based on a sample of 7,000 drawn from an early version of the benefit dynamics data set. Also see Barker and Maloney (1998) for a multivariate analysis of the duration of single spells of UB receipt.

How common is benefit receipt?

Since 1993, cross-sectional benefit data show the number of people receiving the main working-age benefits at any point in time to range between 390,000 and 440,000. This represents between 16 and 18 percent of the working-age population.

How do these figures shift if we allow a longer window of time? Did most people require the income protection that working-age benefits provide at some point in the years since 1993? Or was benefit receipt experienced by only a small, long-term benefit dependent minority?

Benefit dynamics data shows that over the eight years spanning 1 January 1993 to 31 December 2000, 1.3 million different adults received one of the main, working-age social welfare benefits, either as a primary recipient or as a partner.

To estimate what proportion of the working-age population this represents, we need a count of all the different people in that population at some time over the period, taking account of the changing size of birth cohorts ageing in and out, and migration in and out of the country. It is not possible to calculate this number with certainty. The Annex to this paper presents two estimates. Viewing these as broad indications of scale suggests that around nine out of every twenty people present in the working-aged population at some time between the beginning of 1993 and the end of 2000 received benefit at some point in that interval.

With another two years of data we may find that *most* people experienced at least one life event that brought them into contact with the benefit system over the decade from 1993.

How long do people receive benefit?

Over the latter part of the 1990s, just over half of those on benefit at any given date had been in receipt of their current benefit for at least a year, and as many as a fifth had been in receipt for at least 5 years.

We know, however, that these are biased measures of benefit duration - biased upwards because those who stay longer on benefit are more likely to be in receipt on a given date than those who stay for only a short period, and biased downwards because duration is calculated only part-way through the benefit spell. The only alternative measure available from cross sectional data, the duration of benefits cancelled over a period, is biased downwards in that those with long spells are less likely to cancel within any given period.

Because of these biases, and because they tend to focus only on a single spell on a single benefit type, cross-sectional measures leave unanswered some key questions: How long do *all* people who come into contact with the benefit system stay on benefit? How likely are they to return to benefit? How common is long-term benefit receipt and to what extent is it associated with intermittent rather than continuous benefit use?

With the benefit dynamics data set, we have been able to examine the experiences of people who started to receive benefit at a common point in time, and to derive unbiased and more comprehensive measures of benefit duration.

When we followed the 250,000 people who were granted a working-age benefit in 1993,[9] we found that the proportion of people coming into contact with the benefit system who had long single spells on a single benefit was much less substantial than cross-sectional data on benefits current would suggest:
- only one in five (21%) had a spell on benefit that lasted for a year or more;
- fewer than one in ten (7%) had a spell on benefit that lasted for three years or more; and
- fewer than one in 20 (4%) had a spell on benefit that lasted for all five years of the follow-up period.

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[9] See Wilson (1999) for a full discussion of this analysis.

However, long-term receipt of benefit income was much more common than the duration of single spells of benefit receipt would suggest. For most of those who began receiving benefit in 1993, this spell was part of a longer benefit history involving multiple spells and, in many cases, multiple benefit types. Figure 4 contrasts the distribution of durations of initial spells and the distribution of total durations in the five year follow-up. While few had a first observed spell that lasted more than a year, when all spells (including spells on benefit as a partner) were counted:

- almost two thirds (62%) spent a total of at least one year out of the following five in receipt of benefit income;
- one third (33%) spent three years or more out of the following five years on benefit; and
- under one in ten (8%) spent all of the five year follow-up in receipt of benefit.

Long-term "benefit dependency" characterises the experiences of some but not all of the cohort.

Figure 4   1993 entrants' duration on initial spell and total duration on all spells compared

The total elapsed time over which people continued to cycle in and out of income circumstances that brought them into contact with the benefit system was considerable. Figure 5 compares the 1993 entrants' probability of remaining on their initial spell with their probability of being on that or any subsequent spell on benefit as the time from the date of their 1993 grant increased:

- half (50%) of the cohort were in receipt of benefit income on the date one year from their 1993 grant;
- 37% were in receipt at three years; and
- 35% were in receipt at five years.

Of those in receipt at five years, 8% had remained continuously in receipt of benefit for all of the follow-up. Another 27% had moved off benefit but were back in receipt of benefit on that date. Long-term insecurity of non-benefit income streams appears common.

Figure 5   1993 entrants' probability of receiving benefit with increasing time from entry

How do experiences vary by age, sex and family ststus?

Who is most likely to spend a long period on benefit? Who is the most likely to have repeat spells? When someone is granted a benefit, does the information they supply at that time give an indication of their risk of spending a high proportion of the coming years in receipt of benefit income?

To date we have taken only an initial look at these questions. Table 1 shows variation between those with different demographic characteristics and "as at grant" family status in the probability of reaching three thresholds:

- having a first observed spell of at least 32 weeks in duration;
- commencing four or more spells in the five year follow-up; and
- having a total duration on benefit of at least three out of the five years of the follow-up.

Roughly a third of all 1993 entrants reached each of these "high risk" thresholds. What is notable is the significant variation in the proportions reaching each threshold within different sub-groups.

The patterns vary most by age group. The probability of a long single spell was lowest for those aged under 20 at their first observed entry and increased with age before dropping for those aged 60 or over, many of whom qualified for New Zealand Superannuation within three years of their 1993 grant. The probability of having multiple spells followed the opposite pattern with half of those aged under 20 having four or more spells and the probability decreasing with age. The probability of long total duration was bimodal - a different pattern again.

The presence and age of children appears to be an important factor in determining the risk of long-term or repeated receipt. Entrants with children were around twice as likely as those without to have a long first observed spell and a long total duration. Having a youngest child aged under six years slightly increased the probability of a long first observed spell and the probability of multiple spells, and substantially increased the probability of a long total duration.

Table 1
Percentage with duration or number of spells reaching given thresholds counting all spells
(including spells as a partner) in five the year follow-up
1993 entry cohort by characteristics at entry

Characteristics at entry	Percentage of 1993 entrants	Percentage with		
		First spell 32 weeks +	Number of spells four +	Total duration three years +
Sex				
Male	55	30	38	27
Female	45	35	35	40
Age				
Under 20	23	25	52	33
20-29	42	27	35	27
30-39	18	40	32	37
40-49	9	42	29	39
50-59	6	53	21	53
60+	1	47	8	24
Partnership status				
Single	85	32	38	34
Partnered	15	33	30	29
Number of children				
0	77	26	39	29
1	11	55	29	52
2	7	49	27	44
3+	5	49	31	47
Age of youngest child				
Under 6	16	53	31	51
6-13	6	50	26	43
14+	2	46	27	37
ALL	100	32	37	33

Further work is required to establish the extent to which these and other potential explanatory variables available from the benefit dynamics data set can account for individual differences in benefit experiences. The pattern and degree of variation across the three measures suggests that different forces are at work in explaining each.

How do experiences vary between ethnic groups?

Ethnicity data in the benefit dynamics data set require some caution in interpretation. The proportion of cases for whom ethnicity was recorded was very low in the early part of the study period but improved significantly from 1995/96 onwards. In constructing the benefit dynamics data set, the proportion of cases for whom ethnicity is recorded has been maximised by using the most recent ethnicity information available for each individual. However, because ethnicity tends to be recorded at grant the resulting data are subject to some bias:

- members of the 1993 entry cohort who had a single spell on benefit are less likely than those who left benefit and returned at a later date to have their ethnicity recorded in the data set; and
- those who remained on their first observed spell at the end of the follow-up are less likely than those with a long duration made up of multiple spells to have their ethnicity recorded in the data set.

As a result, members of the 1993 entry cohort for whom ethnicity is not recorded had a much lower probability of spending three or more years of the five year follow-up on benefit than cohort members for whom ethnicity is recorded. Because the "not recorded" group accounts for one quarter of the cohort, we can have little confidence that the absolute values of the probabilities of long duration that are found for the different ethnic groups approximate their true level. The figures may, however, offer a reasonable indication of the size of the difference that being in one ethnic group rather than another made.

Table 2 focuses on the measure that is perhaps of greatest concern from a policy point of view - total duration on benefit - and shows the ratio of the probability of a long total duration for each ethnic group to the probability of a long total duration for the European ethnic group.

Table 2

Relative probability of total duration of three or more years out of five
for given ethnic groups,
1993 entry cohort by characteristics at entry

Characteristics at entry	NZ Maori: European	Pacific Peoples: European	Other ethnic groups: European
Sex			
Male	1.8	1.4	1.1
Female	1.8	1.4	1.0
Age			
Under 20	1.9	1.2	0.9
20-29	2.2	1.6	0.9
30-39	1.5	1.2	0.9
40-49	1.4	1.4	1.0
50-59	1.1	1.2	1.2
60+	1.7	9.3	11.5
Partnership status			
Single	1.8	1.4	1.0
Partnered	1.5	1.4	1.2
Number of children			
0	1.9	1.3	1.0
1	1.4	1.1	0.9
2	1.4	1.2	0.9
3+	1.4	1.2	1.0
Age of youngest child			
Under 6	1.4	1.1	0.8
6-13	1.4	1.3	1.1
14+	1.5	1.5	1.5
ALL	1.8	1.4	1.0

Maori were 1.8 times more likely than European entrants to experience a long total duration. The difference was most pronounced for those aged under 30 at entry. This may reflect the existence of fairly widespread experience of benefit income for at least some time within both populations in this age group, but very different long term labour market experiences associated with this receipt. Members of the European ethnic group, for example, were more likely than Maori to have entered Emergency Unemployment Benefit as tertiary students. This group had a much lower risk of a long total duration on benefit than Unemployment Benefit entrants overall.

Pacific entrants were 1.4 times more likely than their European counterparts to have a long total duration on benefit. The difference for those with only one child and those with a youngest child aged under six was not marked however. When we examine the experiences of sole parent Domestic Purposes Benefit entrants only, Pacific entrants with a very young child at grant were in fact less likely than their European counterparts to have a long total duration. These differences may be partly explained by the relatively high rates of full-time employment among Pacific sole mothers with younger children. This may be associated with a high propensity to reside in multi-family households, perhaps offering Pacific sole parents greater access to informal childcare.

Overall, there was little difference in risk between members of other ethnic groups and Europeans. However, members of other ethnic groups aged 60 or over at entry, together with Pacific peoples in this age group, were many times more likely than Europeans to experience a long total duration on working-age benefits. This can be explained by a higher likelihood that members of these ethnic groups did not meet the residency criteria for New Zealand Superannuation.

Some caution needs to be exercised in interpreting these associations. For example, there is good reason to expect that the duration experiences of Maori are partly explained by their educational status and their greater tendency to be located in small towns in economic decline. Were we able to include these factors, and were we to control for them in a multivariate analysis, the strength of the association between being Maori and having long total duration would almost certainly be reduced. It is unlikely that we will be able to do this perfectly using benefit data alone.

Do policy changes make a difference?

One of the uncertainties when using time series data to explore possible policy impacts is the extent to which changes in the composition of the population, rather than changes in policy, account for any changes we observe. With benefit dynamics data we can follow a cohort of individuals through a policy change, and be sure that any change in the experiences of the cohort is not the result of changes in its composition, other than those that result from the ageing of its members. If we follow several cohorts we can tentatively assess the possible impact of a policy change by comparing the experiences of a cohort that has passed the date at which the reform was introduced with that for an earlier cohort that reached the same "age" (or, in the case of this analysis, the same duration from entry) prior to the reform.

Domestic Purposes Benefit (DPB) recipients faced some major policy changes in the late 1990s. The first of these was the 1 July 1996 introduction of a more gradual benefit abatement regime. Together with new "reciprocal obligations" that were introduced soon after, this change aimed to increase DPB recipients' participation in part-time employment. In February 1999, the reciprocal obligations that accompanied the abatement change were strengthened and extended to new groups. For the first time since the introduction of the statutory DPB, a requirement to be available for and search for full-time work applied. This requirement applied to sole parent recipients of DPB with a youngest child aged 14 or over, with provision for deferral in special cases.[10]

When we track cohorts of sole parent entrants to the DPB, we see some major contrasts between the experiences of successive cohorts that emerge at the times these policy changes were implemented.[11]

Figure 6 shows the proportion of cohort members in receipt of DPB who declared earnings at quarterly intervals from the end of their year of entry. It tracks the cohort that entered DPB in 1993 up until 26 quarters from the end of their year of entry, from 31 December 1993 to 30 June 2000. In contrast, it only tracks the cohort that entered DPB in 1999 up until quarter 2, this corresponding with 30 June 2000.

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[10] The requirement also applied to women alone receiving DPB and spouses of recipients of other benefits with no children or a youngest child aged 14 or over.
[11] See Wilson (2000) and Ball and Wilson (2000).

Figure 6   Percentage of cohort members on DPB declaring earned income at quarterly intervals (relative to 31 December of entry year), 1993-1999 sole parent entry cohorts

Comparing the 1993, 1994 and 1995 cohorts at the same number of quarters from the end of the year of their entry, it is clear that up to 30 June 1996 (quarter 10 for 1993 entrants, quarter 6 for 1994 entrants, and quarter 2 for 1995 entrants) they tracked one another closely. However, after the 1 July 1996 introduction of the new abatement regime, each had a much higher earnings propensity[12] than the cohort that preceded it had at the same number of quarters from entry. Cohort-on-cohort differences peaked at around three percentage points at 30 June 1997. At this point each cohort had faced the new regime for a full year while the preceding cohort, at the same number of quarters from entry, was yet to become subject to it.

The 1996, 1997, 1998 and 1999 cohorts entered the follow-up window after the introduction of the new abatement regime. At quarter 0 (31 December of their year of entry), these cohorts had earnings propensities averaging 15 percent, five percentage points higher than the pre-reform earnings propensities of the 1993, 1994 and 1995 cohorts at the same duration.

These shifts in declared income suggest that the abatement change led to increased participation in part-time employment.

Figure 7 shows what happened to chances of being completely off benefit, the best proxy we have for full-time employment, over the same period. Prior to the February 1999-February 2000 roll-out of the new full-time work test and other reciprocal obligations changes, the cohorts shared remarkably similar experiences. Marked cohort-on-cohort differences did not generally emerge until after the February 1999 changes. They peaked at around three percentage points at 31 March 2000, a year after the beginning of the roll-out. The scale of the increase in non-receipt when measured two quarters from the end of the year of entry was greatest for entrants with a youngest child aged 14 or over subject to a full-time work test which is consistent with the expected policy impacts. However, the increase was also marked for those with younger children who were not subject to a full-time work-test which suggests that other factors, including other policy changes as well as general improvements in employment rates, are likely to also partly account for the change.

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[12] Defined as the proportion of cohort members in receipt of DPB who had declared earnings.

Figure 7   Percentage of cohort members not on any benefit either as primary or partner at quarterly intervals, 1993-1999 sole parent DPB entry cohorts

As with the abatement change, the similarity of the experiences of cohorts prior to the reform, and the coincidence of the implementation date with the emergence of the only marked differences in experiences to be observed over the study period, suggests that policy does make a difference. Just how much is an area for further work.

5.   CONCLUSION: FUTURE DIRECTIONS

Longitudinal data assembled from benefit administration records bring new insights to our understanding of benefit use in New Zealand. The numbers of people having contact with the benefit system are far greater than we might have expected from looking at cross-sectional data. We estimate that around 9 in 20 people of working-age had some contact in the eight years from 1993. And the experiences of the 1993 entry cohort suggest a picture of greater heterogeneity in benefit use than cross-sectional data on benefit durations might suggest. Long-term "benefit dependency" characterises the experiences of some but not all of the cohort. For many of those who came into contact with the benefit system, that contact was fleeting. Fewer than one in ten spent *all* of their time in the ensuing five years reliant on benefit for their income. But a third spent three or more of the five years on benefit. The groups with a greater likelihood of a long total duration are perhaps the same as we would expect from looking at cross-sectional data – younger and older entrants, Maori and Pacific Peoples, female entrants and those with children, particularly young children. Finally, examination of the experiences of successive cohorts of sole parent entrants to DPB through the policy reforms of the late 1990s suggests that policy design can, at least partly, influence benefit experiences.

These first, descriptive, findings only scratch the surface of the benefit dynamics data, but point the way to a number of areas for further research.

First, there is great scope to expand the descriptive picture of the experiences of different groups. In particular, we hope to start using the information on children included in the revised and updated benefit dynamics data set to investigate their likelihood of contact with the benefit system, the ages at which this occurs, and the lengths of time they spend in contact with the benefit system. This could provide valuable, albeit indicative, information on the extent and persistence of the experience of low income among New Zealand children.

A second broad area for further work is to look at the risk of long-term benefit receipt for selected benefits in more detail and to investigate whether it is possible to develop some tools that might assist us in identifying early on in their benefit experience those who are most at risk of long-term benefit receipt. If we can identify the long duration group early on, and turn that history around, the benefit savings could be great, possibly sufficient to support a greater up front investment in assisting people to become and remain independent of the benefit system than has been contemplated in the past. Whether this is a sensible strategy depends on whether the duration of receipt can be successfully predicted based on the limited information we have about people's characteristics and circumstances.

It also depends on whether the duration of the long-term group can be altered and the costs of the interventions that this requires. This highlights a third area for further research, which is developing techniques for estimating the impacts of policy changes and interventions. From our work on the experiences of cohorts of DPB entrants, we can see that it is possible to identify changes in receipt that are consistent with policy impacts using this data. What is less clear is how much of these changes can be attributed to the policy reforms rather than other factors.

There are a number of options for augmenting benefit dynamics data in order to increase the power of such analyses. Additional SWIFTT variables could be included in the data set. And variables (such as educational attainment and information on participation in different employment assistance interventions) that are captured on the job-seeker register administered by the Department of Work and Income, but not available through SWIFTT, could be added. Integration with income tax data, already trialled using the initial benefit dynamics data set, could add valuable information on income before, between and after spells on benefit in some cases.[13]

Ultimately, however, we expect that our ability to understand the factors that shape any individual's experience of the benefit system will be limited if we rely solely on administrative data. Adding survey based information for selected individuals would greatly enhance our appreciation of the social and economic context within which people access benefits, and our ability to analyse the links between individual, economic and policy factors and benefit experiences. There are a number of options for doing this. A complementary longitudinal survey could be developed. This could provide the contextual information needed to strengthen our analysis of benefit dynamics, and at the same time serve as a resource for a range of other research and evaluation endeavours. This has been the approach taken by the Australian Department of Family and Community Services. In the United States, moves have been made to combine longitudinal social security data with Census, household, labour force, and other national surveys in order to generate new research data bases while avoiding additional response burden. These and other options have already been the subject of a feasibility study in the New Zealand context, and could be investigated further.[14]

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[13] See Statistics New Zealand (1998).
[14] See Statistics New Zealand (1998).

