

**The association of childhood socioeconomic position  
and adult mental health: is it mediated by adult  
socioeconomic position?**

**A New Zealand population-based investigation**

**Sarah Mckenzie**

**A dissertation submitted for the degree of  
Master of Public Health  
University of Otago, Dunedin  
New Zealand**

**February 2009**

# Abstract

## OBJECTIVES

1. To measure the crude association of childhood socioeconomic position and adult mental health.
2. To measure the association of childhood socioeconomic position and adult mental health after adjusting for common confounders e.g. age, sex and ethnicity.
3. To assess how much of the above association is mediated by adult socioeconomic position.

## METHODS

Data was used from Wave 3 of the SoFIE-Health study (2004-2005) which is an addition to the 8-year longitudinal Survey of Family, Income and Employment (SoFIE) run by Statistics New Zealand. The analysis sample included 14,470 participants aged 15 years and over at Wave 3. A measure of childhood socioeconomic position (SEP) was created by mapping the highest parental occupational code of both parents to the New Zealand Socioeconomic Index to create a childhood socioeconomic class for each participant. Adult mental health status in the four weeks prior to interview was measured using the Kessler 10 scale of non-specific psychological distress.

A measure of the respondents own adult SEP was created from five socioeconomic indicators which included NZDeprivation Index, educational qualifications, equivalised household income, labour market activity and wealth. The association between childhood SEP and psychological distress in adulthood was determined using Logistic regression modeling. The association was adjusted for the confounders age, sex and ethnicity followed by all five hypothesised adult mediators.

## RESULTS

The crude odds of reporting moderate to high psychological distress were 16% (OR 1.16 95%CI 1.05-1.28) higher among participants from a low childhood SEP compared to those from a high childhood SEP.

After controlling for the confounders of age, sex and ethnicity, the odds of reporting moderate to high psychological distress increased by 38% and remained significant, with participants from a low childhood SEP reporting 1.22 (95%CI 1.10-1.35) greater odds of psychological distress than participants from a high childhood SEP.

Once adjusted for adult mediating variables (NZDeprivation, educational qualifications, household income, wealth and labour market activity) there was an overall 64% reduction in the excess odds ratio resulting in a statistically non significant odds of 1.08 (95%CI 0.97-1.20).

## CONCLUSION

This study found that there is an association between childhood SEP and adult mental health and that a large part of the association is mediated by adult SEP. Almost two-thirds of the association (64%) was “explained” by adult SEP. These findings are consistent with the evidence that socioeconomic circumstances in adulthood are important determinants of inequalities in adult mental health and consistent with a life course “pathways” interpretation. These pathways are complex and adult SEP is only one possible mediator of the association between childhood circumstances and adult mental health.

# Acknowledgements

Thank you to Kristie Carter and Tony Blakely for supervising this dissertation. For sharing their knowledge and providing guidance throughout its development.

Thanks to Kristie for her support and skills during our long days in the data lab.

Thanks to Tony for providing me with the opportunity to be an active member of the Health Inequalities Research Group whilst completing this Masters.

Thanks to Sunny Collings for her feedback and thought provoking discussions around the mental health aspects of the literature.

Thanks to Vivienne Ivory, Caroline Shaw and Matt Soeberg my friends, fellow students and colleagues within the Health Inequalities Research Programme for allowing me to discuss my ideas and for providing support, coffee and encouragement.

Thank you to the Health Research Council of New Zealand, the primary funders of the SoFIE-Health study as part of the Health Inequalities Research Programme.

Thank you to Statistics New Zealand for providing access to the SoFIE data. Data was accessed in a secure environment in accordance with the confidentiality provisions of the Statistics Act, 1975. The results presented in this study and any errors contained therein are those of the author, not Statistics New Zealand. Finally, thank you to the SoFIE participants themselves.

# Table of Contents

<b>ABSTRACT</b> .....	<b>I</b>
<b>ACKNOWLEDGEMENTS</b> .....	<b>III</b>
<b>TABLE OF CONTENTS</b> .....	<b>IV</b>
<b>LIST OF FIGURES</b> .....	<b>VI</b>
<b>LIST OF TABLES</b> .....	<b>VII</b>
<b>ABBREVIATIONS</b> .....	<b>VIII</b>
<b>CHAPTER 1: INTRODUCTION</b> .....	<b>1</b>
<b>CHAPTER 2: LITERATURE REVIEW</b> .....	<b>6</b>
1    Part 1: Background .....	6
1.1    Life course epidemiology .....	6
1.2    Causal pathways.....	8
1.3    Exposure: Childhood socioeconomic position .....	13
1.4    Outcome: Mental health .....	18
1.5    The role of confounding and mediation.....	23
2    Part 2: Literature review .....	27
2.1    Methods .....	27
2.2    Results .....	28
2.3    Conclusion .....	48
<b>CHAPTER 3: DATA AND METHODS</b> .....	<b>50</b>
1    Data source: SoFIE.....	50
2    Study sample .....	51
3    Measures .....	52
3.1    Exposure: Childhood socioeconomic position .....	52
3.2    Covariates .....	55
3.3    Adult socioeconomic position .....	57
3.4    Outcome: Psychological distress .....	59
4    Data analysis .....	61
<b>CHAPTER 4: RESULTS</b> .....	<b>62</b>
1    Descriptive results .....	62
1.1    Attrition and missing data .....	62
1.2    Demographics .....	69
2    Logistic Regression.....	78
3    Interactions .....	80
3.1    Sex.....	80
3.2    Birth cohort.....	81

<b>CHAPTER 5: DISCUSSION .....</b>	<b>83</b>
1 Summary of results .....	83
2 Study Limitations .....	84
2.1 Misclassification of childhood SEP .....	84
2.2 Selection bias .....	89
2.3 Confounding and mediation.....	90
2.4 Generalisability .....	91
2.5 Study design.....	92
3 Study strengths .....	93
3.1 Measure of adult SEP .....	93
3.2 Reliability of the Kessler-10.....	93
4 Interpreting the study results .....	95
4.1 What is the crude association of childhood SEP and adult mental health status?.....	96
4.2 “What is the association of childhood SEP and adult mental health status after adjusting for common confounders e.g. age, sex and ethnicity?” .....	97
4.3 How much of the above association is mediated by adult SEP? .....	98
4.4 Interactions of sex and birth cohort .....	99
 <b>CHAPTER 6: CONCLUSIONS .....</b>	 <b>100</b>
 <b>REFERENCES.....</b>	 <b>103</b>
 <b>APPENDIX A.....</b>	 <b>109</b>
<b>APPENDIX B .....</b>	<b>110</b>
<b>APPENDIX C.....</b>	<b>111</b>

# List of Figures

Figure 1. Directed acyclic graph of the association of childhood SEP on adult mental health .....	3
Figure 2. Pathways between the childhood environment and adult mental health.....	9
Figure 3. Examples of indicators measuring socioeconomic position across the life course.....	15
Figure 4. Age, sex and ethnicity confounding triangle .....	24
Figure 5. The mediating pathways of adult socioeconomic position and childhood health Adapted from Graham and Power, 2004 .....	25
Figure 6. Flow chart of respondents over Waves 1- 3 and from Waves 3 to 3a.....	64
Figure 7. Cumulative barcharts of childhood SEP by adult NZDep, education, household income, wealth and labour market activity .....	74
Figure 8. Direct and indirect pathways .....	95

# List of Tables

Table 1. Summary of the research questions answered by the studies included in the literature review.....	28
Table 2. Characteristics of studies included in literature review.....	30
Table 3. The nine major groups of the NZSCO99 .....	53
Table 4. Distribution of childhood SEP groups over NZSEI-96 scores.....	54
Table 5. Distribution of birth cohort groups over time period .....	56
Table 6. Response rates from Wave 1 to Wave 3; and missing data from Wave 3 to restricted Waves 3a and 3b (by Wave 1 characteristics) .....	67
Table 7. Demographic and socioeconomic characteristics at Wave 3 of study sample by childhood SEP.....	71
Table 8. Demographics & socioeconomic characteristics by K10 .....	76
Table 9. Results of multivariable analysis .....	79
Table 10. Models 2 and 3 stratified by sex and birth cohort.....	82



# Abbreviations

CEDS	Center for Epidemiological Studies Depression Scale
CIS-R	Revised Clinical Interview Schedule
CI	Confidence intervals
DMHDS	Dunedin Multidisciplinary Health and Development Study
DSM	Diagnostic Standard Manual
DIS	Diagnostic Interview Schedule
GHQ	General Health questionnaire
HR	Hazard ratio
NZDep	New Zealand Deprivation Index
NZSCO	New Zealand Standard Classification of Occupations
NZSEI	New Zealand Socioeconomic Index
OR	Odds ratio
OSM	Original sample member
RR	Relative risk
SD	Standard deviation
SEP	Socioeconomic position
SNZ	Statistics New Zealand

# Chapter 1: Introduction

Mental illness is one of the most important causes of disability in the developed world; it accounts for a third of the years lost due to disability (YLD), with depression set to become the leading cause of disability in the world by 2030 (World Health Organisation 2008). In New Zealand, just under half of the population is predicted to experience a mental disorder at some point in their lifetime, with the prevalence being higher for people living in disadvantaged circumstances (lower income or education or living in more deprived areas) (Oakley Browne, Wells et al. 2006).

Socioeconomic disparities in mental health have been shown in a number of populations (Dohrenwend, Levav et al. 1992; Weich and Lewis 1998; Weich and Lewis 1998; Miech, Caspi et al. 1999; Fryers, Melzer et al. 2003; Skapinakis, Weich et al. 2006) and for a range of mental disorders, including schizophrenia, anti-social personality disorder and affective disorders (Power, Stansfeld et al. 2002). However, for the more common mental disorders and distress the findings are less consistent. Most studies have, however, shown higher rates of specific disorders, such as depression and anxiety, in lower socioeconomic status groups (Stansfeld, Head et al. 1998; Miech, Caspi et al. 1999; Lorant, Deliege et al. 2003; Stansfeld, Head et al. 2003; Lorant, Croux et al. 2007).

Whilst the literature on the existence of adult socioeconomic gradients in mental health is extensive (Dohrenwend, Levav et al. 1992; Fryers, Melzer et al. 2003; Muntaner, Eaton et al. 2004; Skapinakis, Weich et al. 2006), there has been relatively little research on the origins of these differential risks for mental health problems and their associations with both childhood and adult socioeconomic position (SEP).

Previous investigations of the effects of childhood SEP on health have tended to focus exclusively on physical health especially certain types of disease such as

cardiovascular disease. The risk of coronary heart disease and stroke has been found to be higher in those with less favourable socioeconomic circumstances in childhood (Davey Smith and Lynch 2004). It is unclear however whether these relationships also hold for mental health.

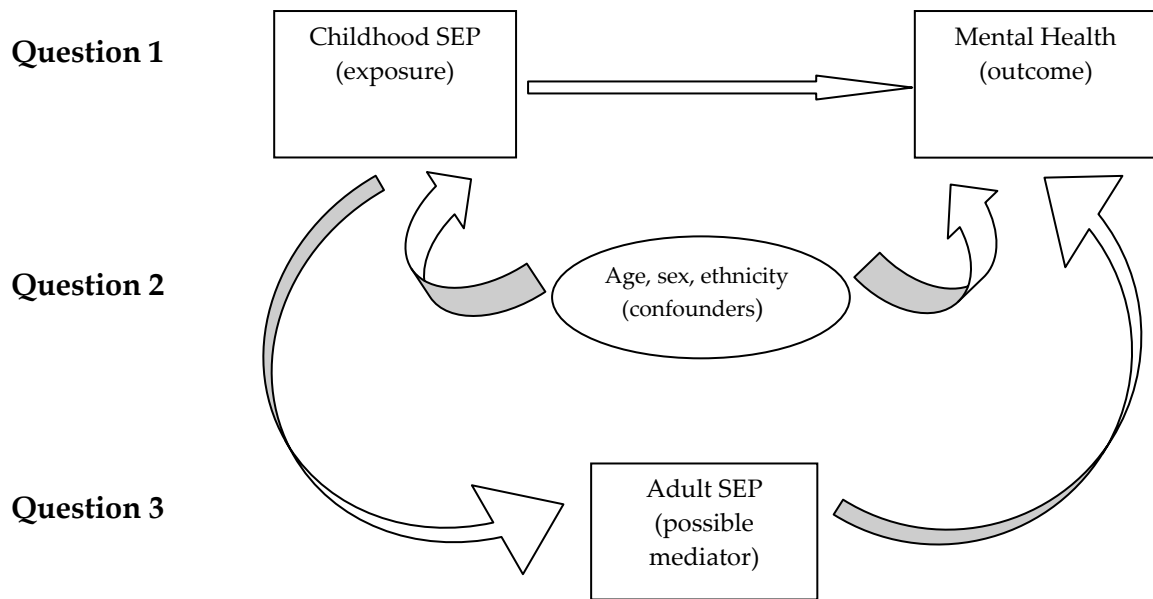
The purpose of this dissertation was to ascertain whether there is an association between childhood SEP and adult mental health status; and if so how much of the association is mediated by adult SEP. The dissertation consists of a literature review which reviews the findings from existing studies that have attempted to explore whether socioeconomic exposures in childhood influence mental health in adult life. It then presents the findings of my own analyses using the SoFIE-Health Study to explore the association between childhood SEP and psychological distress in adults using the Kessler 10.

If an association between childhood SEP and adult mental health status does exist then it is important to test whether adult SEP can explain, or even counteract, the effects of childhood socioeconomic status. Adult SEP is the most frequently hypothesised mediating variable between childhood SEP and adult health because not only is it heavily influenced by childhood SEP but is itself also predictive of later health outcomes.