ANNEX

Estimated number of different individuals in the working-age population
1 January 1993 – 31 December 2000

The Table below sets out two possible broad estimates of the number of different individuals present in the working aged population at some time in the eight year period spanning 1 January 1993 to 31 December 2000.

The first (B) is calculated by taking the population in the working aged population as at the end of the study period ((A), approximated by the provisional as at 31 December 2000 estimates of the NZ resident population – at the time of writing these were the most recently available single year of age estimates). Added to this figure are the numbers of people in the eight single year of age groups who were members of the working age population at some point in the eight year study period but had aged out of it by the end. This estimate:
- assumes that all permanent arrivals during the period remained in New Zealand continuously after arrival (and are therefore captured by the end of period count); and
- takes no account of the impact of outward migration and mortality on the total number of different individuals present.

The second (C) is calculated by adding to (B) the number of permanent departures from New Zealand aged 15-64. This estimate:
- assumes that all permanent arrivals during the period remained in New Zealand continuously after arrival (and are therefore captured by the count A);
- assumes that all permanent departures during the period had resided continuously in NZ before departure and remained absent continuously after departure;
- assumes that all permanent departures are recorded as such – no allowance is made for temporary departures that become permanent; and
- takes no account of the impact of mortality on the total number of different individuals present.

Viewing these broad indications of scale suggests that the proportion of the working aged population that received a main benefit to help meet their income needs at some time over the eight year period could be around nine in twenty.

A	Estimated NZ resident population aged 15-64 at end of the study period -31 December 2000	2,514,370

A Plus eight single year of age groups who aged out of the 15-64 population in the six years previous (enumerated at 31 December 2000):

66 year olds –aged out 1 year previous	26,110
67 year olds –aged out 2 years previous	26,520
68 year olds –aged out 3 years previous	26,040
69 year olds –aged out 4 years previous	26,750
70 year olds –aged out 5 years previous	27,450
71 year olds –aged out 6 years previous	28,180
72 year olds –aged out 7 years previous	27,830
73 year olds –aged out 8 years previous	28,180
B	**2,731,430**

B Plus total number of permanent departures from 15-64 age group in eight years of the study period:

1993	33,297
1994	36,038
1995	39,616
1996	43,738
1997	48,835
·1998	52,485
1999	55,474
2000	60,491
C	**3,040,913**

Source:
Statistics New Zealand Demography Section, Estimated New Zealand Resident Population, by Sex and Single-Year-of-Age, As At 31 December 2000 (Provisional).
INFOS, Total Permanent and Long Term Departures by Age Group, Quarterly Series.

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Competent Children: Findings and Issues from the first 7 years

Paper for Ministry of Social Policy seminar, *The Long Road to Knowledge: longitudinal research and social policy*

April 5 – 6, 2001.

Cathy Wylie,
Chief Researcher,
New Zealand Council for Educational Research

cathy.wylie@nzcer.org.nz
phone (064) 4 802 1444
fax   (064) 4 384 7933

Introduction

The Competent Children project focuses on a sample of Wellington region children who have been followed since 1993, when they were near five years-old, and attending early childhood education. The fieldwork team is currently gathering material as the children turn 12 from the children themselves, their parents, and their teachers. In this paper, I will describe the origins and purpose of the project, the nature of the sample and the data, and some of the findings and insights which have emerged from the project to date, in order to explore the value of taking a longitudinal approach in social research.

Origins and Purpose

Policy interest in the value of early childhood education played a significant role in the original funding of the Competent Children project. By the early 1990s, the majority of New Zealand children had attended some form of early childhood education by the time they reached school. While there was increasing overseas evidence that early childhood education could provide benefits for children that were evident after they had left early childhood education[1], there was then no New Zealand research on the continuing impact of early childhood education attendance.[2] The Ministry of Education was prepared to fund a team led by Anne Meade[3] to embark on the first three stages of a longitudinal study, covering a pilot study, and then data collection at near age 5, and at age 6, after the children had finished their first year at school.

While the main focus of the study was on the role of early childhood education in children's lives, and, to a lesser extent, its role in their parents' lives, we did not think we would get a true picture by focusing solely on early childhood education alone, as much of the then available international research tended to do. We also needed information about the family resources available to children.

As we developed the study we grew more ambitious to include as much information as we could about children's actual experiences. We wanted to go beyond structural variables of early childhood education, such as the teacher: child ratio, or the proportion of trained staff in a centre, to the quality of experience offered, and, further, to whether individual children attending the

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[1] This material is reviewed in Wylie (1994) *What research on early childhood education/care can, and can't tell policymakers.* Wellington: New Zealand Council for Educational Research.

[2] In 1994, material from the Christchurch Health & Development Study was published showing continued associations up to age 13 between length of early childhood education experience and cognitive ability, favouring children with more than 3 years early childhood education experience (Fergusson, D.M., Horwood, L.J., & Lynskey, M.T. (1994). A longitudinal study of early childhood education and subsequent academic achievement. *Australian Psychologist* 29(2), pp. 110-115.

[3] Working with me and Anne Kerslake Hendricks

same early childhood education centre had different patterns of experience there. We asked parents not only about the "usual suspect" characteristics which were likely to have a bearing on children's development, such as income, parental education and employment, but also about the children's involvement in activities at home, particularly those related to literacy and mathematics. As the children have grown older, we have increasingly asked them directly about their own experiences.

We had a number of reasons for pushing our data collection this far. First, we started with the assumption that development reflects experiences. This assumption is derived from educational theorists such as Vygotsky; it is also derived from Anne Meade's original discipline of sociology, and mine of social anthropology. Second, we wanted to provide parents, practitioners, and policymakers with insights that could be used to improve children's experiences and progress.

Our main research questions when we started were:

1. How does the nature and extent of young children's early childhood education experiences in the Wellington region produce short-, medium-, and long-term effects on what the children can do, and on their participation in education?
2. Can early childhood education experiences temper the influences of family backgrounds on children's competence?
3. What is it about the nature of different early childhood education experiences in the Wellington region which affects the development of children's competencies? Of these, which have the greatest or longest impact?
4. What effect do family characteristics have on the development of children's competencies?

We also included material on parental choice of early childhood education and schools, and patterns of parental contact with their child's early childhood education centre and later school. Relations between parents and educational institutions, including questions of the role played by family characteristics, were initially included to allow the sample for the Competent Children project to form a second cohort for the Ministry of Education funded 'Smithfield' longitudinal study of school choice, which was focused on the transition to secondary school. Thus a number of different policy-related questions have been included in the project from the beginning.

Measuring Outcomes

Outcome data in longitudinal studies are sometimes vexing for the user. The measures can seem very slight sometimes for the weight put on them, particularly if the measures are having to be construed from a sample designed for another purpose, or if the measures are inappropriate for the particular sample. Because most longitudinal studies are expected to provide quantitative data which lend themselves to statistical analysis, and therefore involve hundreds if not thousands of participants, the time taken to gather

data on outcomes is probably always more limited than one would like in the ideal world. Considerations of time, meaning cost, play a significant part in the selection and quality of outcome measures, as well as information about the factors which may be shaping outcomes. One is always on the hunt for measures which are like the tips of icebergs, flagging something larger and deeper underneath.

Our pilot study was essential in providing the time to decide what outcomes for children should be included in the study, and how those outcomes could be measured. Much of the current international research used outcome data that was readily available from schools, such as student class grades, or marks on standardised school tests, usually limited to reading and mathematics. New Zealand did not have such measures. We wanted valid data relating to literacy and mathematics; but we also wanted to include other knowledge and skills, particularly those which were included in early childhood education, since any analysis of long-term impact of institutionally-shaped experiences needs to take some account of what the institutions are setting out to achieve. We therefore took note of the main aims of the early childhood education curriculum, *Te Whariki*, then in draft form. These aims were: wellbeing, belonging, contribution, communication, and exploration. They grew from the following set of aspirations for young New Zealand children:

> To grow up as competent and confident learners and communicators, healthy in mind, body, and spirit, secure in their sense of belonging and in the knowledge that they make a valued contribution to society.
> (*Ministry of Education, 1996, Te Whariki —early childhood curriculum,*
> *p. 9).*

These aspirations are also reflected in The National Curriculum Framework, which for the first time in New Zealand identified a set of core skills as well as knowledge.

Thus we identified ten 'competencies' – particular combinations of knowledge, skill, and disposition – that seemed to underpin a successful growth to adulthood, and adulthood itself. We would assess:

Literacy (reading, writing)
Mathematics
Logical Problem-Solving
Communication
Perseverance
Social Skills with Peers
Social Skills with Adults
Individual Responsibility
Curiosity
Motor Skills.

We also wrestled with creativity and temperament, but could not find a way to provide consistent measures of these within the time we would have available for data-collection for each child.

The guiding criteria in our search for relevant measures of these competencies were that they were appropriate for young children, were multidimensional, reflected their environment, and were not superficial. Our search used testing manuals and test reference guides, existing measures of children's achievement, and relevant research. A review of instruments available for children under 5 showed that most are devised for limited purposes: usually to screen (identify) children with developmental delay, or to assign IQ or age-equivalent scores. The Competent Children project was focused on 'ordinary' children, and we did not expect many to have developmental delays. Such tests could not provide the full range of scores which would be needed to differentiate between children.

Some of the instruments developed for overseas research which we trialled were not acceptable in the New Zealand context, using terms which were not widely used here by children, or focusing heavily on problems, and using negative descriptions to which New Zealand early childhood education teachers took exception. Others which were more promising lacked New Zealand norms, or would be too time-consuming to administer. Time – cost – was a factor we could not ignore.

We ended up having to devise or adapt more of our measures than we had anticipated. The measures have had to be further adapted and sometimes changed to suit the children as they grow older.[4] Some of these measures are tasks performed by the children; but others rely on the knowledge gained over time, and so we have used teacher ratings for most of the attitudinal and social competencies.

This broad range of competencies has allowed the Competent Children project to explore children's progress more fully than we initially anticipated, since it allows us to identify some competencies that become core to children's overall progress, and others which, while they stand in their own right, seem less influential.

The Sample

The value of longitudinal studies is also dependent on their samples, and on their attrition rate, or loss over time. No sample is perfect. Our sample is large enough to carry out most of the analysis we want to, though it is smaller than we would like. Our attrition rate is fairly low.

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[4]For more detail on the initial development of measures, see Thompson, J., Hendricks, A.K., Wylie, C. (1997). *Children's competencies at age 5 in the context of family resources and early childhood education Volume II – Appendices*. Wellington: New Zealand Council for Educational Research. 360-377. Each of the Competent Children reports to date (see references at end) contains a description of the measures used for that phase.

Our original hope was to have rolling samples taken in different geographic regions one year after the other. Available funding, and the rapidly changing policy environment for early childhood education precluded this. We therefore concentrated on the Wellington region, as far north as Otaki on the west coast, and as far north as Ekatahuna on the eastern side of the North Island. At the time, this region did not appear unrepresentative of New Zealand as a whole. But in fact most of our sample come from the urban areas of this region, and these tend to have higher incomes than the country as a whole. Our descriptions of children's competency levels for the whole sample are therefore accompanied by the caveat that a nationwide sample would probably find a somewhat lower level of performance. However, it was not our intention to provide national norms, but to explore the factors which are associated with different levels and patterns of performance. We have sufficient numbers within the sample to provide analysis by the main family characteristics of income, parental education, parental employment, family type, welfare receipt, and ethnicity.

We started with 307 children for whom we gathered full information at near-age 5, and whom we have followed through at ages 6, 8, 10, and now 12. The Ministry of Education has continued to fund the Competent Children project throughout. The reports for ages 5, 6, and 8 are available, and the report on age 10 is near completion.

At age 10, 274 of the original 307 children remained, an attrition rate of 11 percent. Around half of those who have left the study have shifted overseas. The family characteristics of those who are no longer in the study vary, with no clear over-representation of low-income families.

In the first phase of the project we also carried out a parallel phone survey of 767 parents of near 5 year olds, with some limited information about the early childhood education centres their children attended.[5] It was intended that this larger survey could serve as a validation of some of the main findings of the full study, and that children from this study could be picked up around age 11 for inclusion in the second cohort of the Smithfield study. With hindsight, it would have been more useful to increase the number of children in the full study from the start, without undertaking this validation exercise.

At age 8, we decided to include children from this survey in the full study, and increase the size of our sample to 520, to allow for attrition over time, and provide larger numbers for analysis of some family characteristics, particularly low income and non-Pakeha. Before merging the two samples, we checked family characteristics, and found no statistically significant differences between them. Additionally, we compared scores on each of the assessment measures for each sample to ensure they had the same distribution before merging them.

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[5] Lythe,C. (1997). *Spreading their wings.* Wellington: New Zealand Council for Educational Research.

How did we find our sample? Part of the pilot study involved a test of the viability of including children who had had no early childhood education experience at all in the longitudinal study. Extensive efforts were made in the Porirua basin to find such children, using means other than a too costly door-to-door survey. (A phone survey would have missed low-income families without phones, who were among the groups most likely not to be participating in early childhood education, and also would have been prohibitively expensive). These efforts were hampered by the introduction of the Privacy Act, which made organisations which served children and families in this area reluctant to pass over any client lists. Our researchers were based in the community, and used their networks; they also approached schools. Most of those thought by principals to have had no early childhood education experience turned out to have attended some form of early childhood education (an interesting comment on the value attributed to early childhood education by principals).

This extensive effort found around 10 children. Most of these were recent migrants to New Zealand, whose English use was unconfident. Anecdotally, we also heard of some children in families using home-schooling, who did not send their children to early childhood education centres. We reluctantly concluded that we would not be able to afford to include children with no early childhood education experience in the study. Additionally, the fact that many of the non-users we had tracked were recent migrants whose children had spent much of their lives to date in another country and culture, could make it difficult to make valid comparisons between children with early childhood education experience, and those without. [6]

Since our sample would cover early childhood education participants only, and because we wanted data on the quality of children's final early childhood education centre, we decided to find our sample by first sampling early childhood education centres. [7] We wanted to ensure we sampled a range of early childhood education centres, and the easiest way to do this, in the absence of any external quality data, was to ensure we had comparable

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[6] Recent interim findings from the Early Childhood Primary Link project being undertaken to improve literacy levels in Mangere-Otara (as part of the Ministry of Education's Strengthening Education in Mangere-Otara project) allow a comparison of the mean literacy scores of 5 year old children coming to school who have attended early childhood education, and those who have not (McNaughton et al, milestone report to the Ministry of Education). These show some benefits to early childhood education attendance per se. Children who had attended early childhood education had higher scores for retelling stories (a comprehension task), on the Peabody Picture Vocabulary Test, and Concepts about Print; there were no statistically significant differences for the Burt vocabulary test, hearing and recording sounds, writing vocabulary, high frequency word or word list tests. Of the 102 children in this group, 30 had not attended any early childhood education, according to school records based on information given by parents when they enrolled their child. Unlike our experiences in Porirua in the early 1990s, the group of children who did not attend early childhood education did not contain a higher proportion of children whose English was a second language, which might otherwise explain this difference in scores.

[7] It would have been prohibitively expensive to meet and select our sample by random approaches to household.

numbers of children in the main types of early childhood education centre. Policy changes limiting access to the childcare subsidy just before we started our research meant that the number of children in family day care schemes dropped, and so while we were able to have equal numbers of children in kindergartens, playcentres, and childcare centres, we had fewer numbers of children in family day care, and a'oga amata, the Samoan language nests. [8]

Uses

Longitudinal studies in social research lend themselves to a range of uses. These include:

* Tracking and interpreting change over time, allowing findings from cross-sectional studies and cultural or policy assumptions about influential factors to be checked, and discovering new aspects and relations between factors, which sometimes signal the need for further and different studies;

* providing snapshot pictures of particular groups or institutions, and the relations between them, useful at the time for policy and other reasons. Because longitudinal studies usually have sizeable samples, these pictures can serve as baseline data to compare similar groups and institutions in new samples at a later date, to trace the impact of policy change

* providing samples for qualitative sub-studies of processes and events which cannot be captured by quantitative measures taken a year or more apart. [9]

The most important use of longitudinal studies is the ability to track changes through time, and to interpret these changes by using contextual information about the conditions and experiences of the children or people involved.

I am hesitant to use words like 'cause', though it is difficult not to talk at times about 'impact' or 'effect'. Longitudinal research on social issues and outcomes which uses large samples and quantitative analysis seeks to isolate the contributions of each factor, and to decide which is weightier. Its quantitative nature and its ability to link things through time makes it seem to some more scientific than other social research, and, therefore, more 'true' or valid. But so much depends on the quality of the data, including the relevance and validity

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[8] At the time, it was hoped that a parallel study could be carried out for kohanga reo children, by the Kohanga Reo National Trust, but funding was unavailable.

[9] We undertook an analysis of competency levels and other material from the study related to resilience for the low-income group in our sample at age 10. This showed that resilience could not be predicted by earlier scores, and that children's experiences of home and school provided better pointers than family resources (within the low income group). It also showed the need for more in-depth qualitative research to explore the relations between experiences and responses. (Wylie, draft report for the Ministry of Social Policy, *Aspects of Resilience: an analysis of resilience indicators and contributing factors for a sample of New Zealand children from low-income homes*).

of measures in relation to the core research questions, the nature of the sample, the nature of the analysis and modelling, and the assumptions behind any modelling.

Involvement in a longitudinal research study leads to reflections on the nature of social research, such as *Is it a science? Should we think any the less of it if it cannot provide the proof or use the experimental methods of physical science?* My own conclusion is that we do have to be content with less certainty in social research, and accept that while longitudinal studies which use statistical analysis provide great and useful illumination and understanding, statistical analysis cannot provide causal explanation for social experiences.[10]

For social research is of necessity, given its subject, working with material which is difficult or unethical to control or limit. It is also working with factors and processes which are intertwined, and which produce great variability, or what the statisticians call 'noise', obscuring the clarity of the signals which can be obtained from the data.

Moreover, many key aspects of human experience are 'soft', and difficult to properly capture in definitive measures of the kind needed for much statistical analysis. We cannot always be sure that what we measure, or can measure, is actually lying behind, or driving, what we see. Often such data has been distorted to fit proposed models, by making it linear (for example, the assumption that each year of education would add the same amount to a given variable), or dichotomous (which can work where there are is a single clear 'threshold', such as lack of any parental qualification versus some, but which will not show the full picture of different patterns and processes at work if there are further thresholds, such as a difference between school-qualified and university-qualified parents).

We have been concerned in the Competent Children project to provide a full a picture as possible of the factors relevant to children's performance. We have therefore used analysis methods which would allow us to investigate the data we had without distorting it, or reducing it. So we have made no assumptions at the outset of the analysis. If we are to understand, for example, why maternal qualification and family income often make a difference for children, we need to include softer material in the analysis, such as the use of leisure time. In some regression models, such material would disappear, not because it may not matter, but because of a high association with the broader factor, which may play a larger part mathematically in terms of accounting for the variability in the data. Good analysis of good data should aim to show us these different facets; the one does not cancel the other out. It helps to think

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[10] From a rather different starting point, Nebycha, T., McEwan, P., & Older-Aguiler, D. (1999). The Impact of family and community resources on student outcomes. An assessment of the international literature with implications for New Zealand. Wellington: Research Division, Ministry of Education reach a similar conclusion based on their review of research about the social factors affecting educational performance.

of analysis in multidimensional terms, rather than a single path which must lead to a single conclusion.[11]

Some major findings from the Competent Children project

Each of the three Competent Children project reports to date, and the fourth, currently being completed, provides a cross-sectional picture of the children's competency levels and lives at that age, and the relationship of aspects of their lives to their competency levels. Since the second phase, when the children were aged 6, we have also been able to look back and use data from previous phases in our descriptions and analysis, allowing us to carry out an increasing amount of modelling.

Today I will concentrate on one of the major themes which have become evident from our analysis of the accumulated data for the study children at age 10. The Ministry of Education has agreed to allow this analysis to be released at this stage, before we have provided them with our full report on our age-10 findings, in order to encourage debate. I will draw together the findings we have about the role of family resources, the family resources which seem to matter most, and why these might make a difference for children.

The role of family resources

I referred earlier to the 'usual suspects' of family resource variables such as income, parental education, and employment. Family type, ethnicity, and income source (particularly welfare receipt) are also of perennial policy and popular interest. Our main findings in this area are that:

- family income and parental education, which we measured through maternal education[12] largely underpin or account for any differences related to family type, family stability, welfare receipt, and ethnicity.

- The associations between family income and children's competencies are not linear. Children's competency levels do not increase in tandem with family income levels. An analysis we did of the relation between family income levels at near age 5 and at age 10, the change in family incomes over that period, family type and stability, and welfare receipt,[13] showed

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[11] One of the great privileges for me in my involvement in the Competent Children project has been to work with an expert statistician, Jean Thompson. The other key member of our team is Cathy Lythe, who has done a superb job of organising the fieldwork.

[12] Because most of the parents we interviewed were the mothers of the study children, and as we wanted to collect information about parents' continuing education as their children grew older. In addition, maternal education levels are thought to have a somewhat greater impact on children's achievement (UNESCO,1997, *Adult education in a polarising world*. Paris:UNESCO).

[13] Wylie, C. & Thompson, J. (draft) *Family income, family type and welfare receipt, and their relation to children's competencies at age 10. Draft report for Ministry of Social Policy.*

that children's competency levels do not necessarily rise if family income levels increase after they are aged 5. Low family income levels (below $30,000[14]) in a child's early formative years have persistent effects.[15] This finding that there are persistent effects of low family income for children's outcomes which explain some of the apparent differences related to family type and welfare receipt is consistent with U.S. longitudinal research findings.[16]

We also found long-term advantages for children whose families had high incomes ($60,000 or more) when they were near age-5.

Children from high-income families at age 10 tend to have higher average scores than others for all the competencies. But the converse is not true: children from low-income families have lower average scores only for Mathematics, PAT Reading Comprehension, and writing.[17] Unfortunately, these are key areas for both school work, and later employment.

Our analysis of why low-income children are disadvantaged in these areas suggests that it is not because of their attitudes or social skills: their average scores on our measures for these (including perseverance, individual responsibility, and communication) are no different from children in middle-income families. What appears to be at work are lower levels of maternal education,[18] and fewer experiences of the kind which use and extend language and mathematics use. These are intertwined.

Maternal education levels and children's experiences

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[14] This seems a reasonable cut-off point given that the eligibility for a community services card for a family of 2 is $29, 398 or less; Hyslop & Mare (2000) describe low-income households as having incomes between $15-30,000 in their paper 'Understanding changes in the distribution of household incomes in New Zealand between 1983-86 and 1995-98', p. 10. This paper was available on www.mosp.govt.nz in late 2000.

[15] Income data was obtained by asking parents to indicate their family income bracket from a list ranging from over $80,001 a year, to less than $5,000, before tax. We took this approach because of the sensitivity of the question, the use of income brackets in the Census, and because the main use of the information was to allow comparison within the sample, rather than, for example, establish adequacy of income against given expenditure.

[16] A review of relevant literature is provided in Wylie (n.d.) *Does welfare receipt harm children? A review of the literature.* Report for the Ministry of Social Policy.

[17] There is a difference in average scores, but children from the highest income families are among the lowest scorers, and vice versa.

[18] Patterns of maternal qualifications are similar for the low-income and middle-income families in our sample. Twenty-two percent of the mothers in low-income families in our sample had no qualification, 63 percent had a mid-senior school level qualification, 9 percent a tertiary, and 7 percent a university qualification. Mothers in the high-income group show a quite different pattern: 4 percent have no qualification, 42 percent a mid-senior level, 21 percent a tertiary, and 33 percent a university qualification.

- Maternal education levels have more bearing on children's competency levels than family income, particularly for Mathematics and the PAT Reading Comprehension test. Children whose mothers have no qualification are noticeably disadvantaged; conversely, children whose mothers have a university qualification are noticeably advantaged. But there are no clear linear patterns in between these two ends of the qualification spectrum.

We found that children whose mothers had no qualification watched more television, which by age 10 has some negative associations for children's competency levels; their parents also watch more television too. These children were twice as likely not to belong to any clubs or groups, and near three times less likely to go to lessons outside school or play a musical instrument. These activities had positive associations with children's competency levels.

Children whose mothers had no qualification found school more interesting than others, perhaps because their out of school activities can be narrower than other children's. But they also found the *work* of school more challenging, less related to what they have experienced in their life before coming to school, or outside school.

While their parents were just as likely as others to know the child's teacher, and work on problems together, the parents were less likely to want things to be done differently at the school. Parental aspirations for children did not reflect family income levels, but did reflect maternal qualification. Mothers with no qualification were half as likely as those with university degrees to specifically mention tertiary or university education.

Unpacking the usual suspects

Analysis

Our exploration of the factors which have an association with children's competencies levels starts with one-factor modelling. From this we develop a clear picture of the factors which continue to have a statistically significant association with children's competency levels after taking maternal qualification and family income levels into account. It is not only the statistical significance that matters, but the size of the difference which a factor can make. If something is statistically significant[19] but the size of the difference is small, say 1-2 percentage points, then practically speaking it warrants little attention, though it may add weight to an overall picture of similar trends. We have then embarked on two further strands of modelling, using the factors which had emerged in this one-factor modelling as having the largest associations with competencies.

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[19] In our study, at a level of $p < 0.0$, or one chance in a 100 that the result we have could have arisen by chance; we also describe 'indicative' relationships where p is < 0.05 and > 0.01.

Models of key contributors to children's competency levels at age 10

The first strand modelled the age 10 mean cognitive composite score (the average of their 3 scores on the Literacy, Mathematics, and Logical Problem-Solving measures), against the set of factors which had the largest associations with competencies, after allowing for the child's cognitive composite score at 5, 6, and 8, producing 3 models. This enables us to see the likely key contributors to children's competency levels. Some of these factors underpin others, particularly if the factors are closely linked, some are there in their own right. This modelling is particularly useful in getting further insight into why maternal qualification and family income levels affect children.

Previous mean cognitive competency scores alone can account for quite a lot of the variance, or spread, of student scores in the mean cognitive competency score at age 10. We can account for 70 percent of the variance by allowing for the score at age 8 alone. The age 6 score accounts for 53 percent of the variance in children's scores at age 10, and the age 5 score, 34 percent. Looking simply at previous scores provides some information, but does not on its own shed much light on the children's development, and the reasons why there are different patterns evident, since previous scores subsume other factors. However, it is consistent with our other analyses of competency development which show that the window of opportunity for laying down some of the basic mathematics and literacy knowledge and skills narrows after age 8.

Thus we turn to models which include experiential and resource factors. Starting with a model which includes the age 5 mean composite score, we can explain a further 28 percent of the variance in children's scores, a total of 62 percent. This model included these factors, in the following order:

Child's Composite Cognitive Competency age 5
Maternal qualification
Family income age 5
School decile (age 10)
Early childhood education centre teachers were responsive
Early childhood education centre teachers asked open-ended questions of children
Television watching (amount) age 10
Child enjoys reading (age 10)
Child does their homework (age 10)
Child gets the help they think they need at school (age 10).

The early childhood education, family income, and school decile factors were subsumed within the remaining group of factors when we fitted all the other factors in this set first: that is, their contribution was no longer separable.

A similar picture was found when the age 6 Composite Cognitive Competency, was used in the model of age 10 Composite Cognitive Competency, but with the factor of early childhood education teachers asking

open-ended questions continuing to make some separate contribution beyond the group of other factors.

The model which used the age 8 mean composite cognitive competency measure with experiential and resource factors accounted for 83 percent of the variance, (another 13 percent on top of the age 8 mean composite cognitive competency score) This model included the factors below, in the following order:

Child's Composite Cognitive Competency age 8
Maternal qualification
Early childhood education socio-economic mix
Early childhood education centre teachers were responsive
Early childhood education duration
Television watching (amount) age 10
Child enjoys reading (age 10)
Child does their homework (age 10)

The duration of early childhood education experience did not make a separate contribution after the other factors in the model were fitted first. Note that family income effects have gone off the centre stage. This does not mean that family income levels do not matter, but that they are subsumed within this group of factors (including previous performance).

There are several things that are striking about these sets of strong contributors to children's competency levels at age 10. First, early childhood education still shows, particularly aspects related to quality. Socio-economic mix in children's educational settings does seem to matter (though we cannot explain why school decile is replaced by early childhood education socio-economic mix when we fit later average cognitive competency scores). Third, what children do with their time outside school matters, with benefits in restricting television watching (our data show benefits associated with watching less than an hour's television or none a day, with low scores particularly apparent among children who watch 3 hours or more).

What can we do?

The second strand of modelling which we have done at age 10 is to focus on activities and experiences which have a large to moderate association with key competencies, particularly Mathematics and the PAT Reading Comprehension test, but also Perseverance and Communication, and to explore factors which may be more readily amenable to policy, home, and school action than the social and economic conditions which shape income inequalities and which shaped previous educational access and opportunities. These are the factors which can largely mitigate the influence of low family income or maternal education levels.

I will focus here on the models for mathematics, and the PAT Reading Comprehension test. We have omitted earlier performance levels in these models. The factors which show in this analysis are not the only things that

have a bearing on performance at age 10. Some of them may be 'standing' for others, or standing ahead of others, simply because they are most likely to co-occur with other activities (tip of the iceberg), or have subsumed others. The strength of these activities lies in the fact that they occur as a cluster.

Mathematics

In the model below, which accounted for 46 percent of the variance between children's scores at age 10, we see something of the importance of the way children spend their out-of-school time. Children who always have to help out at home have less time for activities where they need to think to apply something learnt at school to something in their own environment (e.g. measuring), and less time to widen their world and find out new things by reading.

Table 1
Effects of factors in a model for Mathematics at age 10

Factor (largest contrast of factor categories in brackets, first level given is "the best")	p-value from ANOVA with this factor fitted last	size of largest contrast (%points advantage)	s.e.	prob for this contrast
Reading of books from library (3 weekly cf none)	0.006	15.8	4.1	0.0002
Socio-economic status of ECS (middle-class vs wide)	0.0004	13.5	3.2	0.00003
Helps out at home (sometimes cf always)	0.002	10.6	3.3	0.002
At home tells the time (yes cf no)	0.020	10.2	4.3	0.020
At home uses ruler to measure (yes cf no)	0.016	9.2	3.8	0.016
Child enjoys reading (yes cf no)	0.034	8.8	3.9	0.024
At home uses proportions (other than ½ and ¼) (yes cf no)	0.002	8.4	2.6	0.002
Home maths – tables over 10 (yes cf no)	0.002	7.9	2.6	0.002
At home uses scales to weigh (yes cf no)	0.019	6.5	2.7	0.019

Each of these factors continues to make a separate contribution to children's scores after allowing for all the other factors in the group. But after allowing for the full set, we find no remaining association with family income (current and previous), or maternal qualification. Thus these activities can mitigate any disadvantage associated with low income or parental educational levels.

We found it interesting that more skills-based mathematics activities which had shown some positive associations with children's competency levels when they were younger, such as playing board or card games, no longer did at age 10.

Why should the socio-economic mix of the child's final early childhood education centre still have a bearing five years later? We find some marked associations when we include some quality aspects of early childhood education into the modelling, but these are overtaken if the socio-economic mix of the final early childhood education centre is then included. This also occurred in an earlier model of mathematics performance when we included maternal qualification, and maternal qualification showed no further associations when the socio-economic mix of the child's final early childhood education was included.

When we look at the association of these aspects with the socio-economic mix of children's final early childhood education centre, we get some clues. Early childhood education centres serving children from mainly middle-class homes tended to score more highly than those serving mainly low-income children, or those with what the early childhood education centre teachers described as a 'wide' social mix.

Table 2
Relationships between child's final early childhood education centre socio-economic mix[20] and key early childhood education quality factors.

Early childhood Education socio-Economic mix	Wide n=86	Middle N=117	Low-Middle n=60	Low n=39
ECE staff are responsive	%	%	%	%
1st quartile	35	19	15	44
4th quartile (best)	15	33	25	10
ECE staff ask Open-ended Questions				
1st quartile	51	29	27	54
4th quartile (best)	6	14	8	0
ECE allowed children time to complete activities				
1st quartile	34	25	18	33
4th quartile (best)	16	27	32	5
ECE Print-saturated				
1st quartile	35	17	28	44
4th quartile (best)	6	14	23	23
Mother's Qualification	N=80 %	N=113 %	n=57 %	n=35 %
None	20	4	16	17
University	9	33	9	6

Literacy

Some of the activities which appear to be key (or key indicators of others) for mathematics are also apparent for the PAT Reading Comprehension test. How a child spends their time matters. But with reading, school factors are also evident.
The next model accounted for 54 percent of the variance between children's PAT scores.

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[20] As described by the early childhood education teachers; the quality factors are rated by researchers.

Table 3
Effects of factors in a model for Literacy at age 10

Factor (largest contrast in brackets)	p-value from ANOVA with this factor fitted last	Size of largest contrast (% points advantage)	s.e. of this diff.	prob for this difference
Homework (yes cf no)	0.0007	17.8	4.7	0.0002
Final early childhood education centre socio-economic mix (middle-class cf low)	0.00002	17.4	3.8	0.000007
TV watching at age 10 (none cf 2-3 hours daily)	0.008	17.3	5.5	0.002
Parental support for class (fantastic cf little)	0.025	14.4	5.3	0.007
Child feels they are doing well at school through solving a problem by working hard (agree cf not sure)	0.004	13.7	4.2	0.001
Child enjoys reading (yes cf qual. yes or no)	0.00005	11.6	3.1	0.0002
Child read library books at age 6 (yes cf no)	0.0006	9.4	2.7	0.0006
ECS was a print-saturated environment (4th quartile rating cf 1st quartile rating)	0.013	8.9	3.6	0.014
At home uses proportions other than ½ and ¼ (yes cf no)	0.022	5.2	2.3	0.022
Home maths – tables over 10 (yes cf no)	0.031	4.9	2.2	0.031

Again, each of these factors made a separate contribution after the other factors in the group has been allowed for, and there were no further effects for family income or maternal qualification.

With the data we have accumulated, we are now able to undertake some more formal longitudinal data modelling, such as structural equation modelling, which can distinguish between directly related and indirectly related factors, and to delve further into some of the earlier experiences of children.

However, already the project has shown the importance of enlarging the activities of children whose own parents' educational experience was limited. Some of the previous reports in the project have provided useful information for teachers and policymakers to use in their work with parents, such as the Ministry of Education's *Feed the Mind* campaign.

As we see the persistent associations with preschool experience, and with the quality of early childhood education, the importance of working with parents and early childhood education teachers to enlarge and deepen young children's activities in ways which provide them with a solid base of knowledge and thought also becomes more apparent.

Conclusion

The longer the Competent Children project continues, the richer the picture we are gaining of the influences on children's development over time. It is richer, but it is also increasingly complex, as I hope is evident in the findings offered above. Yet this is the reality of human lives, and one which social research must endeavour to show. Our analysis can reveal useful patterns and configurations of related factors, and should shed some light on the complexity without further complicating it.

What we feel is particularly valuable about longitudinal research is the opportunity it gives to show how early experiences and resources can affect children's progress, how these can be modified or entrenched by later experience, and the opportunity to check some of the popular, policy, and research assumptions about the factors that help shape what we are and can contribute.

Like any other research, much depends on the quality and relevance of the data. Longitudinal social research, perhaps because it attracts people from quite different disciplines, and calls on deeper statistical knowledge and wisdom than many researchers have, also brings to the fore the quality and relevance of methods of analysis, and assumptions behind models. We have taken an exploratory approach, drawing our lead from the patterns revealed in the data, rather than starting with a theoretical model requiring a more reductive approach. If we are to make the most of longitudinal data-sets, from both a research and a policy perspective, we will probably need more understanding of the relationship of statistical analysis and interpretation, and an appreciation of social research in its own terms.