The overall aim of this study therefore was to investigate whether the association between childhood SEP and adult mental health status is mediated by adult SEP. In order to achieve this aim the following three research questions were asked:

1. What is the crude association of childhood SEP and adult mental health?
2. What is the association of childhood SEP and adult mental health after adjusting for common confounders e.g. age, sex and ethnicity?
3. How much of the above association is mediated by adult SEP?

These three questions are portrayed in the directed acyclic graph below (Figure 1).



**Figure 1. Directed acyclic graph of the association of childhood SEP on adult mental health**

In terms of research, the three research questions asked in this dissertation address a gap in the existing literature as studies which have simultaneously analysed SEP in both adulthood and childhood in relation to adult mental health are scarce. In terms of policy these questions are important in elucidating whether interventions aimed at reducing the negative influence of socioeconomic adversity on adult health should also target their influences earlier in the life course.

Data for the analysis in this dissertation comes from the SoFIE-Health study, which is part of the 8-year longitudinal Survey of Family, Income and Employment (SoFIE) run by Statistics New Zealand (SNZ). The SoFIE-Health study dataset includes participants' parental occupation (at age 10) from which socioeconomic class can be derived and used as an indicator of childhood socioeconomic exposure.

The dataset also includes a number of measures of participants' own adult SEP including household income, wealth, education, labour market activity, and New Zealand Deprivation Index. The SoFIE-Health study also contained a questionnaire which included the Kessler Scale for non-specific psychological distress which I was able to use as a measure of adult mental health status. From the original 22,000 randomly selected adults in SoFIE, over 18,000 answered the SoFIE-Health questionnaire in Wave 3 (2004-2005).

In the following chapters of this dissertation I will present a review of the current international published literature which attempts to answer my three research questions. This is followed by a quantitative data analysis using data from the third wave of SoFIE-Health. The dissertation itself is divided into five main chapters as follows:

#### *Background and Literature Review*

This chapter is presented in two parts. The first part discusses the background and concepts relevant to my research questions and the second part reviews the international literature which specifically addresses my research questions either partially or in full.

#### *Methods*

This chapter describes the SoFIE data and the epidemiological and biostatistical methods used in my own analysis.

#### *Results*

The results of my analyses are presented in three sections. The first provides a summary of the descriptive statistics including the attrition, missing data and demographics of my study population. The second section presents the results of my multivariable analysis and the third section covers the results of my investigation into the effects of sex and birth cohort on my results.

### *Discussion*

This chapter provides a brief summary of the results and discusses them in relation to the internal validity of my study and its strengths and limitations. It then discusses the results in the context of the existing literature.

### *Conclusions*

This final chapter provides a summary of my conclusions and the possible further research and policy implications of my study.

# Chapter 2: Literature Review

## 1 Part 1: Background

The first part of this chapter introduces the concepts and background relevant to the study of childhood SEP and mental health status in adulthood. It includes a brief discussion of the life course framework being used to support my research questions and suggests plausible causal pathways between early childhood circumstances and adult mental health. It then discusses the issues around the measurement of childhood SEP; the various definitions and methods for measuring mental health; and the methodological issues of confounding and mediation. The second part of the chapter reviews the international literature and studies which specifically address my three research questions.

### 1.1 Life course epidemiology

The childhood socioeconomic environment is only part of the early life context and only one stage of the life course. In order to be able to ask why we might theoretically expect an association of childhood SEP with adult mental health status we need to step back and look at the bigger picture.

A life course approach to epidemiology challenges the prevailing aetiological model for adult disease which emphasises adult risk factors and supports “the study of long-term biological, behavioral, and psychosocial processes that link adult health and disease risk to physical or social exposures acting during gestation, childhood, adolescence, earlier in adult life, or across generations” (Kuh and Ben-Shlomo 2004). It is more than the collection of longitudinal data or the use of a particular study design or analytical model. It is a theoretical model where “the temporal ordering of exposure variables, and their inter-relationships with respect to a particular health outcome, are specified and then tested” (Kuh and Ben-Shlomo 2004).

Evidence for using a life course approach and its emphasis on early life factors is growing and many recent studies have shown that both childhood and later-life socioeconomic conditions can affect a variety of health outcomes in adulthood such as coronary heart disease (Singh-Manoux, Ferrie et al. 2004), self-rated health (Laaksonen, Rahkonen et al. 2005; Moody-Ayers, Lindquist et al. 2007), biological risk factors such as blood pressure, body mass index and cholesterol (Power, Atherton et al. 2007), cause-specific mortality (Galobardes, Lynch et al. 2008) and all-cause mortality (Power, Hypponen et al. 2005). Birth cohort studies in New Zealand have also shown associations between children's experience of socioeconomic disadvantage and dental health, physical functioning and health behaviors such as smoking (Poulton, Caspi et al. 2002; Melchior, Moffitt et al. 2007).

Within the life course framework three conceptual models or theories have been identified to explain the associations between health and socioeconomic circumstances over the life course. These models are: the 'critical period' or 'latent effects' model, the 'accumulation model, and the 'pathway' or 'chains of risk' model (Kuh and Ben-Shlomo 2004).

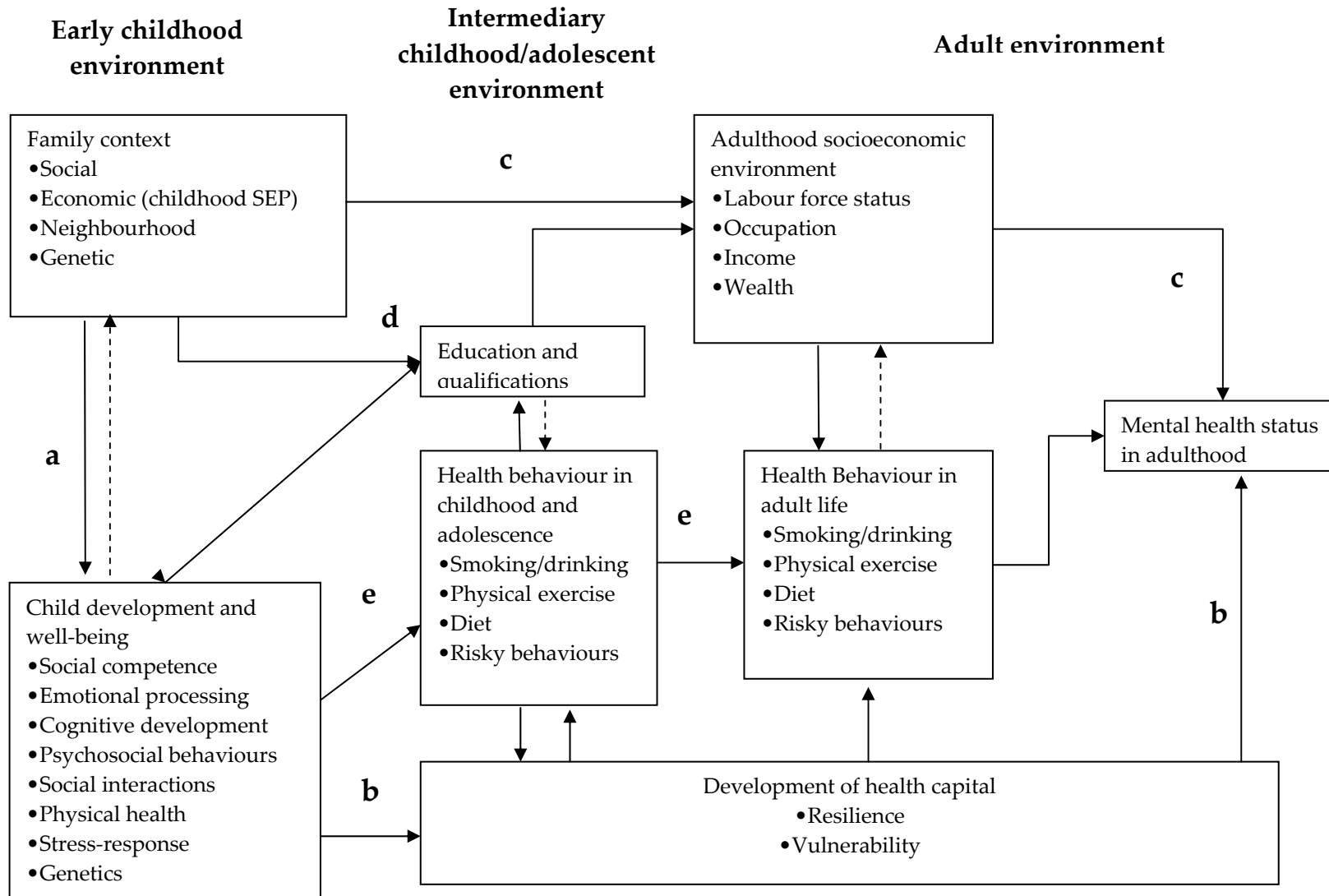
The 'critical period model' or 'latency model' views specific biological or developmental factors at sensitive periods of development, usually early life, to have a lifelong impact on health independently of adult circumstances. The 'accumulation model' assumes that risks to health and the effects of disadvantage or advantage gradually accumulate over the life course without ordering of events being too important. The 'pathway' or 'chains of risk model' views the early environment to be important, but only because it shapes and influences the social and economic trajectories of individuals. These pathways can involve social, biological and psychological chains of risk and can help explain the continuities between early experiences and adult health. These life course models or theories, however, are not mutually exclusive and may overlap (Kuh, Ben-Shlomo et al. 2003).



In this dissertation I am using the 'pathways' model to support my research questions. The pathways perspective views the early or distal socioeconomic environment as being important for adult physical and mental health as it is mediated through proximal socioeconomic circumstances, for example contemporaneous adult SEP.

## 1.2 Causal pathways

Mental health is embedded within social and socioeconomic relationships and so also are the risk and protective factors for mental health. Risk factors for poor mental health are myriad and include a family history of psychiatric disorder, violence, childhood neglect, family breakdown, unemployment and financial strain. Charting connections between this diverse range of risk factors and the processes whereby early negative experiences exert their impact in childhood and how effects are carried forward into adult life are complex and beyond the scope of this dissertation. I will however discuss here possible causal pathways between childhood SEP and poor mental health in adulthood based on the pathways model in Figure 2. The model illustrates how the family context (social, economic, neighbourhood and biological) of early life sets the trajectory into adulthood along **developmental**, **socioeconomic** and **behavioural pathways** which take account of the inter-relationships between social and biological risks throughout the life course.



**Figure 2. Pathways between the childhood environment and adult mental health**

Adapted from Kuh and Ben-Shlomo (2004) and Repetti et al (2002)

So how might childhood SEP or the family socioeconomic environment impact on mental health status in later adulthood?

Firstly, the socioeconomic environment in childhood can affect your exposure during gestation, infancy, childhood and adolescent to adverse causal factors which are part of long-term biological processes. These factors are generally associated with various aspects of childhood development and wellbeing such as social competence, emotion processing; cognitive development; psychosocial behaviours; and the development of biological stress-responses (Bradley and Corwyn 2002; Repetti, Taylor et al. 2002). Children from low socioeconomic families are more likely to begin life in poor health, experience more biological and psychosocial risk factors; more stress; more fetal and birth complications and have elevated rates of emotional and behavioural problems than those born into higher socioeconomic groups (Power and Matthews 1997; Poulton, Caspi et al. 2002; Graham and Power 2004). The start of this developmental pathway is labeled 'a' in Figure 2.

Exposure to adverse causal factors early in life in turn influences future engagement in education or the development of "health capital", i.e. the accumulation of biological resources, inherited or acquired during earlier stages of life which in turn determine current physical and mental health and future health potential. This pathway is labeled 'b' in Figure 2.

These adverse causal factors in early life include exposure to family stressors such as parental mental illness, parental separation and divorce, lack of parental care or maltreatment or growing up in families with serious financial worries. Research has shown that children who have a parent with a parental illness are more likely to develop a mental illness themselves (Downey and Coyne 1990; Beardslee, Keller et al. 1993; Goodman and Gotlib 1999).

Children from single-parent households are at greater risk of depression in adulthood than those raised in intact families (Amato 1991); and research has consistently shown that single parents have elevated levels of psychological distress and are disproportionately represented among the poorest groups in society (Hope, Power et al. 1999).

Parental separation and divorce during childhood or adolescence has negative effects that persist into adulthood resulting in elevated risks of mental health problems (Amato 1991; Aseltine 1996; Kessler, Davis et al. 1997; Cherlin, Chase-Lansdale et al. 1998; Sadowski, Ugarte et al. 1999). These adults are also more likely to face challenges in their own relationships which have important implications for later mental health status (Maughan and McCarthy 1997). Parental divorce and separation has been shown to be associated with reduced educational attainment in childhood (Wadsworth 1999). This can impact on later occupation and income in adulthood which in turn can influence adult mental health status.

A lack of adequate parental care has been associated with elevated rates of both acute and chronic psychosocial disorders in adult life, especially depression (Maughan and McCarthy 1997; Sadowski, Ugarte et al. 1999). Adults who have experienced multiple family disadvantage such as emotional neglect, negative parenting, abuse, a lack of cohesiveness, warmth and support within the family and a lack of parental availability have been shown to be at risk from a broad array of mental health problems including depression, suicidal behaviour, anxiety disorders, aggressive and delinquent behaviour (Bifulco, Brown et al. 1987; Collings and Ellis 1997; Sadowski, Ugarte et al. 1999; Repetti, Taylor et al. 2002; Stansfeld, Head et al. 2008). Child sexual abuse and physical maltreatment has been related to a wide range of negative psychopathological and psychosocial outcomes in adulthood such as depressive and anxiety disorders, suicide and substance abuse (Maughan and McCarthy 1997).