Competent Children project reports

Wylie, C., Thompson, J., & Lythe, C. (1999). *Competent Children at 8 – Families, Early Education, and Schools*. Wellington: New Zealand Council for Educational Research.

Wylie, C., & Thompson, J. (1998). *Competent Children at 6 – Families, Early Education, and Schools. Wellington: New Zealand Council for Educational Research.*

Wylie, C, Thompson, J., & Hendricks, A.K. (1997). *Competent Children at 5 - Families and Early Education* Wellington: New Zealand Council for Educational Research

Te Hoe Nuku Roa - Māori Profiles
Whaihua Tatau

Policies for Māori advancement require reliable information based on actual Māori experience. Who is Māori, what are their economic, social and cultural characteristics, what are the range of aspirations, are questions which need to be answered before policies and programmes designed to address Māori needs can be adequately developed. Although much information has been collated about Māori there are continuing difficulties in reporting on representative Māori samples. Māori diversity, in terms of geography, cultural identity, socio-economic circumstances and lifestyles are key considerations which must be taken into account in the construction of sampling frames for Māori.

Whaihua Tatau[1] is the sampling strategy developed for the Te Hoe Nuku Roa - Māori Profiles project. It has been able to provide a systematic and reliable approach to the regional selection of potential respondents, and the identification and enumeration of Māori households.

This method was favoured for three specific reasons. First, a strategic approach can be adopted with a systematic surveying of regions as they can be reasonably managed and in order to maximise cost efficiency. Second, by utilising existing information about each region it is possible to develop a frame from which a sample reasonably representative of Māori from the regional population can be drawn. Third, it provides an opportunity to compare one region with another in terms of Māori households.

It is an effective tool, within the management constraints surrounding the study: the budgetary limitations on recruitment, and the complexities of data handling. Because the method provides some rigour in the selection of respondents from the range of household circumstances, and weights them accordingly, it is able to satisfy representivity requirements, at least for the purposes of this study.

Whaihua Tatau was developed in collaboration with New Zealand Statistics and involves sampling from primary sampling units (PSU). Based on the stratifications within each region and in relation to Māori population density within each stratum, selections of primary sampling units (PSU) were selected for each survey.

An enumeration phase involving a door to door survey within each PSU was undertaken to establish which households were eligible for inclusion in the study. Later, eligible households were randomly selected to achieve predetermined totals (which allow for non-participation and no-contact), in line with the population stratum proportions.

Te Pūtahi-ā-Toi, School of Māori Studies,
Massey University, Private Bag 11222, Palmerston North
Telephone: (06) 3506267, Facsimile: (06)3505746
hhtp://tehoenukuroa.org.nz

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[1] Fitzgerald, E.D. et al., (1996), Whaihua Tatau: A Representative Sampling Method for Māori Populations, He Pukenga Kōrero, 2(1):34-42.

WHAIHUA TATAU

A REPRESENTATIVE SAMPLING METHOD FOR MAORI POPULATIONS

E.D. Fitzgerald, M.H. Durie, T.E. Black, A.E. Durie, I.S. Christensen, J.T. Taiapa

Department of Maori Studies, Massey University

Whakarapopoto Korero

Ko nga mohiotanga ka hua i nga mahi rangahau i nga ahuatanga e pa ana ki te iwi Maori, hei tuapapa mo te ahu whakamua. Ko wai ma te iwi Maori, tokohia nga Maori, he aha nga ahuatanga ohanga, nga ahuatanga noho, me nga ahuatanga ahurea. Koianei nga patai me matua whakautu i mua i te whakatu kaupapa e ahu whakamua ai te iwi Maori.

Ahakoa te nui o te parongo kua kohia mai mo te iwi Maori, kei te uaua tonu te whakaatu totika i te iwi Maori. He matatini nga ahuatanga o te iwi Maori ara, o ratou wahi noho, te tuakiri ahurea, nga ahutanga-a-noho, a-ohanga hoki, katoa enei ka pa atu ki te whakatu i tetahi anga tipako mo te iwi Maori.

I konei, ka ata tirohia etahi o nga tikanga kua mahia ketia hei huarahi tipako i te iwi Maori, me te totika o aua tikanga. Katahi ka whakaatuhia te 'Whaihua Tatau', tetahi tikanga tipako hou, me tona whakamahinga i roto i te kaupapa rangahau wharoa i nga kainga Maori, a Te Hoe Nuku Roa.

Abstract

Policies for Maori advancement require reliable information based on actual Maori experience. Who is Maori, what are their economic, social and cultural characteristics, what are the range of aspirations, are questions which need to be answered before policies and programmes designed to address Maori needs can be adequately developed.

Although much information has been collated about Maori there are continuing difficulties in reporting on representative Maori samples. Maori diversity, in terms of geography, cultural identity, socio-economic circumstances and lifestyles are key considerations which must be taken into account in the construction of sampling frames for Maori. This paper considers some of the approaches that have been adopted for sampling Maori populations and examines issues of efficiency and representivity. A new sampling method, Whaihua Tatau, is described and its application to a longitudinal study of Maori households, Te Hoe Nuku Roa, is discussed.

Introduction

Maori development not only requires clear goals and objectives but also reliable information. Although Maori related data has been collected by researchers over a wide variety of fields, there has been a tendency to focus on aggregated sectoral data. Iwi research holds promise for a more integrated approach to the collection of data for planning, but at both regional and national levels, there is a relative dearth of integrated data sets which can be described as "representative" and which enable linkages to be made between economic, social and cultural dimensions at household levels. This paper is about obtaining a Maori sample that is representative of the range of geographic, economic, cultural and social circumstances of Maori.

For Maori, and up until 1840-1850 the concept of being Maori was novel. Indeed prior to colonisation, identity was based not on ethnicity so much as tribal origin, whanau (family) affiliations and area of residence. It was not until Pakeha arrived in New Zealand that the term "Maori" became popular. Then it meant "normal" and was used by Maori to distinguish themselves from the new settlers who had fairer skins, distinctive physical features and different cultures. Quite quickly, however, the total New Zealand population changed so that by 1858 Maori had already become a minority. A combination of depopulation and increased immigration from Europe and Australia continued the trend, the non-Maori population growing rapidly while the Maori population declined to 42,000 in 1896. But by 1936 or even earlier, it was evident that another trend was in progress. Due largely to high fertility rates and improved life expectancy the Maori population began to grow and at a faster rate than for non-Maori.

Table 1

Māori Demographic Change

	Māori Population	Non-Māori Population
1800	150,000 (est)	-
1858	56,049	59,413
1896	42,113	701,101
1936	82,326	1,491,486
1991	434,847	2,939,082

(Source: NZ Official Yearbook 1996)

Meanwhile, apart from demographic change, the price of colonisation was manifest in other ways. By the mid 20th century the effects of assimilationist policies, land disenfranchisement, urbanisation, intermarriage, a weakened economy, and monocultural social policies, had altered the perception which people had of themselves and their neighbours. Many Māori had become separated from those determining elements upon which the identity of their ancestors had rested. Being Māori had taken on new meanings, often defined by others, and often according to perceived shortcomings or unfavourable comparisons with non-Māori. (Keenan 1995).

Probably it was the land march of 1975 which clearly signalled to the rest of New Zealand that Māori were no longer prepared to be defined in negative terms, nor from eurocentric perspectives. The Māori Affairs Amendment Act 1974 went some way to formalising the new mood when it declared that a Māori was *"a person of the Māori race of New Zealand; and includes any descendant of such a person"*. However, the Electoral Amendment Act 1975 added to the 1974 definition by introducing the option of self identification. According to the Electoral Amendment Act 1975 a Māori *"means a person of the Māori race of New Zealand; and includes any descendant of such a person who elects to be considered as a Māori for the purposes of the Act."* Previously, Māori had been defined along biological lines, anyone with fifty per cent or more "Māori blood" being described as Māori while others of Māori ancestry but with less than fifty per cent being defined European.

Wereta (1994) notes that the census definition of Māori has changed several times over the last one hundred years, most of the changes having taken place within the last twenty years. Kilgour and Keefe (1992)

highlighted difficulties with official statistics on Māori and Māori health in particular. In considering ethnic statistics they discussed the many concepts on which definitions of Māori could be based: biological, (emphasising lines of descent and the degree of blood of different ethnic groups); cultural affiliation, (emphasising the way people define themselves and the group to which they feel most closely related); descent, emphasising being descended from a Māori regardless of degree of blood.

The situation is further compounded by the lack of consistency in collecting official statistics, some government agencies (such as the Department of Justice in its compilation of birth statistics) continuing to use the biological approach while others (Durie 1994) such as the Ministry of Health adopt a combination of descent and cultural affiliation.

Census data since 1981 has used two measures to define Māori : descent from a Māori (the 1974 definition) and cultural affiliation based on self identification (the 1975 Electoral Amendment Act). These two measures are not identical and in the 1991 census there was a discrepancy of some 80,000. 511,278 respondents said they had some Māori ancestry while 434,847 said they were Māori in terms of ethnic identity (Department of Statistics 1994).

These different approaches to defining Māori, according to biological determination or descent or ethnic affiliation, have been described by Durie (1994) and are summarised in table 2.

Most statistical measures of Māori, however, lack sophistication in so far as they are unable to capture the relevant significance of choosing to identify as Māori or having Māori ancestry. Though when aggregated these measures assist in the development of sectoral information (in health, education, home ownership, etc) they are of limited value in distinguishing the range of Māori cultural realities and, inevitably, contribute to the development of a homogenous Māori stereotype.

Moreover, even though census data since 1991 has included iwi information, the main purpose of Māori statistics has been to differentiate Māori from non-Māori and to make comparisons between different ethnic groups.

This paper, however, discusses a sampling method which takes account of Māori diversity and the need for representivity. The purpose is not so much to enable comparisons with non-Māori as to understand contemporary Māori situations and compare Māori

Table 2
Statistical Definitions of Māori

	Criteria	Minimum Requirement	Examples of Usage
Biological Determination	Constitutional genetic	Half-Māori	Justice Department (births,deaths) Adoptions Schools Foetal and neo-natal deaths
Māori Descent	Whakapapa	One Māori ancestor	Census enumeration Iwi registers
Ethnic Affiliation	Self-identification	Choose to identify as Māori	Census enumeration Household labour force survey Post-secondary education Cancer registration

with Māori in terms of human relationships, access to Te Ao Māori, socio-economic circumstances, and change over time. The representative sampling method proposed has been called " Whaihua Tatau " to indicate its primary focus on Māori and its Māori centred perspective.

Background: Te Hoe Nuku Roa - Māori Profiles

In an effort to better understand Māori situations at household levels and to appreciate the links between cultural identity and socio-economic circumstances, the Department of Māori Studies at Massey University, is undertaking a longitudinal study of Māori individuals and households. The study, known as Te Hoe Nuku Roa, aims to gather information that reflects the current situation of Māori without making value judgements about preconceived virtues of being Māori. It links a variety of cultural and ethnic measures with other indicators to obtain Māori identity profiles in contemporary Aotearoa.

In order to meet the study objectives it was necessary to develop a sampling method which reflected the diverse realities within which Māori live. Various options were considered including random sampling based on the Māori electoral roll, snow-balling techniques, random samples from iwi registers and stratified random sampling. For reasons which will be discussed later a stratified random sampling method was considered most likely to capture the full range of Māori household configurations without in-built

bias or preconceived notions of a "typical" Māori. It would more predictably ensure genuine Māori representation across the range of cultural, social, economic and geographic variables.

A Representative Māori Sample

Māori society is not static, any more than New Zealand society generally. Changing demographic patterns, technological advancement, interaction with other cultures and nations, and variable access to resources, have been accompanied by changing cultural beliefs and practises. In addition, throughout the human life-cycle, situations, attitudes, values and aspirations change so that Māori individuals at different stages in life may demonstrate quite different characteristics.

Far from being homogenous Māori have a variety of cultural characteristics and live in a number of cultural and socio-economic realities. The relevance of so-called traditional values is not the same for all Māori, nor can it be assumed that all Māori will wish to define their ethnic identity according to classical constructs. At the same time, they may well describe themselves as Māori, rejecting any notion that they are "less Māori" than their more conventional peers.

Māori belong to numerous social and cultural groupings. Sometimes ethnicity will be the most significant affiliation but on other occasions ethnicity may be less important than belonging to a school, a sports club, a socio-economic grouping or a family constellation. Balance between individual and group varies over time and according to other competing claims including cultural expectation, opportunities

and personal preferences. Furthermore, social groupings may be seen as primarily Māori in nature even though their origins lie elsewhere. A rugby league club, for example, might be described as a Māori organisation by its members because it incorporates Māori notions of leadership, training and hospitality (Durie et al 1995).

While a sample can never be entirely representative of the entire population, enough is known about contemporary Māori to identify certain key variables which ought to be reflected in a representative sample. These variables cover a range of situations and conditions and include: an urban-rural dimension; socio-economic dimensions; iwi dimensions; cultural dimensions, and age groupings.

Following World War II Māori began moving to the cities and this accelerated in the 1960s. By 1981, 81 per cent of the Māori population lived in urban centres (Department of Statistics 1994). The urban-rural dimension is important since there are significant differences both in lifestyle and cultural identity between Māori who live in towns or metropolitan areas and those who live in the country (Metge 1964).

Of equal importance and likely to become more obvious, are the diverse socio-economic conditions of Māori. Table 3 summarises some of the significant differences within Māori society.

Prior to 1984 the iwi dimension might have attracted less attention than it does now. However, active policies of iwi development, coupled with increasing dissatisfaction with Māori social and cultural structures in urban settings has led to a greater emphasis on iwi affiliations and contacts.

In the 1991 (Department of Statistics 1994) census iwi affiliation was recorded and results suggested that there were some quite large iwi with populations exceeding 40,000 while others appeared to be much smaller with populations less than 3,000.

Cultural identity is a further variable. Not all Māori subscribe to the same cultural values nor does "being" Māori carry the same implications for everyone. A recent survey by Te Taura Whiri i te Reo Māori (1995) showed that although sixty per cent of the Māori population 16 years or over speak some Māori there is a wide range of language ability. The survey was able to confirm that the migration of Māori people from country to city had considerable impact on the state of Māori language, levels of fluency remaining

Table 3

Māori Differentials
NZ Māori Ethnic Group 15 years and Over

Income	42% had an income of $10,000 or less	27% had an income between $10,001-$20,000	19% had an income between $20,001-$30,000	3% had an income over $30,001	9% did not specify an income	
High School Qualication	60% had no formal school qualification	19% had school certificate in one or more subjects	10% had sixth form certificate or university entrance in one or more subjects	5% had higher school certificate or higher leaving certificate, university bursary or scholarship	2% had an overseas or other school qualification	4% did not specify
Employment	36% were empployed in full-time labour force (30 hours or more)	7% were employed in part-time labour force (1-29 hours)	11% were unemployed and actively seeking full-time work	3% were unemployed and actively seeking part-time work	43% were in the non-labour force	

(Source 1991 Census, NZ Population and Dwellings)

higher in rural areas. Durie (1993) has described three broad groupings based on cultural and lifestyle patterns. People belonging to a conservative Māori group are more likely to speak Māori, attend marae functions, enrol their children in kohanga reo and register on the Māori electoral roll "Mainstream Māori", however, may lead lives which are indistinguishable from their Pākehā neighbours though continue to describe themselves as Māori while a third group "alienated Māori" do not participate effectively in either Māori society or mainstream Pākehā society.

The current Māori population composition shows distinctive trends. Although one third of the population is under the age of 15 years it is likely the ratio will change. Māori are projected to make up fifteen per cent of the total population by 2031. A consequence of reduced fertility rates and increased life expectancy will lead to a higher proportion of older Māori people so that by 2031 the proportion of elderly in the Māori population will have trebled to nine per cent (Department of Statistics 1994). Douglas (1995) reports that already, twenty seven per cent of the Māori population do not know their tribe. Either they don't know their tribal name, or they don't know what their tribal connections are. Allied to this are major changes in domestic, household and family arrangements. He notes that the most rapidly growing type of Māori headed household over the past decade was the single parent (usually the mother) and her dependent children, and that over the same period of time the most rapidly growing source of income for Māori males was Department of Social Welfare benefits, (mainly unemployment, sickness and disability benefits).

Māori Sampling Methods

Various approaches have been used to obtain a Māori sample. Although none is entirely representative (of the Māori population), each has validity in terms of the intended purpose.

The Rapuora Study, conducted by the Māori Women's Welfare League 1983-84, used a snowballing technique to recruit women into a survey that would focus on role, status and opportunities for Māori women. Originally intended to be a nationwide survey, funding realities forced it into a series of regional studies. The composite study involved 1177 interviews with Māori women and recorded a response rate of over 99 per cent. The sampling was in four stages: the selection of three regions; random sampling of 24 meshblocks within each region; household enumer-

ation; random sampling from the names of Māori women supplied by meshblock householders, (the snowball sample). Though appropriate for the Rapuora study the sample was primarily focussed on recruiting women only based on highly focussed units within certain communities. The sampling method was not considered sufficiently robust for Te Hoe Nuku Roa mainly because meshblocks contain too few households to enable a more representative selection of household configurations at local levels. Moreover the snowballing technique presented opportunities for high selectivity based on social acquaintances and contacts.

Since 1984 many iwi have compiled extensive registers of their affiliates. Proportionate samples from each iwi would enable the compilation of a regional or even national Māori sample. However iwi registers do not as a rule contain the names of Māori individuals and whānau who do not exercise any iwi links. In addition while many iwi registers are incomplete, many Māori are listed on more than one iwi register. Iwi registers are likely to contain Māori who have similar cultural characteristics and aspirations. They are unlikely to reflect a sufficiently broad range of contemporary Māori to enable the recruitment of a representative sample.

A survey of kaumātua (Māori aged 60 years and over) currently being undertaken by Te Pūmanawa Hauora (1996) has used an iwi networking sampling method. Reliance has been placed on iwi groups being able to identify a sample of kaumātua in their own areas. Though subject to over representation, a large number of respondents has been recruited to compensate for some of the high selectivity which occurs in networking samples. However the method is probably not sufficiently reliable to guarantee the wide range of Māori households proposed for Te Hoe Nuku Roa.