Secondly, childhood SEP may affect adult mental health through socioeconomic pathways between childhood and adulthood. This pathway is labeled 'c' in Figure 2. There is a continuity of family socioeconomic circumstances or social class (including grandparent social class) during childhood and adolescence through to adulthood. The socioeconomic circumstances of the family are responsible for influencing children's access to social and economic resources, and relate strongly to the child's opportunities for education and learning experiences (labeled pathway 'd' in Figure 2). Education in turn is an important determinant of subsequent occupational career, and thus opportunities for ensuring income and favourable living conditions in adulthood i.e. adult SEP. These adult socioeconomic circumstances can in turn affect mental health status by determining exposure to causal factors later in life such as unemployment, deprivation, or social networks and support.

Research consistently shows an association between various measures of socioeconomic status in adulthood and increased risks of mental health problems such as depression, anxiety or psychological distress (Lorant, Deliege et al. 2003). These measures include employment grade or occupational class (Power and Manor 1992; Stansfeld, Head et al. 1998; Stansfeld, Head et al. 2003) psychosocial work characteristics such as skill discretion and decision authority (Weich and Lewis 1998), poverty or a poor material standard of living, social supports, unemployment (Weich and Lewis 1998; Weich and Lewis 1998); wealth (Carter, Blakely et al. 2009), current economic difficulties (Laaksonen, Martikainen et al. 2007).

Thirdly, the childhood socioeconomic environment can affect adult mental health through behavioural pathways (pathway labeled 'e' in Figure 2). Childhood is not only a period of rapid physical, cognitive and psychosocial development but also a formative period for the development of risky health behaviors such as substance abuse, smoking, drinking and dietary habits, which play an important role in adult health and may have

enduring and long-term effects on physical and mental health in adulthood.

Educational attainment is important within this pathway because of its association with such health-related habits as smoking, exercise, and dietary choice (Wadsworth 1999).

In this dissertation I am focusing on the socioeconomic pathway (pathway c) and the role of adult SEP as a mediator in the pathway between early SEP and psychological distress in adulthood.

### **1.3 Exposure: Childhood socioeconomic position**

As illustrated in Figure 2 the socioeconomic position of a child can be thought of as the family socioeconomic circumstances that the child is born into and brought up in, such as relative income, parental occupation, or labour force status. Numerous ways exist to describe and measure socioeconomic conditions. Terms such as social class, social stratification, social or socioeconomic status are used, often interchangeably, despite their different theoretical bases and interpretations (Galobardes, Lynch et al. 2007).

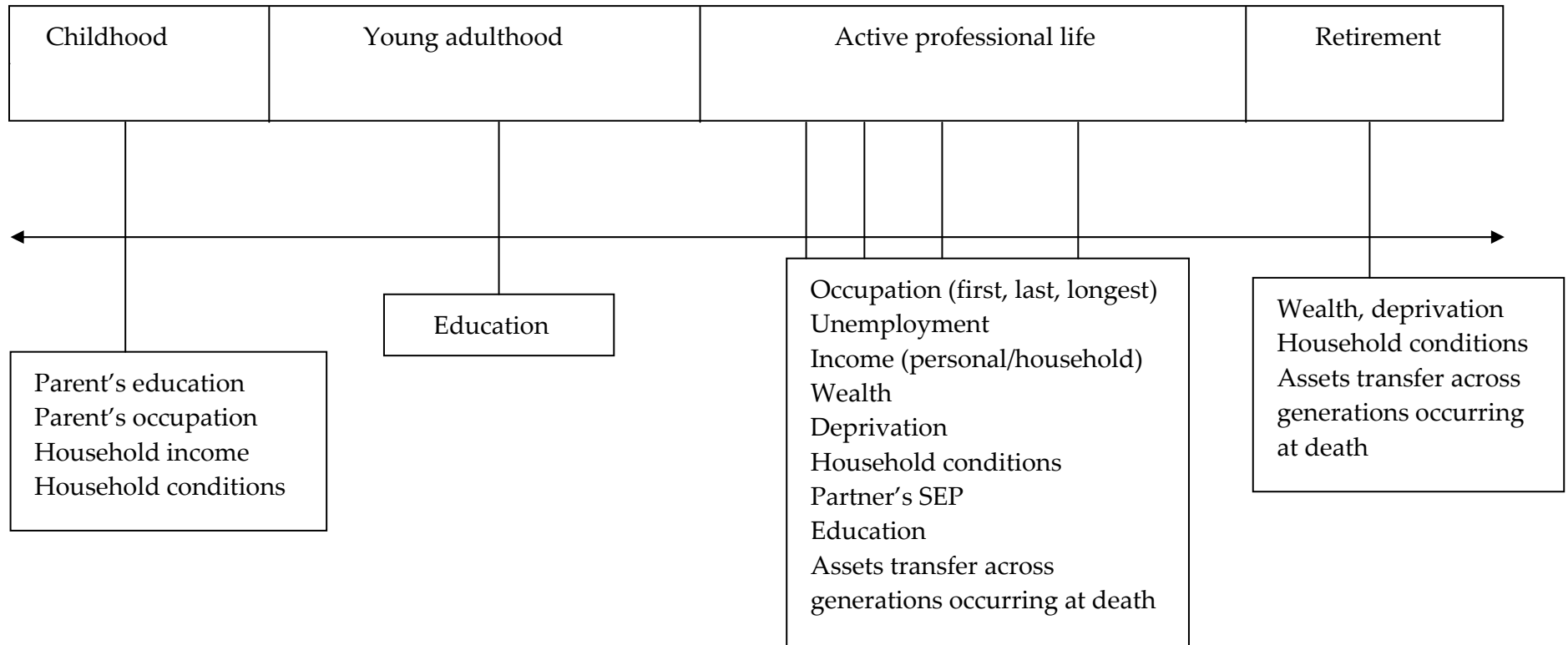
In this dissertation I have chosen to use the term 'socioeconomic position' (SEP) as it is frequently used in the life course literature when referring to the socioeconomic status of a child. It refers to "the socially derived economic factors that influence what positions individuals or groups hold within the multiple-stratified structure of a society" (Krieger, Williams et al. 1997; Galobardes, Lynch et al. 2007).

In life course research, a child's SEP is usually classified by their parents SEP. A number of early-life or childhood SEP measures are used in the literature including parental education, income and occupation, serious family financial hardship, childhood disadvantage, family structure and even residential mobility. There is no single best indicator of SEP suitable for all study aims and applicable at all time points in all

settings; and most SEP indicators are, to different degrees, correlated with each other because “they all measure aspects of the underlying socioeconomic stratification” (Galobardes, Lynch et al. 2007).

Figure 3 on the next page illustrates how different socioeconomic measures are linked across different phases of the life course. These measures are also associated with each other and linked across generations. Socioeconomic inequalities in early childhood circumstances can be generated by continuity of social environment across generations i.e. parents and grandparents (Batty, Morton et al. 2004).

### Life course socioeconomic trajectory



**Figure 3. Examples of indicators measuring socioeconomic position across the life course**

Adapted from Galobardes, Lynch and Davey Smith, 2007



The choice of socioeconomic indicator, whether collected prospectively or retrospectively, often reflects which data are available, rather than any explicit theorisation of the possible effects of different dimensions of socioeconomic disadvantage (Davey Smith, Hart et al. 1998). Studies in the UK tend to use occupational social class as the index of SEP, whereas in the US measures based on education are widely used. These two measures have different characteristics; for example, social class can change throughout adult life, while education is unlikely to alter after early adulthood (Davey Smith, Hart et al. 1998). The following section briefly discusses the advantages and disadvantages of using parental occupation and education as measures of childhood SEP.

### **1.3.1 Parental occupation**

Parental occupation, usually the father's, is the most widely used indicator of childhood SEP in studies looking at the association of childhood SEP and adult mental health. This is consistent with the bulk of existing work on childhood SEP and cause-specific mortality (Galobardes, Lynch et al. 2008).

The main advantage of using occupational measures is that they are in some sense transferable; measures from one individual can be used to characterise the SEP of others connected to them. For example, the occupation of the "head of the household" or "the highest status occupation in the household" can be used as an indicator of the SEP of dependents e.g. children or the household as a unit (Galobardes, Shaw et al. 2006).

There are several disadvantages to using occupational measures. Firstly, since women in industrialised societies have moved into the labour force in increasing numbers, their job stratification may not be well characterised with classification schemes more suited to male occupations. Also, occupation based measures cannot be readily used for groups outside the paid labour force such as homemakers who do not work outside of the home (mainly women), non-retired adults who are

unemployed, retired adults, students and people working in unpaid, volunteered, informal or illegal jobs (Krieger, Williams et al. 1997; Galobardes, Lynch et al. 2007).

Most of the studies discussed in the following literature review have assigned children a SEP based on the highest occupational category of both parents, whilst those from single-parent households have been assigned the occupational category of the parent with whom they were living. This is consistent with Hauser's argument that "rather than focusing on 'father's characteristics' or 'mother's characteristics' as if they were mutually exclusive, it is better to focus on the characteristics of one adult in the household, a head of household or principal earner whether they are male or female" (Hauser 1994).

A major problem that exists in the international comparative research on social class differentials and health is that different countries have different occupational classifications and different methods for grouping occupations into broader social classes. Studies in the UK mainly use occupational indicators of SEP. The 1958 British Birth Cohort Study used the British Registrar General's social class schema which groups occupation into six levels or classes, ranked from higher to lower prestige (Poulton, Caspi et al. 2002; Power, Atherton et al. 2007). The Whitehall II study used the 12 non-industrial Civil service employment grades (Singh-Manoux, Ferrie et al. 2004). Studies in the US have used census categories, which classifies occupations into occupational subgroups (Gilman, Kawachi et al. 2003). Studies from New Zealand have used the Elley-Irving Index, a six-point scale (1= unskilled labourer, 6= professional) based upon the educational level and income associated with that occupation in census data (Poulton, Caspi et al. 2002; Melchior, Moffitt et al. 2007). Other studies have not used a specific occupational classification scheme but have collapsed occupational categories into two broad groups e.g. skilled manual and unskilled manual, or white-collar and blue collar (Lynch, Kaplan et al. 1997; Harper, Lynch et al. 2002; Luo and Waite 2005).

### **1.3.2 Parental education**

The main advantage of using education is it is less likely to change after young adulthood than occupation or income and is therefore a relatively stable indicator of parental SEP. It is also applicable to those not in the paid labour force (Krieger, Williams et al. 1997). However, social norms and meanings of education do change over time, and the meaning of educational level varies for different birth cohorts or generations (Galobardes, Shaw et al. 2006).

Education is usually measured as either a continuous or categorical variable. When used as a continuous measure, such as the number of years of completed education, the assumption is that a greater amount of time spent in education confers health benefits. When used as a categorical variable the assumption is that each category represents a milestone in the educational process and that completion of specific achievement is important in determining SEP (Galobardes, Shaw et al. 2006). Where the education of both parents is collected, the higher is usually used. However the influence of both mother's and father's education on children's own educational attainment has been shown to be different for men and women, supporting the need to include the educational levels of both parents in descriptions of childhood SEP (Chittleborough, Baum et al. 2006).

## **1.4 Outcome: Mental health**

The term 'mental health' has long been considered to be more than the mere absence of mental illness. This is consistent with the World Health Organisation definition of health as:

*'a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity'* (World Health Organisation 1948)

and its definition of mental health:

*“Mental health is not just the absence of mental disorder. It is defined as a state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community”*(World Health Organisation 2007)

There is no widely accepted definition of poor mental health and in some settings the term includes mental illnesses as well. For the purposes of this dissertation it will be helpful to draw a distinction between poor mental health and mental disorder or illness.

Poor mental health includes psychological and emotional reactions or behaviours that are outside the usual range experienced by people in their daily lives. They can cause distress to the individual or others. Such problems are relatively common and are usually either transient or not so severe that they seriously impair the person's ability to carry out their usual daily activities (Disley 1997). In general, any mental health problem that becomes more severe and disabling can become a mental disorder.

A mental disorder or illness on the other hand can be described as a spectrum of behavioural, emotional psychological and biological dysfunctions or “ the existence of a clinically recognisable set of symptoms or behaviour” that involve significant distress and/or interference with personal functions that constitute a major departure from common responses to stresses or problems of daily life (World Health Organisation; Wakefield 1992).

The terms mental illness and mental disorder cover a broad range of clinically diagnosed conditions which are included in two main classifications. These are the *International Classification of Diseases* (World health Organisation 2004) and the *Diagnostic and Statistical Manual* of mental disorders (American Psychiatric

Association Task Force on DMS IV 2000). Both these classifications also make some attempt to classify mental health problems (in contrast to mental illnesses or disorders) but in a very limited manner and with rather loose criteria (Disley 1997).

#### **1.4.1 Mental Health in New Zealand**

With regards to mental disorders, the 2006 New Zealand Mental Health Survey found 39.5% of people aged 16 and over reported sufficient symptoms to meet the DSM-IV criteria for at least one mental disorder at some time in their lives before the interview, with 20.7% experiencing a disorder within the past 12 months and 11.6% in the past month. A mental disorder included any anxiety, mood, substance use or eating disorder. Of those people classified with a disorder in the past 12 months (20.7%), the prevalence of serious disorder (based on a composite measure of severity) was 4.7%. There is however no internationally accepted definition of 'serious', 'severe' or 'major' mental disorder and the terms are used interchangeably (Oakley Browne, Wells et al. 2006).

With regards to poor mental health in New Zealand. The 2006/07 New Zealand Health Survey reported that one in seven adults had a moderate probability of a current anxiety or depressive disorder and one in fifteen adults had a high or very high possibility of a current anxiety or depressive disorder as measured by the Kessler 10 scale (Ministry of Health 2008).

#### **1.4.2 Measurement of mental health**

There is considerable diversity in the instruments used to measure mental health problems and mental illness. They can be broadly divided into two groups: symptom *scales* or screening questionnaires that can be self-administered or by interview, and structured diagnostic *schedules* administered by health professionals. However, there is generally no 'gold standard' for identification of common mental health problems or mental illness (McLeod 2004).

The international literature, including the studies reviewed in the second part of this chapter, use different instruments or constructs to measure mental health outcomes. In general, those using the structured diagnostic schedules are aspiring to identify clinically significant mental illness or disorder such as a major depressive episode. On the other hand, those using the various symptom scales or screening instruments are trying to identify people in the population with 'mental health problems' such as psychological distress or depressive or anxiety symptoms, which may or may not exceed the threshold for clinical significance or disorder.

#### *1.4.2.1 Scales*

Scales or screening instruments are simpler than schedules and include questions about both the essential features and associated symptoms of a mental health problem or illness. Most scales establish duration by asking the subject to report about symptoms experienced over a given period such as a week or a month. Each question in a scale is asked of each subject and specific categories of response are spelled out in advance. This may simply be the presence/absence of a symptom, or it may be expanded to cover the frequency of its occurrence or the degree to which it is distressing. Responses are given numerical values that are added together to form a score. Each scale has a score range which is often described as having a threshold score or cutting-point that allows cases to be separated from non-cases. The scoring of symptoms represents a continuum, but the application of a cutting point means that the final product is often dichotomous (Murphy 2002).

Examples used in the literature include the General Health Questionnaire (GHQ), the Short Form Survey (SF-36), Centre for Epidemiological Studies Depression Scale (CED-S) and the Kessler 10 (K10).

The GHQ is a relatively simple self-administered screening instrument in which high GHQ scores indicated the likely presence of symptoms of psychological distress or psychiatric disorders such as depression or anxiety (McDowell 2006). The CED

scale is also a self-reported screening test used mostly to assess current levels of depressed mood in the general population (McDowell 2006). Both these scales are not diagnostic tools however they are good screening instruments for identifying symptoms of depression and are applicable across age and socio-demographic groups (McDowell 2006). The SF-36 includes multi-item scales to measure eight dimensions of health status including general mental health (psychological distress and wellbeing). Finally the K10 is a 10-question screening scale of psychological distress. This scale is used in the SoFIE study and will be discussed further in Chapter 3.

#### 1.4.2.2 *Schedules*

Diagnostic schedules are more comprehensive in psychiatric coverage than scales in that all of them deal with psychotic disorders as well as depression and anxiety disorders (Murphy 2002). Schedules were originally designed to be administered by clinicians' however most schedules have now been formatted for use by trained lay interviewers.

Examples of structured clinical interviews include the Diagnostic Interview Schedule (DIS) and the Revised Clinical Interview Schedule (CIS-R).

The DIS is a structured interview with discrete modules such as depression which requires the presence of at least five of the following symptoms concurrently for  $\geq 2$  weeks: depressed mood, loss of interest or pleasure, weight or appetite changes, sleep disturbance, psychomotor changes, fatigue, guilt, trouble concentrating or thinking, and suicidality. A case is then determined by whether the subjects' current or past symptomatology meets the specific psychiatric classifications in the DSM (McDowell 2006). The CIS-R is designed to be used to assess common psychiatric disorders including anxiety and depression, usually in the week preceding interview (Murphy 2002).

## 1.5 The role of confounding and mediation

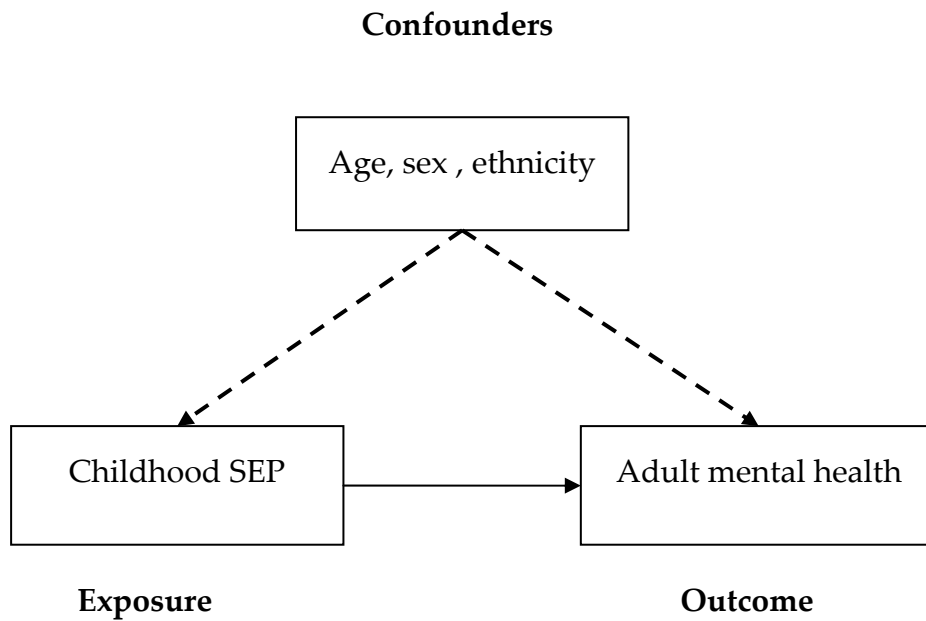
As discussed earlier in the chapter there are a number of hypothesised indirect and direct pathways via which aspects of the childhood socioeconomic environment can affect adult health (see Figure 2). Therefore a number of factors need to be taken into consideration when trying to understand pathways between the childhood socioeconomic environment and adult mental health. Life course epidemiology requires an explicit temporal theoretical model that distinguishes between mediating factors (post-exposure of interest) and confounding factors (prior to and/or tangential to understanding the effects of the exposure of interest) (Kuh, Ben-Shlomo et al. 2003). The following two sections will discuss briefly the role of confounding and mediation with regards to childhood SEP and adult mental health.

### 1.5.1 Confounding

Confounding or the 'mixing of effects' occurs when "the apparent effect of the exposure of interest is distorted because the effect of an extraneous factor is mistaken for or mixed with the actual exposure effect" (p120) (Rothman and Greenland 1998). To fulfill the criteria for a confounding factor, a variable must be (i) associated with the exposure (ii) associated with the outcome (iii) not be an intermediate step in the causal path between the exposure and the outcome. If it was on the causal pathway then it would be an intermediary, or mediating variable which is discussed in the next section.

Sex and age are well-known confounding factors in the relationship between adult mental health and SEP. The increased risk of depression in women has been well documented, with the prevalence of depression found to be twice as high in women as in men (Veijola, Puukka et al. 1998; Muntaner, Eaton et al. 2004). In New Zealand women have an increased prevalence of moderate, high and very high probability of an anxiety or depressive disorder compared to men, especially between the ages of 15 to 24 (Ministry of Health 2008).





**Figure 4. Age, sex and ethnicity confounding triangle**

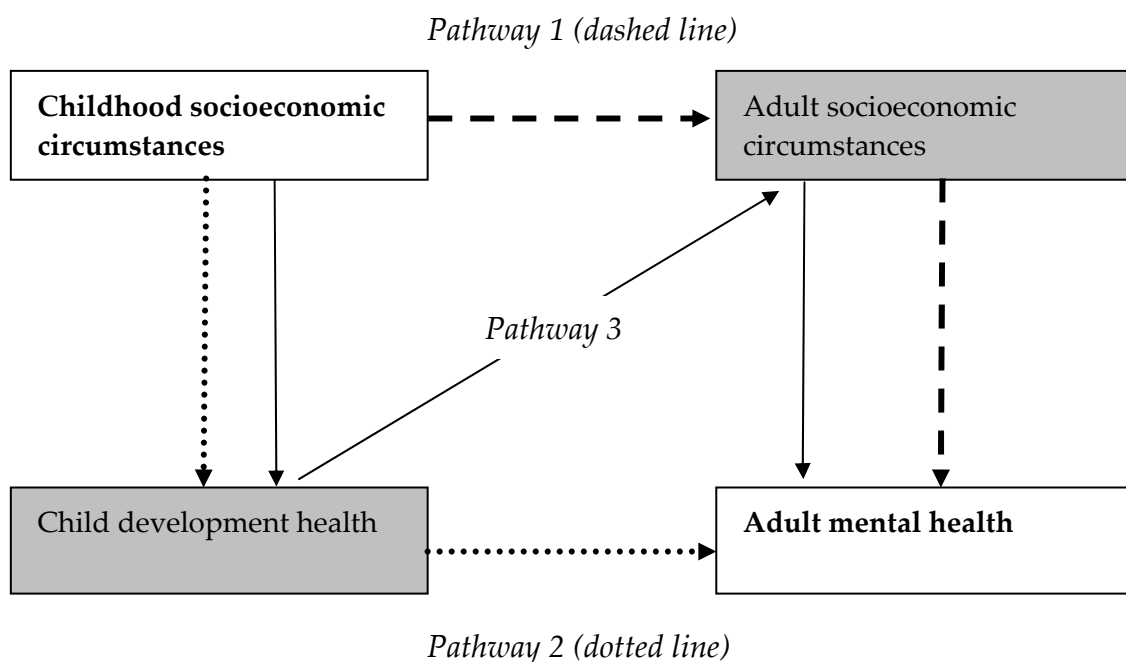
Age has been shown to have a U-shaped association with depression, with the risk higher in the younger and older age groups (Lorant, Deliege et al. 2003). Ethnicity is also a potential confounding factor. Of New Zealand’s main ethnic populations, Maori and Pacific people have a higher prevalence of high or very high probability of an anxiety or depressive disorder compared to the total population (Ministry of Health 2008). Other possible confounders controlled for in the literature include maternal age, single-parent status at time of birth and a family history of mental illness (Gilman, Kawachi et al. 2002; Gilman 2003; Gilman, Kawachi et al. 2003).

### **1.5.2 Mediation or mediating pathways**

An intermediate variable or mediator is “any factor that represents a step in the causal chain between the exposure and outcome [that] should not be treated as an extraneous confounding factor, but instead requires special treatment” (Rothman and Greenland 1998). An intermediate variable is therefore not a confounder, because the direction of the association between an intermediate factor and the exposure is actually in the opposite direction to that of a confounder.

In the published literature investigating the association between childhood SEP and adult mental health, there are two main mediators frequently discussed. These include childhood health, and adult SEP, the latter being the focus of this dissertation. A simple model is presented in Figure 5 illustrating how childhood developmental health and adult socioeconomic circumstances may act as explanatory mediating variables as they lie on the causal pathway between childhood SEP and adult mental health.

In the first pathway (*pathway 1*) adult SEP is heavily influenced by childhood SEP and is itself predictive of subsequent adult health outcomes. In the second pathway (*pathway 2*) childhood health is heavily influenced by childhood SEP and is itself predictive of subsequent adult mental health. In reality these pathways are likely to overlap and work through each other indicated by pathway three (solid line)



**Figure 5. The mediating pathways of adult socioeconomic position and childhood health** Adapted from Graham and Power, 2004

Both confounding and mediation are methodological challenges in studying the life course as a long intervening period between the exposure and outcome can make discerning mediation and confounding more difficult. When adjusting for mediators is difficult to be sure that mediation is only picking up mediation as opposed to other pathway associations with confounders.

## 2 Part 2: Literature review

In this section I review only those studies that investigated the relative contribution of earlier and later-life SEP to adult mental health with respect to my three research questions of my dissertation.

The three specific research questions are:

1. What is the crude association of childhood SEP and adult mental health?
2. What is the association of childhood SEP and adult mental health after adjusting for common confounders e.g. age, sex and ethnicity?
3. How much of the above association is mediated by adult SEP?

### 2.1 Methods

A review of the literature was conducted to identify studies that examined the association between childhood SEP and adult mental health. As this topic is interdisciplinary, literature for this review was identified from the following databases: MEDLINE, PsycINFO, Proquest, Scopus, Google scholar and EMBASE. The following search terms were used "childhood", "early/early life", "socioeconomic/socio-economic position", "socioeconomic/socio-economic status", "adulthood", "mental health", "psychological distress" and "psychological well-being". The keywords "depression" and "depressive" were included in the search terms as an initial scan of the literature indicated that depression is used as a common marker of mental health. Articles were also identified from searching key authors in the area of life course epidemiology and mental health. Bibliographies of key articles were also scrutinised for further references. The review was not limited in relation to start date but was limited to published literature in English up to October 2008. Studies were excluded if they did not use parental occupation as at least one of the indicators of childhood SEP.

## 2.2 Results

Eleven studies were identified which fulfilled my inclusion and exclusion criteria. Studies that simultaneously analysed SEP in both adulthood and childhood in relation to adult mental health were scarce. Four studies were identified that explored the association of childhood SEP with adult mental health and adjusted for the mediating effects of adult SEP. Only two of these answered all three of my research questions. Three studies did not adjust for adult SEP but pertained to my second research question and so are included and reviewed in brief. Table 1 below presents a summary of which of my three research questions were addressed by each of these studies.

**Table 1. Summary of the research questions answered by the studies included in the literature review**

	Question 1 What is the crude association of childhood SEP and adult mental health?	Question 2 What is the association of childhood SEP and adult mental health after adjusting for common confounders e.g. age, sex and ethnicity?	Question 3 How much of the above association is mediated by adult SEP?
Gilman et al, 2002	●	●	●
Power et al, 2007	●	●	●
Harper et al , 2002		●	●
Luo and Waite, 2005		●	●
Lynch et al, 1997		●	
Singh-Manoux, 2004		●	
Melchior et al , 2007		●	

A further four studies which fitted my inclusion and exclusion criteria were not included in my review for the following reasons. The first three papers, one from New Zealand (Poulton, Caspi et al. 2002), one from the US (Gilman, Kawachi et al. 2003) and one from the UK (Power, Stansfeld et al. 2002) presented analytical modeling which addressed my third research question. However, they were unable to actually answer how much of the association is mediated by adult SEP as they did not present results of the analyses of either the crude association between childhood SEP and mental health (question 1) or the association adjusted for confounders (question 2). The fourth study (Gilman, Kawachi et al. 2003) was not included because the same dataset as the Gilman 2002 study was used and I did not gain any new information to address my three research question.