The Māori electoral roll has also been used to obtain Māori samples. It has the advantage of being relatively easy to use, is readily available and is updated every three years prior to each general election. However, the Waitangi Tribunal (1994) has shown that the Māori electoral roll, far from being representative of Māori contains fewer than fifty per cent of eligible Māori voters. In addition voters who enrol on the Māori electoral roll as opposed the General roll are deemed likely to hold certain cultural values and beliefs which distinguish them from other Māori.

Statistics New Zealand periodically conducts Household Labour Force Surveys (HLFS) and House-

hold Economic Surveys (HES) with samples of households from across the country. The sample is derived by dividing the country into a set of 18,800 geographically-defined areas (called Primary Sampling Units: PSUs). Each PSU contains about 70 dwellings. PSUs with similar attributes are combined into a smaller number of geographically related groups called strata. When a HLFS or HES is undertaken two stages of sampling are used. First, PSUs are randomly selected, separately from each stratum. Then the selected PSUs are enumerated (ie each dwelling inside a PSU is listed) and random selections of the listed dwellings are contacted, to provide respondents for the survey. The frame gives a scientifically sound and cost-efficient way of obtaining a cross-section of households, but not necessarily for Māori (Doherty and Templeton, 1994).

This brief review of sampling methods used in Māori populations suggests three sets of criteria against which research appropriateness can be measured. Table 4 combines these criteria into a purpose, efficiency and representivity framework. The Rapuora method for example was appropriate for the Māori Womens Health Survey, was efficient in terms of funding and availability of fieldworkers but did not yield a sample which was truly representative at regional or national levels.

In order to obtain a representative sample for Te Hoe Nuku Roa, a new sampling method was developed and sucessfully piloted together with a pilot questionnaire. Known as "Whaihua Tatau" it is essentially a random stratified sampling method with the five key characteristics shown in table 5.

Table 5

Whaihua Tatau: Key Characteristics

- Representative Māori Sampling Method
- Māori Household focus
- Regional Selectivity
- Stratified Sampling
- Representivity Weightings

Household and Regional Focus

Whaihua Tatau is focussed on households. For the purposes of Te Hoe Nuku Roa a Māori household has been defined as "a household where one or more Māori are living". The household focus was preferred to a family/whānau focus in order to include Māori not living in a family situation or in conventional family homes. Because of high costs it was not possible to sample Māori households in every region; instead key regions which were distinctive in terms of Māori populations were selected. This method was favoured for three specific reasons. First, a strategic approach can be adopted with a systematic surveying of regions as they can be reasonably managed and in order to maximise cost efficiency. Second, by utilising existing information about each region it is possible to develop a frame from which a sample reasonably representative of Māori from the regional population can be drawn. Third, it provides an opportunity to compare one region with another in terms of Māori households.

Four regions were chosen for a baseline survey. The Manawatu-Wanganui, Gisborne, Wellington and Auckland regions were proposed on the basis that the

Table 4

Māori Sampling Methods

	Purpose of Study (aims, objectives)	Efficiency (fieldwork, data management, costs)	Representivity (regional, national)
Meshblock Sampling (eg Rapuora)			
Iwi Registers			
Iwi Networking (eg. Kaumātua study)			
Household Labour Force			
Māori Electoral Roll			

contrasts between all four would provide an extensive range of contemporary Māori household realities, incorporating rural, urban and metropolitan variations and including a range of Māori population densities and cultural and socio-economic circumstances.

The Manawatu-Wanganui region was selected as the first region to be surveyed. This region comprises a "good mix" of Māori household situations. Cities such as Palmerston North and Wanganui contain a range of urban household configurations, smaller rural towns such as Feilding, Marton, Foxton, Levin, Ohakune and Raetihi present a good representation of secondary urban centres, and rural situations are captured from the Norsewood - Herbertville (Central Hawkes Bay), Raurimu (National Park) and Ngapuke (Taumarunui District) areas.

The region was also selected because it could be conveniently coordinated from Massey University. The Manawatu-Wanganui regional survey was undertaken in 1994 -95 and was followed by Gisborne and Wellington in 1995 -96. The Auckland survey will occur in 1996 -97.

Stratified Sampling

Since the number of Māori within each PSU is known, based on census data, it is possible to sample more heavily the strata with higher Māori populations. To maintain the accuracy of estimates covering the total Māori population from which the sample is drawn, reasonably sized samples still need to be drawn from the low Māori strata.

The sample from each region has been selected using a differential sampling approach based on information from past census, HES and HLFS surveys conducted by Statistics New Zealand. Based on the stratifications within each region and in relation to Māori population density

within each stratum, selections of PSUs can be selected for each survey. An enumeration phase involving a door to door survey within each PSU can then be undertaken to establish which households are eligible for inclusion in the study (i.e. which households are Māori by definition). For consistency each PSU is surveyed three times or until each dwelling has been contacted and canvassed in relation to a structured interview. Repeat surveys are conducted at different times of the day and on different days of the week so as to increase the chances of contacting households. Later, eligible households are selected randomly to achieve predetermined totals (which allow for non-participation and no-contact), in line with the population stratum proportions. Where less than 12 eligible households are situated in any one PSU all are included in the study, otherwise a systematic random sampling process is applied as shown in table 5.

Table 6

Whaihua Tatau: The Systematic Random Sampling Process

1	sum the eligible households from the low-Māori PSUs
2	subtract this total from the desired number of survey households
3	divide by the number of PSUs remaining and round to the nearest integer =D (the result tells you the how many dwellings to select from each PSU)
4	calculate the sampling interval Sampint = Psusize/D
5	generate a random number between 0 and Sampint =S
6	repeat for i = 0 to (D-1) dwelling selected = round(S+Sampint x i)
7	this indicates the dwelling to be selected from the eligible list

(Templeton, 1995)

Table 7

Whaihua Tatau: The Weightings Formula

weight =

$$\frac{\text{number PSUs in strata}}{\text{number of PSUs selected}} \quad \times \quad \frac{\text{number of eligible dwellings in PSU}}{\text{number of dwellings selected from PSU}} \quad \times \quad \text{response factor}$$

response factor =

$$\frac{\text{enumerated dwellings}}{\text{screened dwellings}} \quad \times \quad \frac{\text{eligible dwellings selected}}{\text{eligible dwellings responding}} \quad \times \quad \frac{\text{number of eligible residents}}{\text{number of eligible respondents}}$$

Representivity-Weightings

Weightings are applied to the data using the formula, shown in table 6 which is based on PSU characteristics and a response factor.

Conclusion

Sampling methods for Māori populations have for the most part been devised for specific purposes. However, a sample which is to be representative of Māori either at local or national levels, needs to take into account Māori heterogeneity, otherwise there is the risk of bias and skewed results. Underlying this assumption is the demonstration that although Māori people have certain cultural, social and economic characteristics in common, there is also diversity which is not yet well documented.

Whaihua Tatau, unlike other published sampling methods for Māori, provides a method which does not make assumptions about cultural identity, lifestyle preferences, locality or social affiliations. For these reasons it is an appropriate method for the longitudinal study of Māori households, Te Hoe Nuku Roa. It identifies 'households' from which information on household dynamics and relationships as well as information from individual Māori within the household can be collected over time. As individuals with an on-going relationship to the household will be able to tracked over time, comparisons with the results of other sampling methods will be able to be made in order to compare broad representivity issues. So far Whaihua Tatau has been able to provide a systematic and reliable approach to the regional selection of potential respondents, and the identification and enumeration of Māori households. In that sense it has provided an instrument to meet the purpose of the study (the development of representative Māori profiles). It has also been an effective tool, within the management constraints surrounding the study: the budgetary limitations on recruitment, and the complexities of data handling. Because the method provides some rigour in the selection of respondents from the range of household circumstances, and weights them accordingly, it is able to satisfy representivity requirements, at least for the purposes of this study.

Whaihua Tatau may not be suitable for all Māori population research however, although comparatively resource intensive and subject to the difficulties of other door-knocking exercises, does enable a range of Māori experience to be sampled without the sampling method introducing some of the value-based biases of other methods.

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Offprint from

The Journal of the
Polynesian Society

TE HOE NUKU ROA FRAMEWORK
A MAORI IDENTITY MEASURE

M. H. DURIE[1]
Massey University

INTRODUCTION

In 1992 staff of the Department of Māori Studies, Massey University, in response to some pressure from *iwi*, recognised the need for a longitudinal study of Māori households which would enable cultural, social, economic and personal factors to be correlated. With funding for three years from the Public Good Science Fund the programme began in July 1993. Known initially as Māori Profiles, the concept of breaking new ground in the research of Māori households was compared to early Māori mariners embarking on an exploration to unknown places; "Te Hoe Nuku Roa" became the Māori name for the study. Te Hoe Nuku Roa is taken from an ancient incantation (*karakia*) offered by *tohunga* when setting out on an unchartered journey. It refers to the *hoe* or 'paddle' necessary to power the canoe during the *nuku roa* 'long journey'.

The overall aim of the project is to provide a sound empirical base that will inform Māori and other planners and facilitate the development of policies and programmes appropriate to Māori advancement in cultural, social and economic terms. The design of the study incorporates measures of the characteristics of cultural identity. The stability of these characteristics will be tested over time. Data obtained from an initial cross-sectional approach will be supplemented by a longitudinal study so that regular monitoring and evaluation of outcomes at family and individual levels can be continued over ten and twenty year periods.

Four aims of this study make it significantly different from others. First, because it takes into consideration the major influences acting on Māori society, it proposes a Māori framework to gauge personal and family development.

Second, it will examine the relationships of Māori families and individuals with structures in New Zealand society at local, regional and national levels and including Māori societal structures.

Third, the integrated nature of the study provides a basis for the development of co-ordinated policies and programmes, mainly by Māori, but also by other central and regional authorities.

Fourth, by adopting a longitudinal approach, the study offers an opportunity to chart the natural history of families and individuals and to assess the impact of policies and programmes introduced to address their specific and general needs.

The first phase of the study involved the construction of a draft framework relevant to contemporary Māori in a variety of situations. On the basis of the draft, a comprehensive questionnaire, capable of capturing the most appropriate cultural,

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social and economic indicators relevant to Māori well-being and advancement at a household level, was developed and tested and the framework subsequently revised. This paper reports on that framework.

MEASURING MĀORI REALITIES

Several frameworks have been developed in order to conceptualise and locate Māori individuals according to characteristics of Māori identity, culture, well-being and knowledge. Sometimes known as "Māoriness scales", they have all sought to capture the key aspects which best describe Māori, to provide measures (qualitative and quantitative) for specific purposes, and to distinguish Māori experience and realities from non-Māori.

Whare Tapa Whā

Durie (1985a) introduced a framework for understanding Māori health perspectives. The model proposes four health dimensions and compares them to the four sides of a whare: *taha wairua* (spirituality), *taha hinengaro* (thoughts and feelings), *taha tinana* (physical health), *taha whānau* (family).

Though popular, the model has not been put into operation and there is uncertainty about appropriate measures for *taha wairua* and *taha hinengaro* . Probably its greatest advantage has been that it offers a construction of health which accords with Māori understandings and facilitates a sense of ownership. Moreover, it reinforces that health is not the sole province of doctors (Durie, 1994).

Te Wheke

Pere (1984) produced a similar model at the Hui Whakaoranga in 1984.

She used the octopus to illustrate the major features of health from a Māori family perspective. Each of the eight tentacles symbolised a particular aspect of health while the body and the head represented the family unit as a whole. The eight dimensions were: *wairuatanga* (spirituality), *tinana* (physical), *hinengaro* (mental), *whanaungatanga* (family), *mana ake* (uniqueness), *mauri* (vitality), *hā-a-koro-mā-a-kui-mā* (inspiration from ancestors), *whatumanawa* (emotions), *waiora* (represented by the eyes of the octopus).

Ngā Pou Mana

In an attempt to highlight the most significant aspects of cultural identity in relationship to Māori well-being, the Royal Commission on Social Policy used the analogy of four pillars, *ngā pou mana* (Royal Commission on Social Policy, 1988). The four pillars are represented by *whanaungatanga* (family cohesion), *taonga tuku iho* (cultural inheritance), *te ao tūroa* (the environment), *tūrangawaewae* (security). This model is broader than the other two allowing for the consideration of economic resources (land), access to the environment, cultural heritage, as well as family systems. But like them, it seeks to locate the individual within a broader socio-cultural context.

Ngā Pūtake

In relationship to Māori mental health, Durie (1985b) also described three institutions as foundations for good health. These were *whenua* (land), *whānau* (family) and *te reo* (Māori language, i.e. communication). He argued that good mental health required a firm anchoring on all three foundations and, conversely, poor health resulted when access to any was eroded or blocked.

Ngā Pou Ārahi

This model, proposed by the Standing Committee on Māori Health (1987), is about leadership. Though described initially for health purposes it has potential for wider application. Essentially it recognised Māori structures and leadership patterns as important for the maintenance of good health. *Iwi* and *hapū* were described as vehicles for health promotion and care and *ngā tohunga* (elders and healers) were seen as leaders in advocating good health. The links of *ngā pou ārahi* with their own *iwi* were seen to be as important as professional or technical skills in determining attitudes and improve-ments in health.

Māori Identity Scales

Based largely on cultural knowledge and self identification, a number of scales have been used to assess acculturation. Thomas (1988a) developed a Māori knowledge test, in the form of a 40-item questionnaire, which required understanding of a variety of everyday words, together with an awareness of distinctly Māori institutions. Thomas (1988b) demonstrated that Māori children who had some knowledge of Māori language and culture gained higher scores on achievement tests than Māori children who had little or no knowledge of their culture. His main point was that culture and ethnicity are not identical and that because not all Māori have the same cultural capital, outcomes for Māori cannot be assumed to totally reflect cultural difference.

In a study on the perceptions of Māori children to physical disability, Te Pūmanawa Hauora (Ratima, Potaka, Durie and Ratima 1993) used a Māori identity scale, based on Thomas's study. It employed a questionnaire which asked five cultural familiarity questions, seven Māori knowledge questions and a self-identification question.

Māori Cultural Capital

A questionnaire developed by A. E. Durie (1993) and used in an access to education study attempted to measure Māoriness, culture and identity by focussing on knowledge, associations and language. It sought information on: *iwi* identity, marae affiliation, marae involvement, association with Māori organisations, involvement in a Māori school, attitude towards and competence in Māori language. Though used primarily for an educational survey, it brought together a number of factors with wider relevance.

Hapū And Iwi Resources

Winiata (1988) has developed a tool for the measurement of the position of *iwi* and *hapū*. In examining human resources he suggests measurements for membership (of an *iwi* or *hapū*), repositories of *whakapapa, wairuatanga, whanaungatanga, kawa, te reo, tikanga, kaumātua*, health, education. Physical resources are quantified by reference to marae facilities, *taonga*, manuscripts, land, investments and fishing rights. His framework represents an early attempt to quantify cultural and social factors as well as access to the economic wealth of the group.

TE HOE NUKU ROA FRAMEWORK

Most of measures so far described have been used for quite specific purposes, and though appropriate for particular needs, have failed to make provision for links and relationships between culture, individual and group dynamics, change over time and socio-economic standing.

As part of the Te Hoe Nuku Roa - Māori Profiles Study, the following framework has been developed as a basis for understanding Māori individuals and households. The framework is intended as an instrument to aid in conceptualising the current position of respondents and their households and to provide a substrate upon which the philosophical and methodological aspects of Te Hoe Nuku Roa study can be grafted. Importantly, it recognises that although the statistical definition of Māori has been clarified in the Māori Affairs Amendment Act 1974, the significance and actual meaning of being Māori at a personal level is not well understood. Not only do aggregated data make it difficult to distinguish ethnicity from socio-economic class, but, at odds with field observations, they lend weight to a presumption that Māori are a homogeneous group. Moreover there is often an implication that Māori individuals who do not conform to certain pre-ordained cultural characteristics are less Māori than those who do, or that, conversely, most Māori ascribe to similar values, beliefs and lifestyles.

In order to test those and other hypotheses, Te Hoe Nuku Roa does not presuppose the parameters of Māori culture, but attempts to link a variety of cultural and ethnic measures with other indicators so that a more comprehensive profile of Māori might be obtained.

ASSUMPTIONS

To address the position of contemporary Māori, four assumptions have been made. They recognise Māori diversity, dynamic change, multiple affiliations and self-identification.

Far from being members of an homogeneous group, Māori individuals have a variety of cultural characteristics and live in a number of cultural and socio-economic realities. The relevance of so-called traditional values is not the same for all Māori, nor can it be assumed that all Māori will wish to define their ethnic identity according to classical constructs. At the same time, they will describe themselves as Māori and will reject any notion that they are "less Māori" than those who conform to a conventional image.

Māori society is not static, any more than New Zealand society generally. It is

both dynamic and interactive. Changing demographic patterns, technological advancement, interaction with other cultures and nations, and reduced control over resources, have been accompanied by changing cultural beliefs and practises. In addition, throughout the human life-cycle, situations, attitudes, values and aspirations change so that Māori individuals at different stages in life may demonstrate quite different characteristics from those present at other stages.

Māori belong to numerous social and cultural groupings. Sometimes ethnicity will be the most significant affiliation, but on other occasions it may be less important than belonging to a school, a sports club, a socio-economic grouping or a family constellation. Balance between individual and group membership varies over time according to other competing claims such as cultural expectation, financial barriers, opportunities and personal preferences. Furthermore, social groupings may be seen as primarily Māori in nature even though their origins lie elsewhere. A rugby league club, for example, might be described as a Māori organisation by its members because it incorporates Māori notions of leadership, training and hospitality.

People and groups are best able to articulate their own positions, values and beliefs. Imposed stereotypes create misleading impressions that certain individuals will automatically wish to move in particular ethnic or cultural directions when in fact they may have quite different inclinations. Self-identification and choice underpin this study and there has been a deliberate effort to avoid creating stereotypes which carry with them expectations of preferred outcomes. In other words, being Māori in the 1990s cannot be assumed to be synonymous with conservative expectations of a stereotyped cultural heritage.