The main characteristics of these seven studies included in my literature review are described in Table 2. Thereafter, the studies are reviewed as per Tables 1 and 2, in relation to which of my research questions answered. This is presented in three sections, with each section ending with a summary and an overall conclusion provided at the end of the chapter.

**Table 2. Characteristics of studies included in literature review**

Author Country Year	Study type & sample size	Childhood SEP	Mental Health outcome Construct used Duration	Confounders/ mediators	Adult SEP	Analysis	Results Question 1 Question 2 Question 3	Strengths & limitations
Gilman et al US 2002	Prospective Birth cohort  National Collaborative Perinatal Project (1959-1966)  N <sup>a</sup> = 1,780 n= 1,132	Parental occupation  Measured prospectively at birth and age 7  5 categories	Major depressive episode  Diagnostic Interview Schedule (DIS)  Lifetime basis	Family history of mental disorders; mother's age; single-parent status; age; sex; ethnicity	Education  Age 18 - 39	Kaplan Meier (lifetime risk of depression)  Discrete-time survival analysis (age at onset of depression)	OR <sup>b</sup> 's between 1.66 (95% CI 1.01-2.74) and 1.97 (1.23-3.15)  OR's between 1.76 (95% CI 1.06- 2.91) and 2.23 (95% CI 1.37-3.61) <i>Increase in OR of 15-27%</i>  OR's between 1.69 (95% CI 1.02- 2.81) and 2.07 (95% CI 1.27-3.37) <i>Decrease in OR of 9-24%</i>	<b>Strengths:</b> Prospective data collection No recall bias of exposure Choice of confounders  <b>Limitations:</b> Possible residual confounding Selection bias Small sample size Lacks generalisability
Power et al UK 2007	Prospective Birth cohort  Perinatal Mortality Study (1958)  N=17,415 n=9,377	Fathers occupation  Measured prospectively at birth  6 categories	Depressive symptoms and anxiety  Revised Clinical Interview Schedule (CIS-R)  Symptoms in previous week	Sex	Occupation  Age 42 (age 33 if unavailable at age 42)	Logistic regression	4.6% increase from lowest to highest class which equates to an OR per unit increase in class of between 1.13 to 1.14.  OR= 1.14 (95%CI 1.07-1.21), Increased odds of 14% per unit decrease in social class  OR=1.09 (95%CI 1.03-1.16) <i>Decrease in OR of 36%</i>	<b>Strengths</b> Prospective data collection No recall bias of exposure Large sample size <b>Limitations</b> Selection bias Unmeasured confounding

<sup>a</sup> N= number of participants in original study sample; n=number of participants in analysis sample

<sup>b</sup> OR= odds ratios; CI= confidence intervals

Author Country Year	Study type & sample size	Childhood SEP	Mental Health outcome Construct used Duration	Confounders/ mediators	Adult SEP	Analysis	Results Question 1 Question 2 Question 3	Strengths & limitations
Harper et al Finland 2002	Cross-sectional Cohort  Kuopio Ischaemic Heart Disease Study (1984-1989)  N=3,343 n=2,585	Parental occupation and education  Recalled at age 10  4 categories	Depressive symptoms  Human Population Laboratory Depression Index (HPLDI)  Duration not stated	Age	Education Occupation Income  Assessed at ages 42, 48 and 54.	OLS multiple linear regression	Not answered  $\beta = 0.170$ parental occupation and $\beta=0.196$ ( $p \leq 0.05$ ) parental education  $\beta=0.065$ parental occupation <i>Decrease in <math>\beta</math> by 62%</i> and $\beta=0.085$ parental education <i>Decrease in <math>\beta</math> of by 56%</i>	<b>Strengths</b> Multiple imputation  <b>Limitations</b> Recall bias of exposure Selection bias Unmeasured confounding
Luo & Waite US 2005	Cohort  US Health and Retirement Study  N=21,384 n=19,949	Parental education Fathers occupation  Recalled in childhood- age not stated	Depressive symptoms  Centre for Epidemiological Studies Depression Scale (CEDDS)  Symptoms in last week	Sex, Ethnicity, Age, Childhood health	Education Household income  50 years+	OLS multiple linear regression	Not answered 2a. $\beta_c=0.32^*$ (mothers educ) and $0.17^*$ (fathers educ), $0.07$ (fathers occup). 2b. $\beta=0.29^*$ (mothers educ) and $0.15^*$ (fathers educ), $0.05$ (fathers occup). 3. $\beta=0.159^*$ (mothers educ) and $0.06^*$ (fathers educ), $0.10^*$ (fathers occup). * $p < 0.01$	<b>Strengths</b> controlled for child health as a mediator Large sample size  <b>Limitations</b> Recall Bias of exposure Misclassification of exposure

<sup>c</sup>  $\beta$ = Beta coefficients



Author Country Year	Study type & sample size	Childhood SEP	Mental Health outcome Construct used Duration	Confounders/ mediators	Adult SEP	Analysis	Results Question 1 Question 2 Question 3	Strengths & limitations
Lynch et al Finland 1997	Cohort  Kuopio Ischaemic Heart Disease Study  N=3,343 n=2,682	Parental occupation and education  Age 10	Depression  Shortened version of the Minnesota Multiphasic Personality Inventory (MMPI)  Duration not stated	Age	Occupation  Age 42, 48, 54 and 60	Linear regression	Not answered  ↑1.6% in high quartile depression  Not answered	<b>Strengths</b>  <b>Limitations</b> Not adjusted for adult SEP Recall bias Unmeasured confounding Inappropriate mental health construct used
Singh- Manoux et al UK 2004	Cohort  Whitehall II study  N=10,308 n=6,128	Fathers social class, childhood socioeconomic circumstances  (Recalled Before age 16)	Minor (common) psychiatric disorders  General Health Questionnaire (GHQ) Mental component of SF-36  Duration not stated	Sex Age	Occupation  Age 35-55	Logistic regression	Not answered  OR= 1.38 (95% CI 1.13-1.69) for men and OR=1.26 (95% CI 0.93- 1.69) for women  Not answered	<b>Strengths</b>  <b>Limitations</b> Not adjusted for adult SEP Birth cohort effects Recall bias
Melchior et al NZ 2007	Birth cohort  DMHDS  N= 1,037 n= 972	Parental Occupation  At ages 3,5,7,9,11,13 and 15	Major depressive disorder and anxiety disorders  Diagnostic Interview Schedule (DIS)  Symptoms in last 12 months	Sex	Occupation  Age 32	Cox regression	Not answered  RR=1.21 (95% CI 0.79-1.85)  Not answered	<b>Strengths</b> Prospective data collection  <b>Limitations</b> Small sample size Not adjusted for adult SEP

### **2.2.1 Studies that answer research questions 1, 2 and 3**

Two studies were identified that adjusted the crude association of childhood SEP with adult mental health for selected confounders and adult SEP. The first paper by Gilman et al (2002) explored the association of childhood SEP with a major depressive episode and the second paper by Power et al (2007), with depressive symptoms and anxiety.

#### ***Gilman et al, US (2002)***

Gilman et al investigated the relationship between childhood SEP and the life-time risk of major depression using data from the National Collaborative Perinatal Project (NCPP) in the US. This multi-site cohort study included over 50,000 pregnancies enrolled between 1959 and 1966 and followed for the first 7 years of life. In this analysis data from one site was used (Providence, Rhode Island) where 1,780 of the 4,140 births were randomly selected for follow-up as adults in two phases (1984 and 1996). During the first phase those sampled were between the ages of 18 and 27, whereas those sampled in the second phase were between 30 and 39 years old.

Childhood SEP was measured using parental occupation, asked directly of parents during pregnancy and when children were aged 7. In two-parent households children were assigned the higher occupational category of both parents; those from single-parent households were assigned the category of the parent with whom they were living. Parental occupation was classified as manual/non manual using the 1960 US Census categories and five categories were created: 'manual at birth and age 7', 'non-manual at birth and age 7', 'non-manual at birth and manual at age 7', 'manual at birth and non-manual at age 7', 'not employed/other'.

Depressive symptoms based on the DSM III and IV diagnoses of major depressive episode were identified using the DIS, administered by trained interviewers at the adult follow-up interviews. This diagnosis requires the presence of at least 5

symptoms concurrently for 2 or more weeks. Symptoms were assessed on a lifetime basis and age at onset of depression was determined by asking respondents how old they were when they first experienced multiple depressive symptoms. for a period of  $\geq 2$  weeks.

Prospective data collection allowed the authors to control for a number of potential confounders during analysis, including maternal age and single-parent status at the time of the respondent's birth, ethnicity, sex, age at interview and family history of mental disorders prior to respondents birth.

Adult SEP was measured using the participant's number of years of education at follow-up. Education was split into four categories 0-9, 10-11, 12 or 13+ years and adjusted for during survival analysis. Education was the preferred choice of adult socioeconomic indicator as a large proportion of the study sample was aged  $\leq 25$  years.

Complete data for 1,132 adults was analysed using Kaplan Meier methods to test for differences in the lifetime risk of depression in relation to childhood SEP and discrete-time survival analysis was used to model the retrospectively reported age at depression onset. Results were presented as odds ratios and 95% confidence intervals with the highest childhood SEP category (non-manual parental occupation at birth and at age 7 follow-up) used as the referent group.

The lifetime risk of depression varied significantly according to the occupational level of respondent's parents with 26.5% of those from a low childhood SEP (manual occupation at birth and age 7) meeting the criteria for depression compared to 17.1% of those from a high childhood SEP. With regards to the age at onset of depression. Those individuals from a lower childhood SEP had a significantly higher risk of depression onset than those from the highest childhood socioeconomic group with an odds that was between 1.66 (95% CI 1.01-2.74) (non-manual occupation at birth/

manual occupation at age 7) and 1.97 (95% CI 1.23-3.15) (manual occupation at birth/non-manual occupation at age 7) times higher.

When adjusted for potential confounders (maternal age, single parent status, ethnicity, sex, age and family history of mental disorder), the OR's increased to between 1.76 (95% CI 1.06-2.91) and 2.23 (95% CI 1.37-3.61) and remained statistically significant. After this adjustment the residual effect of childhood SEP strengthened by 15-27%. This negative confounding suggests the unadjusted association was an underestimate of the true association between childhood SEP and risk of depression.

After adjustment for adult SEP (i.e. educational attainment), childhood SEP remained significantly associated with the odds of depression onset. The results declined with respondents from lower childhood SEP backgrounds having an odds of depression that was between 1.69 (95% CI 1.02-2.81) to 2.07 (95% CI 1.27-3.37) times higher than those from the highest SEP backgrounds. The average percentage movement towards the null after adjustment for adult SEP was about 16% suggesting that part of the association between childhood SEP and depression is explained by one measure of adult SEP. This study provides evidence that part of the association of childhood SEP with major depression is mediated by adult SEP. Interpreting the residual and unexplained 84% of the association of childhood SEP with major depression is more difficult because had there been a range of adult SEP measures included, there may have been a greater reduction to the null.

A particular strength of this study is the prospective measurement of confounders and childhood SEP. This will reduce the potential for misclassification of exposure from measurement error and retrospective recall of parental occupation. There is the possibility of residual confounding from a family history of mental illness being self-reported rather than directly measured. However any measurement error here would likely lead to non-differential misclassification in which case the results are likely to be underestimated.

The analysis sample comprised participants with complete data on all variables included in the analysis. Simply excluding participants with missing data on childhood SEP may have introduced bias if this group was different in terms of the association between childhood SEP and depression than the group that did not have missing data. There is also the possibility that the significant findings in this study may be biased as the selected sample had a higher lifetime risk of depression than a nationally representative study of psychiatric disorders in the US (Gilman, Kawachi et al. 2002).

### *Power et al (2007)*

Power et al used data from the Perinatal Morality Study, more commonly known as the 1958 British Birth cohort study, which comprised all children born in England, Scotland and Wales during one week in March 1958 (n= 17,415). Data were collected prospectively at birth and ages 7, 11, 16, 23, 33 and 44-45 and analysed to explore the relationship between childhood SEP and disease risk measures for major chronic disease, physical and mental functioning. This particular study utilised data from the age 44-45 follow-up where 12,069 subjects were invited to be interviewed.

Childhood SEP was measured using father's occupation at birth, or if unavailable at age 7. Occupation was classified using the six Registrar General's occupational groups, which range from professional (class I) to unskilled manual (class V). For analysis, childhood SEP was treated as a continuous variable with six levels., and 'no male head of household' category was included in the unskilled manual group.

The revised Clinical Interview Schedule (CIS), administered by a nurse, was used to assess symptoms of depression and anxiety in the previous week to interview. Participants reporting  $\geq 2$  items for the depressive symptoms or anxiety modules were identified as cases.

Adult SEP was measured using the participant's current or most recent occupation at age 42 years, or 33 years also classified using the same occupational groups as childhood SEP.

The crude association of childhood SEP and depressive symptoms was presented as an overall percentage of depressive symptoms within each childhood social class. As childhood social class grade decreased from high (class I) to low (class V), the percentage of adult depressive symptoms increased from 6.0% in the highest social class to 10.6% in the lowest social class which equates to an average of 0.76% increase in depressive symptoms per decrease in social class (equivalent to OR of 1.135 for each unit increase in childhood social class). In other words, there was an increase in the risk of reporting depressive symptoms from high to low childhood SEP.