A MULTI - AXIAL FRAMEWORK

Te Hoe Nuku Roa is built on a relational framework made up of four interacting axes - *paihere tangata* (human relationships), *te ao Māori* (Māori culture and identity), *ngā āhuatanga noho-ā-tangata* (socio-economic circumstances), *ngā whakanekeneketanga* (change over time). A set of indicators, *ngā waitohu*, is used to describe the four axes according to: levels of choice, access, participation, satisfaction, information and knowledge and aspirations.

Table 1 shows the four axes, *ngā Pūtake* and their related dimensions

Table 1 *Ngā Pūtake*

Axes	*Ngā Pūtake*	Dimensions
Axis 1	*Paihere Tangata*	Human Relationships
Axis 2	*Te Ao Māori*	Māori culture and identity
Axis 3	*Ngā Āhuatanga noho-ā-tangata*	Socio-economic circumstances
Axis 4	*Ngā Whakanekeneketanga*	Change over time

Table 2 shows the indicators, *ngā Waitohu*, which can be applied to each axis

Table 2 *Ngā Waitohu*

Indicator	*Ngā Waitohu*	Descriptors (examples)
Choice	*Kōwhiringa*	options, alternatives
Access	*Tomokanga*	opportunity, barriers, control over goods and services
Participation	*Whaiwāhitanga*	involvement, active/passive interaction
Satisfaction	*Painga*	confidence, value, outcome
Information & Knowledge	*Ngā Whakamōhiotanga me ngā Mātauranga*	medium of exchange, source style of presentation
Aspirations	*Ngā tūmanako*	aims, goals, intentions

Table 3 shows the four axes and the indicators

Table 3 Axes and Indicators

Ngā Waitohu	Axis 1 *Paihere Tangata*	Axis 2 *Te Ao Māori*	Axis 3 *Ngā Ahuatanga noho-ā-tangata*	Axis 4 *Ngā Whaka-nekeneketanga*
Indicators	Human relationships	Māori culture and identity	Socio-economic circumstances	Change over time
Choice				
Access				
Participation				
Satisfaction				
Information & knowledge				
Aspirations				

Axis 1, *paihere tangata*, the human relationship axis, is consistent with the several units of focus in the study - individuals, households, families, and *whānau* - and the relationships between them. The nature and extent of the relationships between Māori individuals and other social groupings will be explored, without

assuming that all Māori are actively involved in wider kin-based circles. A distinction will be made between household, family and *whānau* groups; they are not synonymous though the metaphor of the *whānau* may be used, loosely, to describe all three. *Whanaungatanga*, the processes by which *whānau* links, cohesion and mutuality are maintained will be a further focus of Te Hoe Nuku Roa.

Axis 2, *te ao Māori*, the Māori cultural identity axis, contains four subsets that will enable a construction of identity and cultural positions according to: *mana ake* (personal identity), *taonga tuku iho* (cultural heritage), *ngā rawa o Rangi rāua ko Papa* (natural resources), *whakanōhanga Māori* (Māori institutions). This axis moves beyond equating a Māori identity with knowledge of Māori culture. Instead the focus is on a range of quantifiable measures potentially available to Māori by virtue of ethnic inheritance. While the axis includes knowledge and understanding of culture, it also embraces access to and participation in Māori institutions (such as the marae), and Māori economic resources (such as land and fisheries).

Axis 3, *ngā āhuatanga noho-ā-tangata*, is concerned with socio-economic circumstances and includes *oranga tangata* (well-being), *whai tūnga* (societal standing) and *whai huanga* (economic position). Though using conventional indicators, such as income levels, occupational class and level of education, the approach will emphasise self assessment and satisfaction without assumptions that Māori necessarily wish to pursue the same socio-economic track as non-Māori.

Axis 4, *ngā whakanekeneketanga* is related to change over time. The longitudinal nature of the study will enable an assessment of the impact of particular policies at individual and household levels, mobility, improvement or deterioration in socio-economic status, and changes in household and *whānau* dynamics. Of particular interest will be the levels of dependence, independence and inter-dependence for different age groups and in different contexts.

Each axis forms a *pūtake* (root), from which sub-sets, *ngā peka* (branches), take form, resulting in *ngā rau* (leaves), the areas of inquiry that will provide essential information both to quantify and to qualify *ngā peka* and *ngā pūtake*. The questions contained in the lengthy questionnaire are capable of capturing data across the range of concerns and can be quantified.

Although there is no absolute agreement about many of the terms used in the framework, the study itself will, among other things, provide contemporary perceptions about Māori cultural values and beliefs.

A Māori institution for example could be defined as "an institution which is controlled by Māori and which operates within *tikanga Māori* (according to Māori protocol)". Under that definition marae or *hapū* or *iwi* would be obvious examples of Māori institutions. But other situations may be less clear. Even though operating within *tikanga Māori*, for example, a Kura Kaupapa Māori could be regarded as a State institution since control rests largely with the Ministry of Education. There are also some institutions such as sports clubs which have a high level of Māori membership, even Māori control, but which may not operate according to *tikanga Māori*. Then there are Māori dominated institutions, closely linked to *iwi* and *hapū* but operating within *tikanga Pākehā*, e.g. the Waitangi Tribunal, the Treaty of Waitangi Fisheries Commission and Te Puni Kōkiri.

Respondents in Te Hoe Nuku Roa will be asked to give their own views about Māori cultural values enabling the development of a set of understandings based on a range of modern Māori views.

Table 4 shows *ngā peka*, the subsets from which *ngā rau* are derived

Table 4 *Ngā Peka*

Ngā Peka	Subsets
Tangata	Individual
Noho kāinga	Family / Household
Whānau	Extended family
Mana ake	Personal identity
Taonga tuku iho	Cultural heritage
Ngā rawa a Rangi rāua ko Papa	Natural resources
Whakanōhanga Māori	Māori institutions
Oranga tangata	Well-being
Whai tūnga	Societal standing
Whai huanga	Economic position
Whakawhiti kāinga	Changing household dynamics
Hurihuri whakaaro	Shift in cultural identity
Whakarerekētia	Altered circumstances

AN INTEGRATED APPROACH

Although the framework consists of four axes, the significance of Te Hoe Nuku Roa is that items on one axis can be linked with items on any other. This provides for the creation of a more complete profile of Māori than has been possible in the past. Most descriptions of Māori have suffered from cross sectional limitations and a single sectoral interest. Moreover, assumptions about what constitutes a Māori cultural identity have tended to be based on "traditional" values, or at least on popular perceptions of a Māori identity. Often these have been romantic constructs based on the writings of early anthropologists and missionaries, but bearing little relationship to common Māori experience.

By focussing simultaneously on four distinct but related dimensions (the four axes), Te Hoe Nuku Roa will be able to demonstrate the relationships, for example, between access to a marae, income levels, educational achievement and employment. It will also enable an exploration of relationships between *ngā rau* , (e.g. language and *tikanga*, language and education, language and *whānau* cohesion). It will give meaning to "being Māori in the 1990s and beyond".

The longitudinal component of the study will also provide access to the fourth axis, the dimension of change. Follow up at three yearly intervals will enable exploration of altered personal and group circumstances, household dynamics, changes in identity, mobility, and the realisation of aspirations.

Table 5 summarises the three levels of inquiry: *ngā pūtake, ngā peka, ngā rau*
Table 5 Te Hoe Nuku Roa Framework: *Ngā Pūtake, Ngā Peka, Ngā Rau*

Ngā Pūtake Axes	*Ngā Peka* Subsets	*Ngā Rau* Focussed units of inquiry
Axis 1 *Paihere tangata* Human relationships	Individual Family Household *Whānau*	Household roles and relationships *Whānau* cohesion Interdependence
Axis 2 *Te Ao Māori* Māori identity	*Mana ake* (personal identity) *Taonga tuku iho* (cultural heritage) *Ngā rawa a Rangi rāua ko Papa* (natural resources) *Whakanōhanga Māori* (Māori institutions)	Ethnic affiliation Language *Tikanga* Land Fisheries Forests Environment Marae *Hapū* activities *Iwi* links
Axis 3 *Ngā āhuatanga noho-ā-tangata* Socio-economic circumstances	*Oranga tangata* (well-being) *Whai tūnga* (societal standing) *Whai huanga* (economic position)	Health Education Housing Employment Lifestyle Income
Axis 4 *Ngā whakaneke-neketanga* Change over time	Changing household dynamics Wider interactions Shift in cultural identity Altered circumstances	Mobility Stability Realisation of aspirations Vulnerability Impact of external factors New groupings

CONCLUSIONS

As Māori move towards self determination and defining their own futures, there is a danger that a narrow focus based on prejudice about a "typical" Māori, could distort a view of Māori people by relying on 20th century stereotypes rather than 21st century realities. In order to avoid classifying Māori solely according to traditional cultural knowledge and skills, or on the basis of affiliation with marae, *hapū* and *iwi*, it is necessary to emphasise the range of circumstances which not only shape cultural expression but also permit or inhibit cultural identification and practice.

Most frameworks used to describe Māori have been of a single dimension stressing links with traditional knowledge and skills but failing to capture the range

of activities, lifestyles and multiple affiliations which characterise Māori people in modern society.

The Hoe Nuku Roa framework provides a method for the conceptualisation and description of the position of Māori individuals and households without value-laden judgements about the "level of Māoriness." In addition, by incorporating four inter-related axes, it enables cultural, social and economic circumstances to be linked in a holistic manner. It recognises the diverse realities within which Māori families live and accepts that identification as Māori necessarily includes a range of cultural, social, lifestyle and economic realities. A Māori identity in the 21st century will encompass all of those factors.

The framework will be used as a basis for developing an appropriate methodology to conduct a longitudinal study of Māori households and will be used in the analysis of complex data sets. It is compatible with an evolving and constantly changing culture, and because it takes into consideration the major influences on contemporary Māori society, can be legitimately described as a Māori relevant framework. It is hoped that it will contribute to a more complete understanding of contemporary Māori profiles and provide a bridge between class, culture and ethnicity.

NOTE

1. Te Hoe Nuku Roa framework is a research project involving a number of staff members of Massey University, all of whom have contributed to the production of this paper. Apart from the author, these are T. E. Black, I. S. Christensen, A. E. Durie, J. Taiapa, U. K. Potaka, E. D. Fitzgerald.

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CHRISTCHURCH HEALTH AND DEVELOPMENT STUDY

(CHRONOLOGY)

1. 1970-1974:   Initial research by Professor F T Shannon into single parenthood.

2. 1974:   MRC invites Dr Mia Kelmer Pringle to New Zealand.

3. 1975:   MRC approves initial funding to set up longitudinal study.

4. 1976:   Principal Investigator and core research staff appointed.

5. 1977:   First data collection for CHDS began.

6. 1998:   CHDS cohort studied for 21 years.

OVERVIEW OF CHDS

1. <u>Initial cohort</u>: 1265 children born in the Christchurch urban region during mid 1977.

2. <u>Studied at</u>: birth, 4 months, 1 year, annual intervals to age 16, 18 and 21 years.

3. <u>Data sources</u>:

    i) Parental interviews (0-16).

    ii) Self interview/assessments (8-21).

    iii) Teacher reports (6-13).

    iv) Medical records (0-21).

    v) Police records (13-21).

SAMPLE RETENTION

At age twenty one, 1,011 subjects were studied.

These subjects represented 80% of the original cohort of 1,265 children and 90% of all cohort members resident in New Zealand at age 21.

Losses to follow-up were due to:

Migration from New Zealand 50%

Refusal to participate 37%

Failure to trace 3%

Death 10%

RESEARCH OUTPUTS

The CHDS has published over 200 scientific papers and books describing the 21 year life history of the cohort. These publications have spanned the following areas:

- Pediatric epidemiology.

- Developmental Psychopathology.

- Health economics.

- Psychology.

- Sociology.

- Psychiatric epidemiology.

- Immunology.

- Research methodology.

Example: Breastfeeding and Longer Term Cognitive Development

It has been known, for some time, that children who are breastfed tend to have slightly higher intelligence and perform better at school. These associations have been found to persist when potentially confounding factors (eg, social class) have been taken into account statistically.

However, it has not been known for how long these benefits persist. As part of the CHDS, we have completed an 18 year longitudinal study, looking at the relationships between: the duration for which children were breastfed and longer term academic achievement.

BREASTFEEDING AND EDUCATIONAL

ACHIEVEMENT

	Duration of Breastfeeding (Months)				
	0	<4	4-7	>7	p
IQ score 8 years	97.46	98.89	102.16	102.83	<.0001
Reading 10 years	97.86	98.94	101.77	103.06	<.001
Maths 11 years	98.16	98.81	101.19	102.90	<.001
% Leaving school without quals	25.3	25.5	10.8	9.7	<.001
Mean number of SC passes	2.66	3.04	3.75	3.99'	<.001

With increasing duration of breastfeeding there was evidence of increasing IQ, increasing school performance and increased achievement of the point of school leaving.

BREASTFEEDING AND EDUCATIONAL

ACHIEVEMENT

In part, the superior performance of breast fed children was due to the fact they tended to come from socially advantaged homes. Statistical corrections for perinatal factors (birth weight, smoking during pregnancy, birth order) and family factors (maternal age, maternal education, socio-economic status, family living standards, family income) reduced these associations. Nonetheless, even after such control, clear relationships between duration of breastfeeding and achievement remained.

Adjusted Results

	Duration of Breastfeeding (Months)				
	0	<4	4-7	>7	p
IQ score 8 years	98.70	99.65	100.59	101.54	<.005
Reading 10 years	98.86	99.76	100.66	101.56	<.005
Maths 11 years	99.06	99.77	100.49	101.21	<.05
% Leaving school without quals	22.2	19.2	16.4	14.0	<.05
Mean number of SC passes	3.05	3.22	3.40	3.57	<.005

Conclusions:

Increasing duration of breastfeeding is associated with small but detectable gains in intelligence and school achievement that are evident up until at least 18 years. These gains cannot be explained by social and economic factors that are associated with breastfeeding. The results are consistent with (but do not prove) the hypothesis that breastfeeding may lead to increased intelligence and educational achievement. One explanation is that breast milk contains long chain polyunsaturated fatty acids (LCPS) that are not present in formula milk. It is believed that LCPS may improve neurological development and thence may lead to better cognitive ability.

CHILDHOOD LEAD EXPOSURE AND

LONGER TERM ACHIEVEMENT

Since the early 1980s, there have been concerns about the extent to which exposure to lead at subclinical levels may have small adverse effects on childhood intelligence. As part of the CHDS, we have gathered shed deciduous (baby) teeth from the cohort at around age 8. From these teeth, it was possible to secure estimates of dentine lead levels and further, to examine the relationships between lead levels at around age 8 and subsequent academic achievement.

LEAD LEVELS AT AGE 8 AND ACADEMIC

ACHIEVEMENT AT AGE 18

	Dentine Lead Level (ppm)					
	0-2	3-5	6-8	9-11	12+	p
% Reading Delayed	4.6	5.3	10.1	14.1	14.0	<.005
% Leaving school without quals	13.2	12.2	20.8	24.1	36.4	<.0001
Mean number of SC subjects	3.87	3.77	2.91	3.01	2.35	<.0001

With increasing dentine lead levels, there are clear

increases in reading delays and school dropout and

a corresponding decline in levels of success in

School Certificate.

LEAD LEVELS AND ACADEMIC

ACHIEVEMENT

Adjusted Relationships

	Dentine Lead Levels (ppm)					
	0-2	3-5	6-8	9-11	12+	p
% Reading Delayed	5.3	6.3	7.8	9.7	16.5	<.001
% Leaving school without quals	15.6	16.7	18.1	19.7	24.1	<.02
Mean number of SC subjects	3.52	3.45	3.37	3.27	3.06	<.05

Even after control for confounding factors,

increasing lead levels were associated with small

but detectable increases in rates of reading delay

and school dropout and lower pass rates in School

Certificate.

SEXUAL ABUSE AND PSYCHIATRIC

ADJUSTMENT

In the last decade there have been growing concerns about the prevalence of child sexual abuse (CSA) and the long term effects of CSA on later vulnerability to psychiatric disorder. As part of the CHDS, we have gathered:

a) Accounts of young people at age 18 of their exposure to CSA before 16.

b) Measures of psychiatric symptoms.

THE PREVALENCE OF CSA

At age 18, just over 10% of the CHDS cohort reported that they had been exposed to some form of CSA during childhood:

1. 17% of females reported exposure to CSA compared to 3% of males.

2. There was a continuum of abusive experiences ranging from episodes of non contact abuse (eg indecent exposure) to incidents involving sexual penetration:

    - 2.3% reported non contact abuse.

    - 4.5% reported CSA that involved contact but did not involve sexual penetration.

    - 3.5% reported CSA involving sexual penetration.

RELATIONSHIP BETWEEN EXTENT OF CSA

AND PSYCHIATRIC ADJUSTMENT AT AGE

16-18 YEARS

	Extent of CSA				
Outcome	None	Non Contact	Contact	Penetration	P
% Depression	17.1	39.5	35.5	48.6	<.001
% Anxiety	14.5	30.6	32.0	32.9	<.001
% Conduct disorder	3.9	3.9	14.7	26.0	<.001
% Alcohol abuse	17.9	28.1	39.2	35.7	<.01
% Substance abuse	10.6	8.2	17.0	39.0	<.001
% Suicide attempt	4.1	3.3	8.3	15.2	<.01

Those exposed to CSA involving intercourse have rates of disorder that were 2-6.6 times higher than those not exposed to CSA.

THE DEVELOPMENT OF EARLY START

The impetus for the development of Early Start came from a study conducted by the CHDS which examined the childhoods of a small group (3%) of teenagers who had developed severe multiple problem behaviours. These young people were characterised by high rates of:

- Juvenile crime.

- Substance abuse.

- Depression.

- Suicidal behaviours.

- Early onset sexual behaviours.

THE DEVELOPMENT OF EARLY START

(Cont)

The childhoods of multiple problem teenagers were found to be characterised by high rates of:

- Family social and economic disadvantage.

- Impaired child rearing practices and environment.

- Family conflict and change.

- Parental adjustment problems.

THE DEVELOPMENT OF EARLY START

(Cont)

As a result of concerns about the impacts of multiple problem family environments on children, a consortium of local providers have come together to develop an intensive home visitation programme for at risk families. These organisations include:

- **The Southern Regional Office of the Plunket Society.**

- **The Family Help Trust.**

- **The Pegasus GP group.**

- **Representatives of the Maori Women's Welfare League.**

- **The Christchurch Health and Development Study.**

KEY FEATURES OF THE EARLY START PROGRAMME

1. Client Identification: This involves a two stage process in which:

    i) Plunket Nurses refer families to Early Start on the basis of simple and broad screening criteria.

    ii) Referred families are enrolled in the programme for a one month period to conduct an indepth needs assessment.

2. Service Provision: Family support is provided by intensive home visitation. Family support workers each have a client load of 15 families.

KEY FEATURES OF THE EARLY START

PROGRAMME (Cont)

Key programme issues:

- Child preventive health care.

- Management of childhood illness.

- Improvement of parent skills.

- Reduction of child abuse risk.

- Identification and management of maternal depression.

- Identification and management of family violence.

- Assistance with family budgeting and finances.

RESULTS OF PILOT STUDY

i)   The screening methods proposed are feasible and acceptable.

ii) The programme leads to clear benefits in the areas of child health care provision and, particularly, the provision of preventive health care.

iii) Clear changes have been found in parenting behaviour, maternal depression and child abuse risk following programme enrolment.

iv) The programme has been less successful in changing "life style" related outcomes including: family violence, parental substance use, welfare dependence and poverty.

FURTHER EVALUATION

Given the general success of the pilot study, the Early Start Consortium is currently conducting a randomised field trial. The overall design of the trial is:

A series of 220 families receiving the Early Start programme will be compared with a control series of 220 families not receiving the programme.

Both series will be assessed at baseline, 6 months, 12 months, 24 months and 36 months programme participation on a series of measures of: child health; child development; parenting; parental functioning; family functioning and family economic circumstances. These assessments will make it possible to ascertain the extent to which the Early Start programme has benefits for client children and their families.

PROGRESS TO DATE ON RANDOMISED

TRIAL

1. Funding for both the service provision and research evaluation components of the trial has been obtained. The HRC has provided initial funding for the research evaluation, whereas funding for service provision for a period of 4 years has been provided by the Health Funding Authority (HFA) and the Community Funding Agency (CFA).

2. The trial has been ethically reviewed and approved by: a) the Canterbury Ethics Committee and; b) the Plunket Ethics Committee.

3. A Trial Co-ordinator has been appointed and family support workers have been employed.

PROGRESS TO DATE ON RANDOMISED

TRIAL (Cont)

4. 347 families have been recruited into the trial.

It is anticipated that the trial recruitment will be completed in

June 2001.

CONCLUDING COMMENTS: THE ADVANTAGES OF THE LONGITUDINAL DESIGN

1. The ability to study the ways in which events and circumstances in early childhood (eg breastfeeding, lead exposure) may influence longer term outcomes.

2. The ability to examine multiple and disparate topics within the same overall research design and framework.

3. The ability to adapt the design to address changing public and public health concerns.

CONCLUDING COMMENTS: THE ADVANTAGES OF THE LONGITUDINAL DESIGN (Cont)

4. The ability to develop natural history accounts of the ways in which antecedent conditions are related to consequent outcomes.

5. Providing local data to lay the foundations of programmes based on local evidence.

Whilst longitudinal design are costly and time consuming, the above features mean that these approaches are often a highly cost effective approach to addressing a wide range of research issues.

Longitudinal Developments at Statistics New Zealand

Diane Ramsay
Janette Briggs
Max Wigbout

Introduction

This presentation is in three parts.

Part One provides an overview of longitudinal data currently available in Statistics New Zealand and describes two current developments which will significantly add to the available longitudinal data.

Part Two describes some typologies of change which could be used to analyse data from the Longitudinal Survey Of Income, Employment and Family Dynamics when this data becomes available.

Part Three describes some longitudinal analysis techniques currently being researched and tried in Statistics New Zealand.

Part One

Current Longitudinal Surveys in Statistics New Zealand April 2001

This document gives details of the longitudinal datasets and surveys under development in Statistics New Zealand.

1. Linked Household Labour Force Survey Dataset

Brief Description and Objectives

The overall objective of the dataset is the study of the labour force status of the same people over a period of 8 quarters using Household Labour Force Survey (HLFS) data.

Sample Design

- The HLFS is a household based panel survey, with a households selected from a stratified random sample of small areas (PSUs) distributed across New Zealand.

- The HLFS sample consists of 8 panels of households, each followed for 8 quarters. Each quarter one panel rotates out and replaced by a new panel.
- A longitudinal dataset has been created from the individual respondents in panels newly rotating into the HLFS sample in the 8 quarters from June 1995 to March 1997.
- Respondents with undetermined labour force status at more than two quarters have been deleted.
- Respondents with one or two quarters of missing data have their responses imputed for those quarters.
- Appropriate adjustments to the survey weights have been made

Analyses

- The data have been used to calculate labour force status transition probabilities from the first quarter to each of the other 7 quarters, with ethnicity, age and sex as explanatory covariates. The results have been written up in a report, which is at the moment with a peer reviewer. The report also describes the updating of the weighting factors and the representativeness of the data.

2. Linked Income Supplement Dataset (LIS)

Brief Description and Objectives

A linked dataset of households taking part in the annual Income Supplement (IS) to the Household Labour Force Survey (HLFS)

- Because of the rotation of dwellings in the HLFS only a subset of the households interviewed in a given June quarter are interviewed again the following June quarter.
- The purpose of the linked IS is to explore the feasibility of developing a range of transition probability matrices. Among these are:
    - individual income transitions (by income source and total across income bands)
    - individual transitions between benefit and non-benefit status (by benefit type, non-benefit status type and income)
    - joint family/couple transitions (employment and earnings)
    - family tax credit transitions
- The work aims to provide a useful platform for developing our understanding of income and benefit dynamics.

Sample design

- The IS is an annual supplement to the HLFS.
- Given the rotation scheme of the HLFS sample, each individual can complete the income supplement at most twice
- A longitudinal dataset has been created for individuals who responded twice to the IS in the periods 1997-1998, 1998-1999 and 1999-2000
- Appropriate adjustments to the survey weights have been made to create a longitudinal dataset

Data in the dataset

- Demographics
- Income from different sources
- Hours worked

Analysis

- Statistics New Zealand
- Treasury
- Department of Labour
- Ministry of Social Policy

3. Longitudinal Survey of Income, Employment and Family Dynamics (LSIEFD)

Brief Description and Objectives.

The overall objective of the Longitudinal Survey of Income, Employment and Family Dynamics (LSIEFD) is to provide information about changes over time in the economic well-being of individuals and their families, and about factors influencing that change.

Specific objectives are to:

- Identify the pattern of income level experience over time for individuals and their families.
- Measure significant shifts in income levels for individuals and their families and explore the relationship of these shifts to labour market activity, receipt of government income support and family status.
- Determine patterns over time of labour market activity, participation in education and training, and receipt of government income support.
- Identify transitions between spells of labour market activity, education and training participation and receipt of government income support, and examine the factors that influence transitions from one status to another.
- Determine patterns of saving for retirement and relate these to income dynamics and life cycle stages.
- Determine patterns of change in family status and the number of families affected by family status changes.

Current Status

- Feasibility study, including 2 wave pilot, conducted in 1997- 2000.
- Main survey goes into the field, April 2002.

Data to be collected

The following list shows variables that will be collected in LSIEFD by variable type:

Spell variables
- Earnings
- government transfers
- labour market activity
- family type
- education participation (in monthly blocks)
- social marital status

Annual variables
- interest income
- investment income
- self-employment income
- other regular or irregular income, e.g. gaming wins, inheritance

Point-in-time variables
- demographics
- education qualifications
- household type / composition
- standard of living indicators e.g. tenure, amenities
- health indicator
- assets   - every second wave
- liabilities - every second wave
- legal marital status

Sample Design

- The LSIEFD will use the area based frame used for other SNZ household surveys. A stratified cluster design will be used.
- Respondents will be surveyed each year for eight years.
- All adult members of selected households in Wave 1 will become Original Sample Members (OSM's) and will form our panel. In subsequent waves, household members of households that contain an OSM will also be surveyed, while they live with an OSM. This is for the purposes of obtaining Household and Family characteristics for the OSM only.
- The survey will aim to survey 10,000 households (20,000 people) at the first wave.

Timetable

- Feasibility study conducted with waves in June 1999 and March 2000
- Main survey into the field for Wave 1 April 2002
- Data collection for Wave 1 concludes March 2003
- Data from Wave 1 available around September 2003

Analysis

- "Standard" output SNZ
- Analysis plans currently being developed
- Data available in the SNZ Data Laboratory for use

4. Longitudinal Survey of Immigrants: New Zealand (LisNZ)

Brief Description and Objectives

- A longitudinal survey of new migrants to New Zealand
- Developed in partnership between
  - The Department of Labour
  - Statistics New Zealand
- Main Objective
  - To provide reliable, authoritative data about migrants' initial settlement experiences in New Zealand, and the outcomes of immigration policies
- Current status
  - Pilot study underway (completed end 2002)
  - First wave of Main Survey early 2003

Data to be collected

- Demographics
- Reasons for migration
- Housing
- Labour Market
- Business Activities
- Assets/Income
- English language proficiency
- Education/Qualifications (before and after arrival)
- Need for and use of social services
- Social networks
- Health
- Information on partners and dependants of migrants

Spell data will be collected for:
- address
- labour force participation in NZ prior to residence approval (onshore migrants only)
- labour force participation in NZ
- participation in education

Sample design

- The sampling frame is the set of all new residence approvals listed in AMS database maintained by NZ Immigration Service
- A random sample of approvals is taken, stratified by
  - immigration approval category (e.g. family, general skills, business etc.)
  - region of origin (e.g. Pacific, South East Asia etc.)
  - migration onshore or offshore
- From each selected approval choose the principal applicant and one random other for inclusion in the survey
- Offshore migrants are included in the survey only once they arrive in NZ - notifications of the arrivals of migrants are available from AMS

- Wave definitions:
  - Pilot Study: Two waves - at 6 months and 16 months after residence approval (onshore migrants) or arrival in New Zealand (offshore migrants)
  - Main Survey: Three waves - at 6, 18 and 36 months after residence approval (onshore migrants) or arrival in New Zealand (offshore migrants)
- Sample size:
  - Pilot Study: 500 interviews at Wave 2
  - Main Survey: 5000 interviews at Wave 3

Data collection methods

- Electronic questionnaire
- Questionnaire translated into the survey languages (Pilot study: English, Samoan, Tongan, Chinese) (The Chinese questionnaire will be on paper)
- Bilingual interviewers (Pilot study: English and: Samoan, Tongan, Mandarin, Cantonese)

Timetable

- Planning and development began in 2000
- Pilot Study selection began August 2000, Wave 1 July-August 2001, Wave 2 May-June 2002
- Main Survey selection begins October 2002, Wave 1 April 2003, completion 2007 or 2008.

Analysis

- Analysis will be carried out at the individual level (not households)
- Reporting of results will be done by the Department of Labour

Part Two

Analysing longitudinal data from the Longitudinal Survey of Income, Employment and Family Dynamics: some suggestions for typologies of change

Introduction

Typologies of change are a means of describing dynamic data in summary, by defining and classifying change over time in terms of patterns, for example long-term change in income levels, labour market participation, family circumstances, patterns of saving for retirement, acquisition of educational qualifications, movements in standard of living etc. Overseas longitudinal surveys for which typologies of change have been developed include the Survey of Employment and Unemployment Patterns carried out by the Australian Bureau of Statistics from 1994 to 1997, and the British Household Panel Survey, carried out by the Institute for Social and Economic Research, University of Essex, which has been collecting data since 1991.

This paper will present suggestions for a typology of labour market change, two typologies of family change and two typologies of income change. Two of these are adaptations of the overseas typologies mentioned; others evolved from our knowledge of cross-sectional patterns and involve assumptions about how change might be characterised. Assumptions that form the basis of the typology could potentially be checked using the longitudinal data from the LSIEFD. Longitudinal data could also be used to build new typologies, which could then be used in cross-sectional research - for example, using cross-sectional characteristics to predict an individual's future risk of experiencing certain events, or being in a particular state.

A typology of labour market change

This typology of labour market change has been adapted from one proposed by Mel Butler and David Smith of the Australian Bureau of Statistics (ABS). The ABS had longitudinal data from its Survey of Employment and Unemployment Patterns and aspired to show how such longitudinal data could be analysed in relation to ILO labour definitions. They expanded the ILO labour force framework to produce a variable describing a pattern of activities for a given year.

The most significant revision made here to the original ABS typology is that the term 'unemployment/unemployed' is not used, in order to avoid implications of comparability with the official SNZ measures from the Household Labour Force Survey. Instead the proposed typology uses the label 'not working and looking for work', which accurately describes the state of labour market activity about which data will be collected in the LSIEFD. As the table below shows, the typology consists of 7 major categories - stable employment, mobile employment, unstable employment, stable not working and seeking work, long-term not working and seeking work, turbulent labour market activity and stable out of labour market - and 18 sub-categories.

Table 1: Labour market change typology

Category	Subcategory
Stable employment	Employed whole period same job
Mobile employment	Employed whole period: changed industry at least once, same occupation
	Employed whole period: changed occupation at least once, same industry
	Employed whole period: changed occupation and industry at least once
	Employed whole period: changed job but occupation and industry same
Unstable employment	Employment followed/interrupted by at least one seeking work spell lasting not more than t weeks in total, no spells out of labour market
	Employment followed/interrupted by at least one spell of out of labour market lasting not more than t weeks in total, no spells of seeking work
	Employment followed by a spell of seeking work of at least t weeks
	Employment followed by a spell of out of labour market of at least t weeks
Stable not working and seeking work	Seeking work whole period
Long-term not working and seeking work	Seeking work followed/interrupted by one or more employment spells of not more than t weeks in total
	Seeking work followed/interrupted by one or more spells out of labour market of not more than t weeks in total
	Seeking work followed by a spells of out of labour market of at least t weeks
Turbulent labour market activity	Out of labour market and studying followed/interrupted by at least one spell of employment and/or seeking work
	Out of labour market and not studying followed/interrupted by at least one spell of employment and/or seeking work
	Other combinations of employment, seeking work and out of labour market not classified elsewhere
Stable out of labour market	Studying for the whole reference period
	Out of labour market for the whole reference period
	Studying during some of the reference period

Typologies of Family Change

a) Family life-stage typology

The first typology of family change has been adapted from one proposed by Suzie Carson, Social Statistics Analyst with Statistics New Zealand. One way it could be used for looking at changes in family type over a defined period, is by comparing family type at the beginning T1 with family type at the end T2, but not counting multiple interim changes. 'Same family' would cover all family types - whether couple only, couple with children or one-parent family with children. The 'Main life-stage family changes' are meant to cover 'vital' life events such as birth, death after an allotted life expectancy and formation of unions (with or

without children) which usually occur at reasonably predicable stages in the lifespan. 'Family change due to marital/partnership dissolution' on the other hand, is less predicable in its timing, can have more or less serious impacts on vulnerable family members and outcomes which can often be measured in economic terms.

This typology could also be used in another approach, which would count all changes experienced over the defined period; in this approach people who had multiple changes would be counted more than once.

Table 2: Family life-stage typology

Stable family	Same family whole period
Main life-stage family changes	From non-family to couple only From couple only to couple with children From couple with children to couple only From couple to non-family through widowhood From non-family to one-parent family From one-parent family to non-family From one-parent family to couple with children From non-family to couple with children family
Family change due to marital/partnership dissolution	From couple to non-family due to marital/partnership breakdown From couple with children to one-parent family due to marital /partnership breakdown From couple with children to non-family due to marital/ partnership breakdown
Other family changes	From couple with children to one-parent family through widowhood From one-parent family to couple only From couple only to one-parent family

b) Family risk typology

The second typology was also proposed by Suzie Carson of Statistics New Zealand. It incorporates labour market and income characteristics of an individual's family members, as well as family change, and could be used for classifying people (particularly children) at risk of poor life outcomes. Measurable outcomes could be in the area of education, health, future employment, income and asset accumulation.

Table 3: Family risk typology

Low risk	No family change for whole period or lifecycle family changes only Moderate to high levels of family income At least one parent in employment No benefit receipt*
Some risk	Non-lifecycle family changes or series of lifecycle family changes Periods of low to moderate income At least one parent in employment for majority of period No benefit receipt* for majority of period
Serious risk	Series of non-lifecycle family changes Low family income No parent in employment for majority of period Benefit receipt* for majority of period

*Benefit receipt would cover Income Support payments and ACC weekly payments, but exclude NZ Superannuation payments

Typologies of income change

a) A typology of income dynamics, levels & source

The first typology of income change proposed aims to incorporate income dynamics (stable, mobile or unstable) as well as the level and main source of income. Definitions of income stability, mobility and instability obviously are debatable, and the types of change in main income source could vary according to the focus of analysis.

The most contentious issue would probably be how to define levels of income, particularly 'low income'. One proposal is for low income to be defined as the bottom two income quintiles (lowest 40%) of the distribution for gross personal annual income; medium income as Quintiles 3 & 4; high income as the top quintile (highest 20%) of the distribution for gross personal annual income. But if we are looking at a period of several years for analysis (LSIEFD will eventually have 8 years of annual income data) which year's distribution should be taken? Should each year's income distribution be adjusted for inflation? Another approach is to define 'low income' by a cut-off point, for example having an annual income below 50 percent of mean annual income for the first wave, or below 60 percent of median annual income for the first wave. But the same problem presents itself, since mean and median annual income may change each wave.