Once adjusted for sex, an OR of 1.14 (95%CI 1.07-1.21) existed for every unit increase in childhood social class grade from high to low i.e. as childhood SEP decreased, the odds of reporting depressive symptoms increased by 14%.

This result was no different to the OR calculated for research question 1.

After adjusting for adult SEP, childhood social class remained significantly associated with adult depressive symptoms (OR=1.09, 95% CI 1.03-1.16). There was an overall 36% decrease in the odds, suggesting that about a third of the association between childhood SEP and depressive symptoms was mediated by adult education.

A major strength of this study is prospective data collection, resulting in less recall bias and less opportunity for misclassification of childhood SEP exposure.

Participants lacking information on both child and adult SEP were excluded, however this number was small (n=17) therefore unlikely to lead to any selection bias as the overall sample size is large. From a target sample of 12,069 participants who were still in contact with the study and invited to participate, 78% responded. If those 22% of participants who did not participate are from a low childhood SEP and

are more at risk of suffering from depressive symptoms than low childhood SEP children who did participate, then selection bias may be introduced into the findings, but major selection bias seems unlikely. A limitation of this analysis is unmeasured confounding as the results were only adjusted for sex.

## **Summary**

My literature search identified only two studies which answered all three of my research questions. An association between low childhood SEP and an increased risk of depressive symptoms in adulthood compared to high childhood SEP was reported by both studies. Both studies also reported a reduction in the strength of the association after adjustment for a single measure of adult SEP. Powers' results suggest adult occupation explains about a third of the association (36%) whereas Gilman's results suggests that adult education may account for less (between 9 and 24%). After adjusting for confounders and adult SEP the residual association attenuated and remained significant in both studies. So what is the most likely explanation for this difference in findings? Both these longitudinal studies used prospective data collection thereby reducing the likelihood of measurement error of childhood SEP (parental occupation). Both studies have used clinical schedules to assess depression however; Gilman has assessed depression on a lifetime basis whereas Power has assessed symptoms in the previous week. There is also a difference in the number of potential confounders adjusted for during the analysis, differences in sample size, and the use of different adult SEP indicators (occupation versus education). Despite the difference in the proportion of the association explained by adult SEP both these studies provide good evidence that adult SEP is a mediator in the pathway between childhood SEP and depression in adulthood.

## 2.2.2 Studies that answer Research Questions 2 and 3

Although the following two studies did not provide a crude unadjusted estimate of the association between childhood SEP and mental health status, they did adjust for selected confounders and adult SEP, thereby answering research questions 2 and 3.

### *Harper et al, Finland (2002)*

Harper et al investigated the effects of both childhood and adult SEP on general indicators of psychosocial functioning (cynical hostility, hopelessness and depression) using data from the Kuopio Ischaemic Heart Disease Risk Factor Study. This was a population-based study of 2,585 men aged 42 to 60 years from Eastern Finland recruited between 1984 and 1989.

Measures of childhood SEP were based on the respondents' recall of their parent's education and occupation when they were aged 10. Both indicators were dichotomised into low (unskilled manual or did not complete primary school) or high (skilled manual/white-collar or completed primary school or higher).

Information from both parents was used to create two cross-classified measures of childhood SEP; both parents high (referent group), father high/mother low, father low/mother high and both low.

Depressive symptoms were assessed using the Human Population Laboratory Depression Index. This 18 item scales contained questions about mood disturbances, negative self-concept, loss of energy and sleep or eating problems. The duration e.g. previous week was not given. One point was assigned for each true or false answer indicative of a 'depressed' response. Scores generated ranged from zero to thirteen with higher scores indicating poorer psychosocial functioning or greater depressive symptoms. The mean value for depressive symptoms in the study sample (n=2,585) was 1.9 (SD 2.1).



The respondents own SEP was measured using their education, income and occupation at time of baseline interview (age 42 to 60 years) Education, measured in years was categorised as either low (<7 years) or high ( $\geq 7$  years). Occupation was categorised as farmer/blue collar, or white collar. Income was measured continuously from the year prior to examination and divided into quartiles with respondents being classified as either low income (bottom 25th percentile) or high income (top 75th percentile).

Linear regression analysis was used and results were presented as beta coefficients and standard errors. The beta values are interpreted as the difference in psychosocial scale score of depressive symptoms between the level of childhood SEP and the referent high childhood SEP group (both parents high education and occupation) Parental occupation and education were each entered separately into the model and then both simultaneously.

Age-adjusted results showed that men with both parents in low occupations during childhood had higher levels of depressive symptoms than those men whose parents had high occupations (beta= 0.22 i.e. about 10% of one standard deviation,  $p \leq 0.05$ ). Also men for whom both parents had less than a primary school education also had higher number of adult depressive symptoms than men whose parents had a high education (beta= 0.239,  $p \leq 0.05$ ). When both parental occupation and education were modeled simultaneously, the difference in scale scores decreased for both parental education (beta= 0.193,  $p \leq 0.05$ ) and parental occupation (beta=0.170). Only parental education remained significant.

Once adjusted for the multiple measures of adult SEP (education, occupation and income) the beta coefficients decreased to 0.065 for low parental occupation and to 0.085 for low parental education, with neither being significant. By comparing the change in coefficients for low versus high childhood SEP before and after adjusting for adult SEP, we can assess the mediation effects of adult SEP.

Almost 62% of the association of low parental education with depression and 56% of the association of low parental occupation with depression was explained by adjusting for adult SEP. Although the actual contribution of childhood SEP to adulthood depression is modest in magnitude (about a fifth of a standard deviation) the changes in coefficients do provide evidence that both adult SEP and childhood SEP influence the risk of depressive symptoms in adulthood, certainly in men.

These findings may be subject to selection bias if the 15% who refused to participate and the 6% lost to follow-up are more likely to come from lower socioeconomic backgrounds and also be at a higher risk of depressive symptoms i.e. their exposure-outcome relationship differs to those who remain in the study. In this case the results would be underestimated. The authors have attempted to address potential selection bias using multiple imputation for missing data which was mainly a problem for childhood SEP. Recall of parental education and occupation may be subject to bias due to the time span being covered (32 to 50 years ago) and may lead to misclassification of childhood SEP. This is likely to be non-differential and thus under estimated the results. A major limitation of this study is unmeasured confounding as only age has been accounted for. The percentage reduction in the beta values once adult SEP was adjusted for may therefore be an overestimate and partially explained by unknown, unmeasured confounding.

#### *Luo & Waite, US (2005)*

Luo and Waite investigated the relationship between childhood SEP and physical, mental and cognitive well-being in later life. Their study used a nationally representative sample of 19,949 adults aged 50 years and over from the longitudinal US Health and Retirement Study (1998).

Childhood SEP was measured retrospectively by asking respondents whether their parents had  $\geq 8$  years of education, whether the respondent's father had a white-

collar occupation and whether the family was financially pretty well off, about average, or poor. The age at which these measures were recalled was not stated.

A short version of the Center for Epidemiological Studies Depression Scale (CEDS) was used to assess number of depressive symptoms. Each item on the scale asked a question about how the respondent felt in the last week. The number of depressive symptoms was a count of the affirmative responses, with two items or more being classed as a positive affect. The scale ranged from 0-8, with the mean value for depressive symptoms in the sample population (n= 19,949) being 1.61 (SD=1.94).

Linear regression was used in the analysis with results presented as regression coefficients. The potential confounders sex, ethnicity, age were controlled for in the first model, childhood health was added into the second model and adult SEP into the fully adjusted model. Childhood health, treated as a mediator in this study, was based on respondents retrospective recall and rating of his or her own health as a child on a 5-point scale ranging from poor to excellent. There is no mention of what age was being used as the reference point for childhood health. Adult SEP was based on respondent's own education, measured in years (mean= 11.67), and total household income (values log transformed) in the year prior to the survey.

In the first model adjusted for confounders respondents whose fathers had white collar jobs had 0.07 fewer depressive symptoms compared to those whose fathers did not. This reduction in depressive symptom scores was not statistically significant. A significant reduction in scores was found with both parents having  $\geq 8$  years of education. More specifically, respondents who had 'mothers with  $\geq 8$  years of education had on average 0.32 lower score on the depressive symptom scale than those whose mothers had  $\leq 8$  years of education (beta = -0.32 and,  $p < 0.01$ ). Also respondents whose fathers had  $\geq 8$  years of education had 0.17 fewer depressive symptoms than whose fathers had  $\leq 8$  years of education (beta = -0.17,  $p < 0.01$ ). These

results indicate that fewer depressive symptoms were associated only with both parents having  $\geq 8$  years of education and not father's occupation.

When childhood health was adjusted for the association of childhood SEP (indexed by parental education) with adult depressive symptoms attenuated. This suggests that part of the association between childhood SEP and depressive symptoms in later adulthood is mediated by childhood health. There was a 9% reduction for mothers education with a decrease in beta from -0.32 to -0.29 ( $p < 0.01$ ) and a 12% reduction for fathers education (beta= -0.15,  $p < 0.01$ ), with both remaining statistically significant. The association of fathers occupation with depressive symptoms, although not statistically significant, also attenuated by 29% from 0.07 to 0.05.

Adjusting for respondent's own adult SEP (education) substantially attenuated the effect of childhood SEP on depressive symptoms. For mothers education the coefficients were further attenuated by almost half and remained significant with respondents whose mother had  $\geq 8$  years of education experiencing 0.15 fewer depressive symptoms than those whose mothers had  $\leq 8$  years of education (beta= -0.15,  $p < 0.01$ ). For fathers education the coefficient attenuated by 60% but no longer remained significant. Adjusting for adult SEP has almost halved the association of childhood SEP (indexed by mother education) and depressive symptoms from 0.029 to 0.15 and as the study sample was large this is probably a significant finding. Fathers occupation become statistically significant from -0.05 to 0.10 when adjusting for adult SEP. This finding is probably due to chance.

Childhood health and SEP were obtained through retrospective reports and thus may be subject to recall bias and measurement error. As with the previous studies, if the cases excluded from the analysis due to missing data on key variables ( $n=500$ ) differ in their exposure-outcome relationship to those included in the study then there may be some selection bias in the results.

## **Summary**

These two studies did not model the crude association of childhood SEP and depressive symptoms in adulthood, therefore could not answer question one. They were however able to answer questions 2 and 3 which allows me to assess how much of the association was mediated by adult SEP.

Both studies found that adjusting for adult SEP accounted for a fairly large part of the association between childhood SEP and adult depressive symptoms. Harpers' results remained statistically non-significant but the adjustment accounted for approximately 60% of the association. Luo & Waite found a similar proportion was mediated by adult SEP, with the adjustment accounting for almost half (48%) of the association between childhood SEP and adult depressive symptoms. Both these studies add to the evidence provided by the previous two studies that adult SEP is a pathway between childhood SEP and mental health and responsible for part of the association, apparently explaining up to half of the association of childhood SEP with adult depressive symptoms.

### **2.2.3 Studies that answered research question 2**

My literature search identified three studies which investigated the association of childhood SEP with mental health whilst adjusting for a number of confounders. These studies did not adjust for adult SEP but are included here as they pertain to my second research question 2. These three studies are discussed in brief below.

#### ***Lynch et al 1997***

Lynch et al used data from 2,682 men aged 42-60 years in the Kuopio Ischaemic Heart Disease Risk Factor Study. The authors examined the association between childhood SEP and depression adjusted for the confounding of age .

Childhood SEP was based on recall of parental education, occupation and family financial status at age 10. These items were dichotomized and the scores summed to form an index of childhood socioeconomic conditions which was split into tertiles of high, medium and low childhood SEP.

Depression was assessed using a shortened form of the 180 item Minnesota Multiphasic Personality Inventory (MMPI), although no duration was given.

The authors found the association of childhood SEP and depression in adulthood was not statistically significant when adjusted for age. However, there were still a marginally greater percentage of men from a low childhood SEP in the highest quartile for depression (20.2%) versus those from a high childhood SEP (18.6%).

#### *Singh-Manoux et al, 2004*

Singh-Manoux et al analysed data from the longitudinal Whitehall II study of 10,308 British civil servants aged 35-55 years to explore the association between childhood SEP and minor (common) psychiatric disorders adjusted for the confounder's age and sex.

Childhood SEP was indexed by fathers social class and family socioeconomic conditions recalled before the age of 16 years. General mental health was assessed using the mental components scores of the Short-Form 36 (SF-36) questionnaire and common psychiatric disorders were assessed using the GHQ 30. Poor health functioning was indicated by being in the worst quintile for mental component scores on the SF36 and those scoring 5+ scores on the GHQ were considered 'cases'.

The association between childhood SEP and general mental health was significant for both men and women when adjusted for age. However for common psychiatric disorders the association was significant for men only. Males from a low childhood SEP were 1.38 times more likely to suffer from common psychiatric disorders

(OR=1.38 95% 1.13-1.69) and 1.61 times more likely to suffer from general mental health problems (OR=1.61 95% CI 1.31-1.98) than those from a high childhood SEP. Females from a low childhood SEP were 1.47 times more likely to suffer from general mental health problems (OR=1.47, 95%CI 1.08-2.00) than females from the highest childhood SEP.

### *Melchior et al 2007*

Melchior et al investigated whether children who experienced socioeconomic hardship disproportionately suffered from various health outcomes in adulthood including major depressive and anxiety disorders. They used data from 972 study member of the Dunedin Multidisciplinary Health and Development Study at the age 32 follow up (2004-2005).

Childhood SEP, measured using the average of the highest SEP level of either parent, was assessed repeatedly at birth and at ages 3, 4, 7, 9, 11, 13, and 15 years. Parental occupation was classified using the Elley-Irving Scale to create six categories that were split into low, intermediate and high childhood SEP.