Table 4: Typology of income dynamics, level and source

Category	*Subcategory*	*Income main source* category*
Stable income	Stable low income - in low income for whole period	Earnings as employee
		Government income support
		All other incl. self-employment *or* private superannuation/pension or interest & other investments *or* no single main income source
	Stable medium income - in medium income for whole period	Earnings as employee
		Self-employment *or* private superannuation/pension
		All other incl. or government income support *or* interest & other investments *or* no single main income source
	Stable high income - in high income for whole period	Earnings as employee
		Self-employment *or* private superannuation/pension
		All other incl. or government income support *or* interest & other investments *or* no single main income source
Mobile increasing income	From low to medium; medium to high; low to high income over period	No change in main income source
		From government income support to earnings as employee
		From government income support to all other main sources *or* to no single main income source
		From self-employment to earnings as employee
		From earnings as employee to self-employment
		From earnings as employee to all other main sources *or* to no single main income source
		All other changes

Table 4. *contd.*

Category	Subcategory	Income main source* category
Mobile decreasing income	From high to medium; medium to low; high to low income over period	No change in main income source
		From earnings as employee to government income support
		From earnings as employee to private superannuation/ pension
		From earnings as employee to self-employment
		From self-employment to earnings as employee
		All other changes
Unstable income	More than one income change in more than one direction over period	Mostly same income source** - earnings as employee
		Mostly same income source - government income support
		Mostly same income source - self-employment
		Mostly same income source - private superannuation/pension
		Main income from all other sources *or* main income source changing year by year *or* no single main income source for any year over the period

*Main source of income means that source from which the person derived half or more of their personal annual income during each year of the period

**Mostly same income source means a main source of personal annual income which remained the same from one year to the next, or in a period of 3 years or longer changed only once to another main source

b) A typology of income turnover - characteristics of income turnover groups

This typology is adapted from a model shown by Professor David Rose of the Institute for Social and Economic Research, University of Essex, in a presentation to Statistics New Zealand about the British Household Panel Survey. For describing 'wave-to-wave' change, Professor Rose defined low income as "having income less than half the Wave 1 average income", and low income 'stayers' were those with "those with low income at all waves" of the specified survey period. A low income 'escaper' was someone having "an income below the low income cut-off at Wave t, and an income at least 10% higher than the low income cut-off at Wave $t+1$". A low income 'entrant' had "an income above the low income cut-off at Wave t, and an income at least 10% lower than the low income cut-off at Wave $t+1$".

The adapted typology is shown below, with some suggested characteristics for analysis, for describing wave-to-wave change i.e. ignoring within-wave change.

Table 5: Typology of income turnover – characteristics of income turnover groups

Selected characteristics	Low income[1] stayers[2]	Low income entrants[3]	Low income escapers[4]	High & medium income stayers[2]	High & medium income entrants[3]	High & medium income escapers[4]
Sex	%	%	%	%	%	%
Age group at T1						%
Ethnic group						%
Family type by age categories of children at T1						%
Labour market activity of adults at T1						%

Notes:
1. Column percentages would show the number of persons in each subgroup as a proportion of the total in that turnover group.

2. Row percentages would show the distribution of the different population groups over income turnover categories.

3. 'Low income' could be defined as the bottom two income quintiles (lowest 40%) of the distribution for gross personal annual income; 'high & medium income' as the three top quintiles of the distribution for gross personal annual income.

4. 'Stayer' could be defined as an individual whose gross personal annual income remains in that income group for the whole of the period.

5. 'Entrant' could be defined as an individual whose gross personal annual income starts in another income group at T1 but ends in that income group at T2

6. 'Escaper' could be defined as an individual whose gross personal annual income starts in that income group at $T1$ but ends in another income group at $T2$.
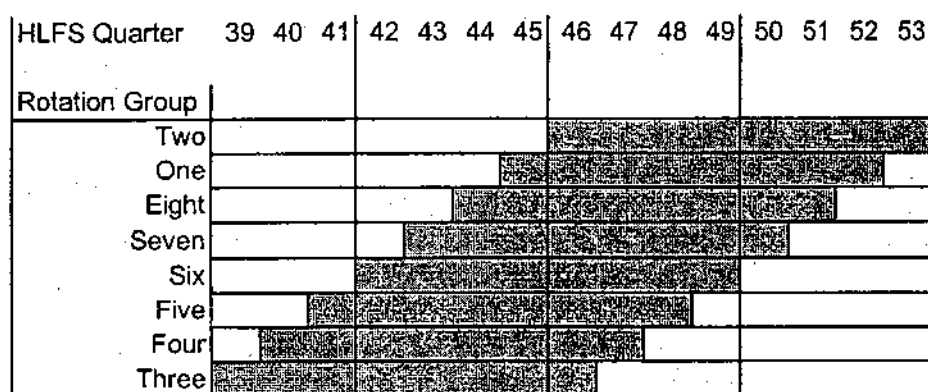
Part Three

Longitudinal Analysis

Analyses with HLFS data.

In the past we have carried out some analyses with the Household Labour Force Survey (HLFS) data and although the main idea here is to discuss a few possible analyses with the LSID data, I would like to mention a couple of HLFS results briefly as introduction. They might also give ideas for analyses with LSID data.
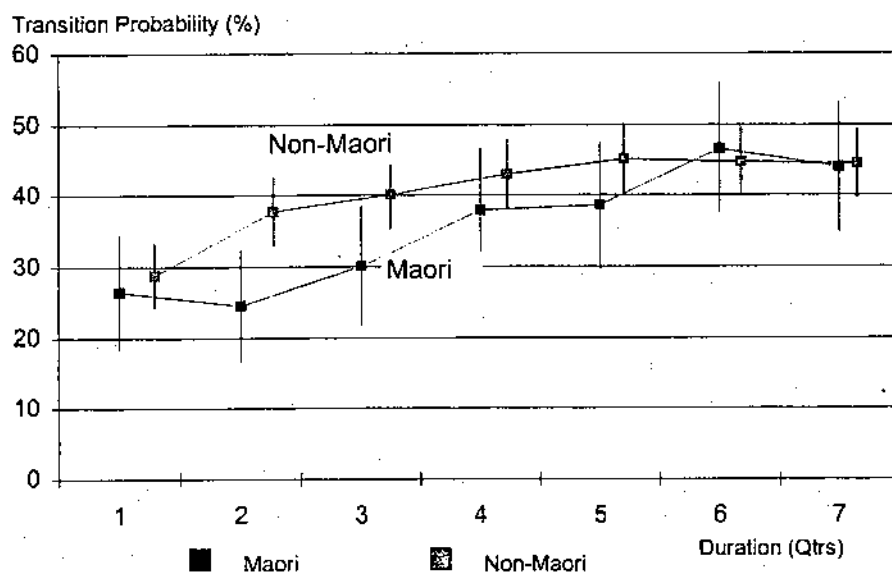
The HLFS collects every quarter the labour force status (LFS) from a sample of about 32,000 persons. Although the survey is meant to give point in time estimates there is a longitudinal aspect as each person remains in the survey for two years and is interviewed eight times. Every calendar quarter 1/8th of the sample is replaced by a new group of persons, as shown in Display 1. This means that for any period of 2 years only 1/8th of the data can be analysed for the same persons. We have studied the possibility of analysing the LFS transitions over 8 quarters for one rotation group, ie all persons starting their participation in the same quarter. Although we did some special imputations and adjusted the sample weighting factors, this resulted in a relatively small sample. We found more satisfaction with 8 rotation groups by combining the records, despite different starting times.

Display 1. 8 HLFS rotation groups starting in 8 consecutive quarters (HLFS Quarter 39 refers to the June 1995 quarter).

HLFS Quarter	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53
Rotation Group															
Two								▓	▓	▓	▓	▓	▓	▓	▓
One							▓	▓	▓	▓	▓	▓	▓	▓	
Eight						▓	▓	▓	▓	▓	▓	▓	▓		
Seven					▓	▓	▓	▓	▓	▓	▓	▓			
Six				▓	▓	▓	▓	▓	▓	▓	▓				
Five			▓	▓	▓	▓	▓	▓	▓	▓					
Four		▓	▓	▓	▓	▓	▓	▓	▓						
Three	▓	▓	▓	▓	▓	▓	▓	▓							

We have ignored seasonality and the macro-economy. I just give one example of transition probabilities we estimated from the combined dataset. See Display 2. In this display only persons unemployed in the first quarter are considered, irrespective of their LFS history. Of these persons the percentage employed in each of the following 7 quarters are graphically shown, by ethnicity.

Display 2. Maori / Non-Maori: transition probabilities to employment for persons being unemployed in their first HLFS quarter. For each quarter the point estimates are shown next to each other to show the confidence limits as well.

The results indicate that Maori are slower in their transition into the work force, with lower rates of transition in each of the first 5 quarters. The Maori and non-Maori transition rates do converge eventually to a rate of 44% after 7 quarters, ie of those originally unemployed 44% were employed after 7 calendar quarters.

The other study we did was trying to find patterns of LFS over the 8 quarters applying a multivariate cluster analysis. The resulting groups are summarised in Display 3. The 3 clusters were compared for a number of demographic variables. There were no statistically significant differences for age group and ethnicity, but clear differences for gender, marital status, past labour force status and full employment status.

It appeared that Cluster 3, characterised by unemployment, consisted of relatively many separated persons and relatively few married persons. This group also contained relatively many males. Cluster 2 consisted of relatively many part-timers, ie unemployed persons working later relatively often part-time, or looking for part-time jobs. There were also relatively many women in this cluster. Cluster 1 could be characterised by persons with a short unemployment history during the 8 quarters, while the reverse was true for Cluster 3.

Display 3. Employed, unemployed and persons not in the labour force: Cluster analysis resulting in 3 clusters, using the data of 8 amalgamated rotation groups for 627 persons who were unemployed in their first surveyed quarter. For each quarter the most occurring labour force status is indicated, if at least 60 % of the persons in the cluster had that status.

Cluster Number	Cluster Size	Most occurring labour force status, per quarter							
		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
1	224	U	E	E	E	E	E	E	E
2	213	U	N	N	N	N	N	N	-
3	190	U	U	U	U	U	-	-	-
		Actual percentages of the statuses mentioned above.							
1	224	100	62	77	85	84	89	80	79
2	213	100	63	71	80	77	69	65	-
3	190	100	80	74	73	64	-	-	-

Legend: E= employed, U=unemployed, N= Not in the labour force. Only indicated if at least 60% of the persons in the cluster and the specific quarter had the indicated status.(All persons were unemployed in Q1 by definition). Q=Quarter.

The main restriction with interpreting the results of these studies was that we had the LFS as a point in time observation and missed start and end points of spells of LFS. In this respect, the LSIEFD will give us more information.

2. Analyses with spell data of the LSIEFD (formerly LSID).

The survey will present an abundance of data for analyses. The focus will have to be on user requirements. Once priorities of requirements have been sorted out, the methods can be tested with the data from the two waves of the pilot study. Of course this might lead to other types of analyses while analysing the results.

Once we have collected the data of Wave 1 analyses could be carried out cross-sectional as well as with spells. Wave 2 will give the additional possibilities of estimating transition probabilities while after that more sophisticated modelling could be carried out, such as a study of income dynamics.

One of the features of the LSID data, not available in data of other longitudinal surveys of Statistics New Zealand (except the future data of the LISNZ), are the spell data, ie spells in time, where the start and finish is known, such as the start and finish date of certain labour market activity, income spells, family formations, etc. Hence we decided to look at the aspects of analysing spell data. I chose spells of 'not working and looking for work', partly to test the feasibility of the data sets produced. I found the data very easy to work with.

A suitable analysis method of spell data is found in statistical survival theory. Survival analysis is a set of statistical techniques, which measure length of time to an event. In our case we considered the event to be a change of labour market activity, but it can be used for other events such as change in income and change in economic status. When considering 'looking for work' spells the relationship between 'looking for work' duration and the probability of exit from 'looking for work' can be studied. Other variables can be involved simultaneously, including number and lengths of previous spells, Labour Market Activity (LMA) at the end of the 'looking for work' spell, variables at various times (eg household compositions at different times) and attributes such as ethnicity, age, etc. The Department has the SAS system as main computer package. This system has various programs based on survival theory, specifically the procedures Lifetest, Lifereg and Phreg. We have tested these products using the pilot test data. The results as such are not of interest due to the small and non-random data set. But I would like to mention some aspects of the possibilities and limitations.

We consider a collection of spells of say 'looking for work'. Although they start at different times, we can consider them as having started at the same point in time by shifting the starting point over the time axis, ie each spell starts at time $T=0$ (neglecting seasonal effects). We are now interested at the chance that a spell finishes at time $T=t$, which is equivalent with considering spells of lengths t.

With survival theory various functions are calculated. The two of most direct use are the:
Survival function, ie $S(t) = Pr(T>t)$.
Hazard function $h(t) = \lim[Pr\{t<T < t+dt \mid T>t\}/dt]$ for $dt \rightarrow 0$.

$S(t)$ is a probability function, $h(t)$ is not but can be seen as a conditional density function, or the number of events per interval of time.
An example of the survival function for the 'looking for work' spells is given in the graph below. It was produced with the SAS procedure Lifetest, using the Kaplan-Meier estimation method.

Display 4. Survival density function with lower and upper confidence limits (ie for each estimate, not simultaneous).

extent of this phenomenon in the 97 'looking for work' spells, with only 64 persons contributing to the 97 spells:

Display 5. Number of persons with number of 'looking for work' spells.

Spells per person	Persons	Spells
1	42	42
2	16	32
3	5	15
8	1	8
Total	64	97

The 64 persons came from 55 families (9 families with two persons looking for work at least once).

The person with 8 'looking for work' spells was an elderly male with clear spells of working between these eight spells.

To take these dependencies into account we cannot apply the SAS procedures discussed above. We suggest that the survival functions have to be formulated explicitly and that special programs have to be used, for example the procedure MIXED of SAS or hierarchical model (also called mixed model) packages such as MLwiN and HLM. Alternatively we could restrict ourselves to maximal one spell per family, randomly chosen in case there are more than one.

Extra complications are formed by the complex sample design (stratified) and the weighting factors. Computer packages for complex survey analyses might help here.
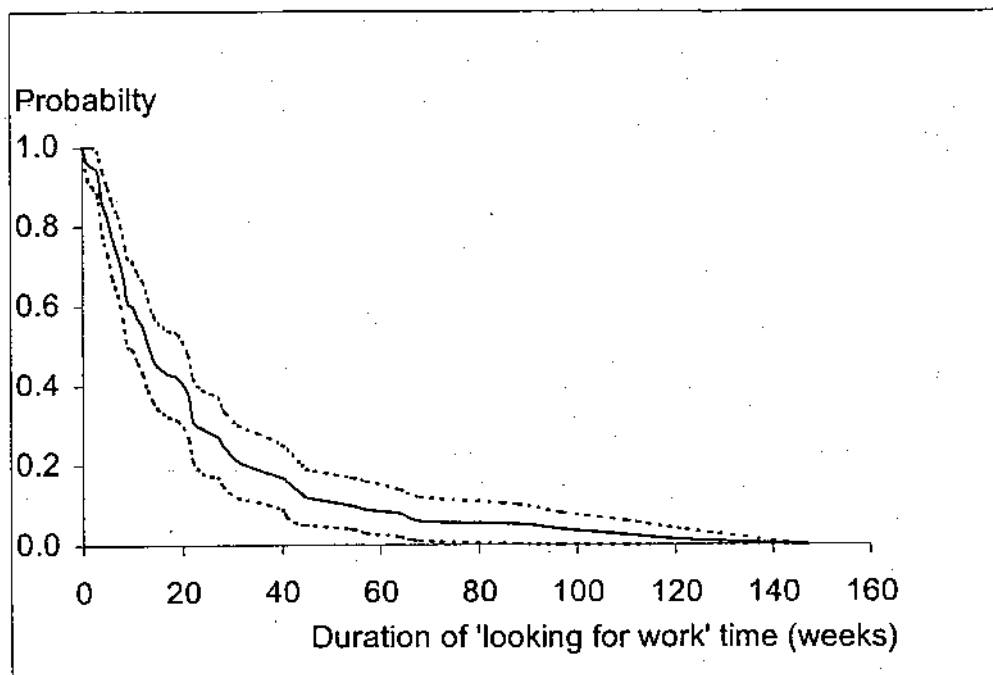
Also the previous number of 'looking for work' spells and the various length of them should be considered.

We intend to carry out further study of these complications and possible solutions. Here we merely warn future users of the complexity of the analyses of this type of data (via our Data Laboratory facility). We are open for suggestions for applications for our own publications.

4. Careful interpretations of tables.

Of course the same problems occur with cross-tabulations. An extra complication here is formed by the censored data. In Display 6 they have been added to the main diagonal (eg from 'Working' to 'Working').

I would also like to show a possibility of presenting transition probabilities for sub groups of the population in a pseudo-two dimensional table, which I have not seen elsewhere. Consider transitions from one LMA spell to another. The following table presents changes (in percentages), when going from one LMA level to another with for each cell the percentages per age group on the diagonal, from top left to bottom right (respectively 15-

The survival function becomes really interesting when those of various
groups of persons are compared and when predictors are considered to obtain more
information about for example What factors cause people to remain in a particular state or
to move to another? Is retraining significant in moving people from the unemployment
benefit to the work force? What is the effect of aggregation of data for individuals over
time (eg the summation of education expenses for a child during their high school or
university years).

Most of these issues can be handled with all three SAS procedures mentioned, but each
considers different types of estimation and functions:
Lifetest: parameter free estimation using the Kaplan-Meier method or the life-table method,
Lifereg: parametric regression models with censored survival data using the method of
maximum likelihood.
Phreg: semiparametric regression, ie the Cox regression models.

Phreg is the most popular method, although the other procedures are used as well.

3. Complications requiring more detailed models.

The data set of LMA spell data from the two waves of the pilot survey consists of 881
records. These came from 486 persons in 277 families. The 881 spells had 97 for 'looking
for work'. As indicated above, these 97 spells were not from 97 different persons and
hence there is dependency among them. For example if a person has three spells, there
are three spells with exactly the same explanatory variables. The following table shows the

24 , 25-44 and 45-64 yrs in this case). A spell during the last interview is assumed to continue (censored data).

Display 6. Transition probabilities (%) from one Labour Market Activity another by age group. Each cell shows the probabilities for the three age groups 15-24, 25-44 and 45-64 yrs.

From	To			Total	
	Working	Not working	NLM	(%)	(No)
Working	52 76 71	21 8 10	27 16 19	100 100 100	86 215 137
Not Work	42 70 83	27 22 13	31 8 4	100 100 100	33 36 24
NLM	44 58 41	12 16 8	44 26 51	100 100 100	80 69 61

It can be seen for example that in the youngest age group 42% of the 'Not working' spells changed into working, while this was higher for the older age groups (resp. 70 and 83 %). The data are based on only 741 spells and are not representative for New Zealand. Hence no inferences from this table should be made.

Similar tables could be produced for changes in income spells, stratified for another variable, such as age, ethnicity or duration of the previous status.