Major depressive disorder and anxiety disorders diagnosed during the 12 months preceding the age 32- interview were ascertained using the DIS and diagnosed using the DSM-IV.

Study members from a low childhood socioeconomic background had an increased risk of suffering from major depressive disorder and/or anxiety disorder compared to those who came from more privileged family background, (RR=1.21 for major depressive disorder and R=1.16 for anxiety disorders) but both sets of 95%CI's included 1.0. As these results were not statistically significant the authors did not include this outcome in subsequent analyses of health outcomes which adjusted for adult SEP.

## Summary

These three studies explored the association of childhood SEP and depression or common psychiatric disorders adjusting for the confounders sex and/or age. Lynch et al did not find a statistically significant association of childhood SEP with depression in older men after adjusting for age. This could be because the MMPI was designed to be a tool for assessing personality and is an inappropriate tool for assessing depression. Melchior also failed to find a statistically significant association between childhood SEP and major depressive or anxiety disorders in 32 year olds after adjusting for sex. This study may be limited by the small sample size. Singh-Manoux on the other hand did report a significant finding of childhood SEP with general mental health in men and women and with common psychiatric disorders in men. The large sample size of this study reduces the likelihood that these results occurred by chance. The evidence for an association of childhood SEP with adult mental health after adjusting for confounding is equivocal and these studies do not provide a clear answer to my second research question.



## 2.3 Conclusion

This literature review has highlighted the lack of published studies investigating the association between childhood SEP (indexed by parental occupation) and adult mental health status, adjusted for adult SEP.

Only four studies were identified that investigated how much of the association between childhood SEP and adult mental health is mediated by adjusting for adult SEP in their analytical modeling. These four studies do suggest that adult SEP is a mediator in the pathway between the socioeconomic environment in childhood and mental health status in adulthood. On average about 40% of the association between childhood SEP and adult mental health can be “explained” by adult SEP.

The differing results found in these studies, including in the strength and size of the association may depend on several factors.

Firstly, the choice of childhood SEP measure being used and the domain of the childhood socioeconomic environment the measure represents may be important. This review focused on parental occupation as a measure of the childhood socioeconomic environment which may represent only one domain such as access to economic resources. However some studies have used both parental occupation and education whereas others have used occupation only. Whether childhood SEP is measured prospectively or retrospectively may be important due to the potential for misclassification of exposure.

Secondly, the association may depend on the sub-domain of mental health being investigated and the instrument being used to measure it. There was considerable diversity in the instruments used, including scales and clinical scales. Thus case-identification is approached in many different ways even though most of instruments used are all to some extent standardised and validated. Underlying the

use of different instruments is a variety of concepts of mental illness or poor mental health. As discussed earlier in the chapter, those using schedules such as the DIS and CIS-R were generally speaking aspiring to identify clinically recognisable treatable illness. On the other hand those using scales such as the GHQ (designed as a screening instrument) or CEDS were trying to identify people with 'mental health problems which would not necessarily be expected to be seen by a specialist (Fryers, Melzer et al. 2003). There is a variety of duration of symptoms being identified in these studies. Some are measuring symptoms on a life time basis whereas others are assessing symptoms over a one or two week period. Many symptoms fluctuate over time thus making comparisons between these studies difficult.

Thirdly, the socioeconomic differences observed may depend on the population being studied. Fourthly, methodological problems may cause variations in the associations such as the inability to adjust for a number of potential confounders and/or mediators. As discussed earlier in the chapter when adjusting for mediators such as adult SEP is difficult to be sure that mediation is only picking up mediation as opposed to other pathway associations. Some studies have used a single measure of adult SEP whilst others have used a greater range. Those studies which use more than one measure of adult SEP may be 'drawing in' other factors which are correlated with adult SEP.

## Chapter 3: Data and methods

The chapter is divided into four sections. The first describes the SoFIE study and the dataset; the second section describes the study sample used in my analyses; the third describes the variables used in the analysis and the fourth describes the statistical methods employed to analyse the data.

### 1 Data source: SoFIE

This investigation used data from the Survey of Family, Income and Employment (SoFIE) study, a single fixed panel longitudinal survey run by Statistics New Zealand. SoFIE is the largest longitudinal survey ever run in New Zealand with a duration of eight years.

The target population of the SoFIE study is the usually resident population of New Zealand living in permanent, private dwellings on the main islands in the North and South Islands, including Waiheke Island as at the first wave of the panel (October 2002).

The survey excludes overseas visitors resident in New Zealand for less than 12 months and who intend to stay in New Zealand for less than 12 months; non-New Zealand diplomats and diplomatic staff and their dependants; members of non-New Zealand armed forces stationed in New Zealand and their dependants; and people living in institutions or in other non-private dwelling establishments such as boarding houses, hotels, motels and hostels, as well as people living on offshore islands (excluding Waiheke Island). The cross-sectional population for a particular wave, wave  $t$ , can therefore be defined as: the usually resident New Zealand population living in permanent, private dwellings, as at wave  $t$  of the panel (Carter, Hayward et al. 2008).

In SoFIE, face-to-face interviews are used to collect information annually, on income levels, sources and changes; and on the major influences on income such as employment and education experiences, household and family status and changes, demographic factors and health status. Every two years (Waves 2, 4, 6 and 8) information on assets and liabilities is collected to monitor net worth and savings.

Health questions are asked as part of the SoFIE-Health module which is an extension which was developed by the University of Otago and consists of a 20-minute addition to the core SoFIE questionnaire, and is asked at years 3 (2004-05), 5 (2006-07) and 7 (2008-09) of the study. The health module includes questions in the following health related domains: health-related quality of life (SF36), mental distress (Kessler scale), perceived stress, chronic conditions, tobacco smoking, alcohol consumption, health care utilization, access, and continuity of primary health care. The SoFIE-Health extension has Central Regional Ethics Committee approval.

## **2 Study sample**

At the first wave of the SoFIE study, every eligible responding resident of the selected households became an original sample member (OSM). These are the participants who are interviewed over successive waves of the survey, regardless of whether or not they still reside in their original dwelling. The initial SoFIE sample comprised approximately 11,500 responding private households (household response rate of 77%) with 22,165 adult OSM's and 7,520 children responding in Wave 1. The population for this analysis is the eligible Wave 1 population who would be eligible to respond as adults in Wave 3 which is 23,240 OSM's. The analysis sample consisted of 18,950 OSM's who actually responded at Wave 3 (83% of Wave 1 adult responders) and were aged 15 years and over at the time of interview. Of these individuals, 14,740 had complete data on parental occupation (childhood SEP) and the Kessler scale (psychological distress). Data used in this analysis was SoFIE data version 6 (Wave 1 to 4 release).

### 3 Measures

All variables were derived by Statistics New Zealand (SNZ) unless otherwise stated and are from wave 3 of the SoFIE study (except wealth which is from wave 2, and age and sex which are asked at wave 1- baseline interview).

#### 3.1 Exposure: Childhood socioeconomic position

As part of the health module at Wave 3 participants were asked to recall their parent's occupation when they were 10 years old (see flow diagram of questions in Appendix A). The question asked if the respondents parent or guardian had a paid job and only if the respondent answered yes was the resulting occupation entered as text field by the interviewers and then coded by SNZ using the 1999 version of the *New Zealand Standard Classification of Occupations* (NZSCO99) (Statistics New Zealand 2001). If they had more than one parent/guardian in paid occupation then they were asked for both.

The NZSCO99 is a skills-based classification used to classify all the occupations and jobs that exist in the New Zealand labour market and is based on the 1998 *International Standard Classification of Occupations* (ISCO). As a hierarchical classification it consists of 5 levels from the major group level (summarised in Table 3) to the occupation level which is classified into 565 occupations.

The original SoFIE survey data was collected as free text then coded at the occupational level (5 digit) but supplied to University of Otago at the 2 digit level in order to preserve confidentiality. If a participant's answer was too vague to be classified or the respondents did not know or refused to answer the question then the response was classified as 'response unidentifiable' (code 97) or response outside scope or not stated' (code 99).

**Table 3. The nine major groups of the NZSCO99**

(Source: NZSCO, Statistics New Zealand, 2001)

1	Legislators, administrators and managers
2	Professionals
3	Technicians and associated professionals
4	Clerks
5	Service and sales workers
6	Agriculture and fishery workers
7	Trades workers
8	Plant and machine operators and assemblers
9	Elementary occupations

In my analysis, where occupational codes existed for two parents, the higher of the two codes was used to code respondent's parental occupation. The measure of childhood SEP used was derived by converting the parental occupation variable supplied by SNZ, as two digit NZSCO99 codes, into a socioeconomic status score. I did this by mapping the highest occupation score of both parents to the New Zealand Socioeconomic Index (NZSEI 1996), to create a childhood socioeconomic class for each respondent. (See Appendix B for mapping of NZSCO99 codes to NZSEI96 codes). The assignment of a socioeconomic status score to occupational groups is a similar method employed by Davis et al (Davis, Jenkin et al. 2004).

The NZSEI is an occupation-based measure of socioeconomic status derived from the education, income age and occupation variables in the 1996 Census (Davis, Jenkin et al. 2003). The NZSEI was chosen for use in my analysis rather than the Elley-Irving scale as the latter was designed specifically for educational research, based on data for males only, restricted to ages 25-44 and each of the six groups include a wide spread of NZSEI scores (Elley and Irving 1976). The NZSEI on the other hand is more up to date, has a more rigorous conceptual basis underlying the scales and has

used more advanced statistically modeling to derive scores for the scales (Davis, McLeod et al. 1997).

The 1996 version (NZSEI-96) was used as opposed to the 1991 version as it includes part time and full time workers, adjusts for the understatement of income by self-employed and includes the economically inactive such as retired or housewives. A limitation of using NZSEI-96 scores was that it does not capture social class of parents at the year SoFIE respondents were aged 10. However, there are not social class scales back to 1950 in New Zealand and therefore the recent NZSEI was used.

The NZSEI-96 scores (on a scale of 10-90) were split into three discrete socioeconomic groups to create low, medium and high childhood SEP. They were split in a way that ensured each group consisted of a reasonable proportion of the study population. For my analysis I created tertiles using cut points based on the 33 and 66 percentiles splits of the distribution of NZSEI-96 scores in the sample. These were similar cut points to Davis et al and had no clear-cut theoretical or technical rationale (Davis, Jenkin et al. 2003). The three childhood SEP groups and their corresponding NZSEI-96 scores are shown in Table 4. The score range used by Davis et al has also been included in the table for comparison.

**Table 4. Distribution of childhood SEP groups over NZSEI-96 scores**

<b>Childhood SEP group</b>	<b>NZSEI-96 score range</b>	<b>Davis et al NZSEI-96 score range*</b>
1 (high)	47-90	56-90
2 (medium)	31-46	32-55
3 (low)	10-30	10-31

\* Figures taken from NZSEI 1996 report (Davis, Jenkin et al. 2003)

## 3.2 Covariates

There are a number of key demographic variables which are asked at the initial SoFIE interview such as sex and others are asked and updated at every wave such as self-identified ethnicity.

### 3.2.1 Sex

The participant's sex is identified and answered by the interviewer as part of the initial interview. The previous response is internally checked in subsequent interview waves.

### 3.2.2 Age

The participant's date of birth is asked at the initial interview and then checked with the respondent at subsequent waves. The age variable used in my analysis was age at the household enumeration date at wave 3 which was categorised into five age groups 15-24, 25-34, 35-44, 45-54, 55-64 and 65+ years.

### 3.2.3 Ethnicity

At each wave, every adult is asked their self-identified ethnicity during the personal questionnaire. Participants are asked to *'choose as many responses as you need to say which ethnic groups you belong to'*, from a list of fifteen possible groups. In order to have mutually exclusive groups during my analysis, I used prioritised ethnicity where each respondent is allocated to a single ethnic group using the priority recording system. Maori ethnicity is prioritised over Pacific ethnicity; and Pacific ethnicity is prioritised over other ethnicities. If any Asian ethnic group is reported among those not already assigned to the Maori or Pacific group, the respondent is assigned to Asian ethnicity. All other respondents are assigned to 'non-Maori, non-Pacific, non-Asian'. The ethnicity variable used in my analysis consisted of five categories: NZ/European, Maori, Pacific, Asian and other.



### 3.2.4 Birth cohort

I created a birth cohort variable using participant's age at the Wave 3 interview. My study population was divided into three approximate birth cohorts based roughly on each individual's age. The details of the three birth cohorts and the time periods which they represent are shown in Table 5. Study members aged 15-30 years were assigned to the 'recent' birth cohort (born between 1970 and 1990), those aged 35-54 were assigned to the 'middle' birth cohort (born between 1950 and 1990), and those aged 55 and over (including the oldest SoFIE participants in their 80's) were assigned to the older cohort (born between 1920 and 1950).

**Table 5. Distribution of birth cohort groups over time period**

<b>Birth cohort</b>	<b>Years</b>
Recent	1970's-1990's
Middle	1950's-1970's
Older	1920's-1950's

### **3.3 Adult socioeconomic position**

A number of different measures of adult SEP were used to attempt to take into account the many different facets of SEP. A measure of the respondents own SEP at the time of the Wave 3 interview was created from five socioeconomic indicators which included their NZDeprivation Index (NZDep), educational qualifications, equivalised household income and labour market activity.

#### **3.3.1 NZDep2001 Index of Deprivation**

The first indicator of respondents own SEP was NZDeprivation (2001), an index of deprivation for small areas. This is a scale of deprivation from 1 to 10, where 1 represents the areas with the least deprived scores and 10 the areas with the most deprived scores (Salmond and Crampton 2002). The NZDep2001 deprivation scores apply to areas rather than to individual people. In SoFIE the deprivation index decile of dwelling location is derived from the NZDep and assigned to the meshblock of the address. NZDep information was divided into quintiles where NZDepQ1 is the least deprived and NZDepQ5 is the most deprived.

#### **3.3.2 Education**

The second indicator of respondents own SEP was education. SoFIE collects two types of education information. The first covers the type of qualification held, and the second covers participation in education during the period covered by this wave of the survey. The levels of education in SoFIE are aggregated into: Other School Qualification, School Certificate/Fifth Form Qualification, Sixth Form Qualification, Higher School Qualification, Post-school qualification not identifiable, Basic Vocational Qualification, Skilled Vocational Qualification, Intermediate Vocational Qualification, Advanced Vocational Qualification, Bachelor degree, Higher degree, No qualification. Education was measured using the respondent's maximum education qualification over the three waves of data collection and categorised as

follows: No Qualification, School Qualification, Post-school Qualification and Degree or Higher.

### **3.3.3 Equivalised Household Income**

The third socioeconomic indicator used was income. Household income is used rather than personal income as it more fully reflects the resources available to the individual. However, households of different size and composition require different incomes to produce similar standards of living. There are economies of scales in households such that a household of four does not require four times the income as a household of one to purchase the same standard of living. In order to adjust the incomes of household to produce incomes that are comparable in terms of the resources available to family members, the procedure of equivalisation is used in SoFIE Health. Household equivalised income has previously been calculated for household economies of scale using the New Zealand-specific Jensen Index (Carter, Hayward et al. 2008). Household income was ascertained continuously from the mean household income across all four waves and divided into quintiles as follows: q1: low <21,080, q2: 21,080-<34,010, q3: 34,010-<49,380, q4: 49,380-<72,280 and q5: 72,280- <high.

### **3.3.4 Labour market activity**

The fourth socioeconomic indicator used was respondents labour force involvement at the time of the Wave 3 interview. This was defined as being either employed, not employed but seeking work, or not employed and not seeking work at the interview date. Of note, students and the retired often form a large proportion of those 'not employed and not seeking work' (Carter, Hayward et al. 2008). Labour market activity was categorised as 'not employed looking for work', 'not employed not looking for work', 'overseas and working'.

### **3.3.5 Wealth**

The fifth measure of socioeconomic position was net worth (overall wealth). This was calculated by subtracting the total value of all liabilities from the total value of all assets for individuals and couples. Overall individual wealth was calculated by taking the couple wealth and dividing by two if the respondent was in a couple, otherwise the individual wealth was used. This method was used rather than just using the sum of the individual's assets and liabilities because if the respondent was in a couple, it was assumed that their assets and liabilities were shared (Carter, Hayward et al. 2008). Wealth was divided into quintiles as follows: q1: low-<25,585, q2: 25,585-<70,315, q3: 70,315-<128,085, q4: 128,085-<232,930, q5: 232,930-high.

## **3.4 Outcome: Psychological distress**

Adult mental health status was measured using a scale of non-specific psychological distress developed by Kessler et al (Kessler, Andrews et al. 2002). The K10 scale consists of ten questions about non-specific psychological distress and seeks to measure the extent of current anxiety and depressive symptoms based on questions about negative emotional states experienced by a person in the four weeks prior to interview.

Each question has a five-value response option- all of the time, most of the time, some of the time, a little of the time, and none of the time- scored from five through to one (a copy of the 10 questions can be found in appendix C). Items 3 and 6 are not asked if the response to the preceding questions was 'none of the time'. Scores for the ten items are then summed with severe psychological distress indicated by a maximum score of 50 and no psychological distress by a minimum score of 10

The scores were grouped into four levels according to the criteria developed by Andrews and Slade (2001): low (10-15), moderate (16-21), high (22-29), and very high

(30+) (Andrews and Slade 2001). The last category represents the portion of the population previously found to meet diagnostic criteria for clinical depression and anxiety requiring professional help. For analysis the K-10 was dichotomised into low (10-15) versus moderate to very high ( $\geq 16$ ) mental distress.

The K-10 has been tested and validated in the Australian population against clinical diagnoses of depression and anxiety (Andrews and Slade 2001). It has also been used in the in other mental health surveys around the world as well such as the WHO World Mental Health Surveys and has recently been used in the New Zealand Mental Health Survey (Oakley Browne, Wells et al. 2006) and 2006/07 New Zealand Health Survey (Ministry of Health 2008). There is a strong association between a high score on the K10 and clinical diagnosis of anxiety and affective disorders and a lesser but still significant association between the K10 and other mental disorder categories (Andrews and Slade 2001).

## 4 Data analysis

Access to the unit record data was via SNZ's Data Laboratory under protocols designed to protect the confidentiality of information. Whilst the analysis was conducted on actual numbers, in order to meet SNZ confidentiality requirements, rounding procedures were used on all outputs and all counts and values in the tables have been randomly rounded (up or down) to the nearest multiple of five.

Data were analysed using the SAS statistical package (version 8.2). Initial analysis involved the examination of attrition and missing data of SoFIE data from Waves 1 to 3. This was followed by investigation of the demographic and socioeconomic characteristics of the study sample by exposure and outcome.

The associations between childhood SEP and adult psychological distress were assessed using Logistic regression modeling. Firstly, I calculated the crude odds ratio of experiencing moderate to high psychological distress (score of 15+) in the low and medium childhood SEP groups as compared with the high childhood SEP group (model 1). Next, I adjusted for confounders sex, age and ethnicity (model 2). The final model included sex, age and ethnicity and adjusted for respondents own NZDep, education, income, labour market activity and wealth i.e. mediation (model 3). I compared the fully adjusted odds ratios (OR's) (model 3) with those from models 1 (unadjusted) and 2 (adjusted for confounding) by calculating the percentage change in the odds ratio in the low childhood SEP group as follows:

$$\frac{\text{odds ratio (adjusted)} - \text{odds ratio (unadjusted)}}{\text{odds ratio (unadjusted)} - 1} \times 100\%$$

Finally, a Wald Statistics test of heterogeneity was performed to test for the interactions between sex, birth cohort and childhood SEP and the results of models 2 and 3 were subsequently stratified by sex and birth cohort.

# Chapter 4: Results

This chapter is divided into three parts. The first section is descriptive and presents the results from my examination of the attrition and missing data from Wave 3 of the SoFIE study and the socioeconomic and demographic characteristics of my study population. The second section provides the results of my univariate analyses and logistic regression used to answer my three research questions. The third section presents the results of my investigation into the interactions of sex and birth cohort in the association of childhood SEP and psychological distress.

## 1 Descriptive results

### 1.1 Attrition and missing data

Attrition is the loss of respondents from the survey sample and can occur for a number of reasons such as death, emigration, failure to trace or contact respondents and refusal to be interviewed. The quality of longitudinal data through time is affected by attrition as it occurs at each wave of the survey, resulting in fewer and fewer people who have complete records over the life of the survey and making it less representative of the original population.

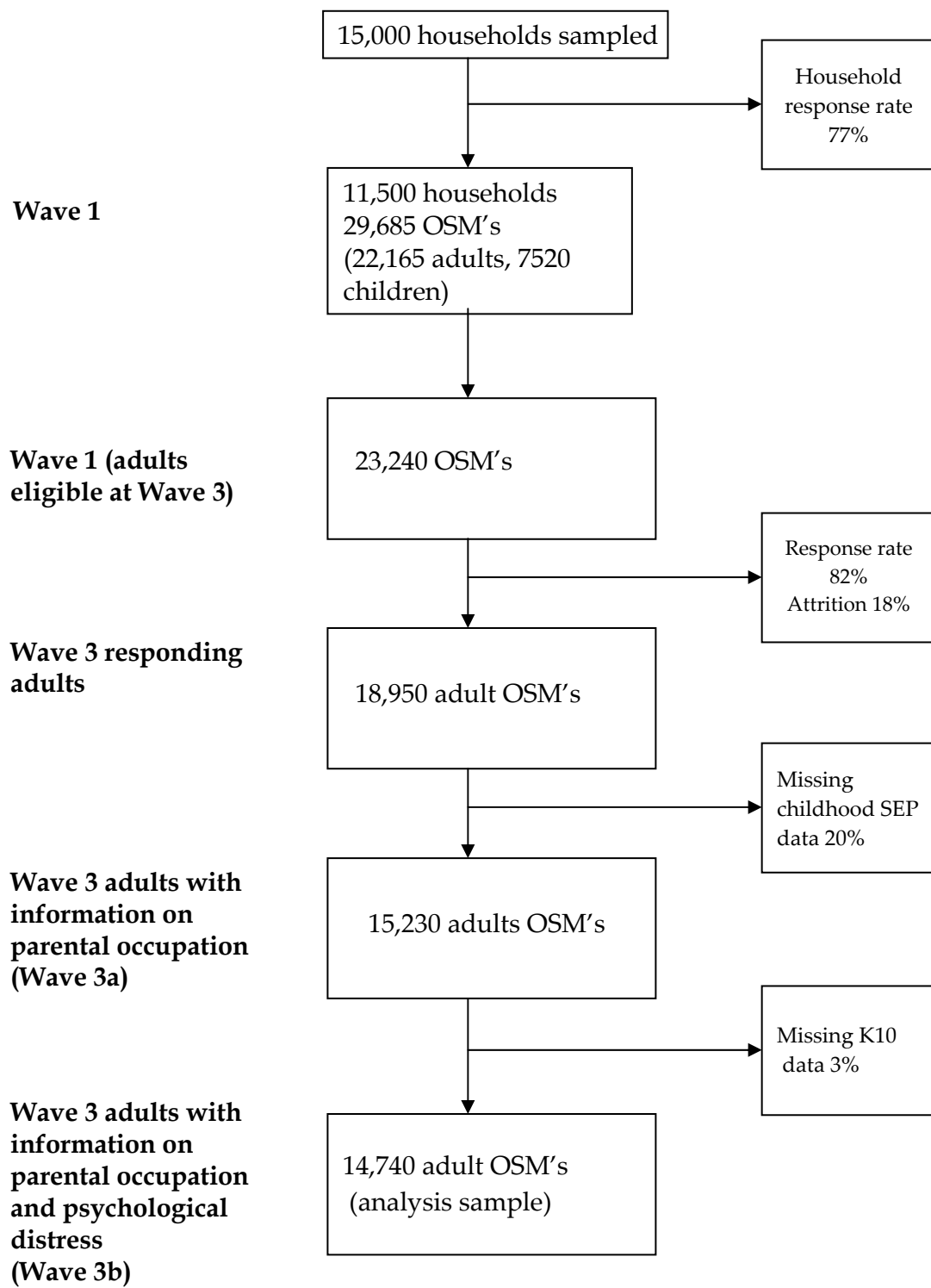
Figure 6 provides a flow chart of OSM's across Waves 1 to 3 of the SoFIE study. Of the 15,000 households originally sampled by SNZ, 11,500 (77%) agreed to participate in the study. In these households were 29,685 OSM's (22,165 adults and 7,520 children). Of these, 23,240 were eligible to be interviewed as adults in Wave 3 (note this number includes 1,075 OSM's who would be children at Wave 1 and turned 15 years of age by Wave 3). At Wave 3 of the study there were 18,950 responding adults remaining in the study which is an attrition rate of 18% compared with Wave 1.

Missing data are a pervasive problem in epidemiological studies. The standard approach is to restrict analyses to only those subjects with no missing values for the

relevant variables i.e. complete case analysis. Imputation was beyond the scope of this dissertation and indeed probably not possible for much of SoFIE data. Figure 6 provides details, down the right-hand side of the flow diagram, of the missing data when Wave 3 was restricted to those OSM's whom answered yes to the question asking if their parents had a paid job, this Wave is called 3a. This restriction resulted in a loss of 20% of adults leaving 15,230 with complete data on parental occupation. This missing data will include the economically inactive parents who will not have been assigned an occupational code during interview.

For my analyses the sample was further restricted by excluding those OSM's at Wave 3 that did not have data on both parental occupation (exposure) and psychological distress (outcome), to create Wave 3b. As can be seen in Figure 6 this resulted in a further loss of 3% of OSM's, leaving 14,740 adults with complete data on both exposure and outcome (a total loss of ~22% of Wave 3 adults). These 14,740 participants or adult OSM's comprised my analysis sample and represent 49% of the original study sample.





**Figure 6. Flow chart of respondents over Waves 1- 3 and from Waves 3 to 3a**

(Wave 3a is restricted to those respondents not missing parental occupation and Wave 3b is restricted to those respondents' not missing parental occupation and psychological distress)

### 1.1.1 Attrition across Waves 1 to Wave 3

Table 6 presents the distributions of OSM's across a number of key Wave 1 characteristics showing the response rates from Wave 1 to Wave 3; Wave 3 restricted by parental occupation (Wave 3a); and Wave 3 restricted to parental occupation and psychological distress (Wave 3b).

It can be seen from Table 6 that the relative proportion of males to females remained stable across Wave 1 to 3. The age group 0-14 years i.e. respondents who were children at Wave 1, had the highest level of attrition between Waves 1 and 3. This reflects the fact that when an OSM child turns 15 years of age between Wave 1 and 3 interviews they will be interviewed next as an adult.

Respondents aged 35 years and over had greater response rates (less attrition) between Waves 1 and 3 than those aged 34 years and under. Respondents reporting Asian ethnicity had the worst attrition (38.4%) compared to NZ/European who had the highest response rates between Waves 1 and 3 (86.3%). Respondents who were 'never married' had the greater percentage of attrition (25.9%)\* compared to those who were 'married' (12.4%). Table 6 also shows that the highest attrition rates between Waves 1 to 3 were observed in respondents living in the most deprived areas (NZDepQ5) (26.6%), with no qualifications (20.3%), in the lowest quintile of household income (29%), in the lowest quintile for wealth (17.6%) and 'not employed but looking for work' (31.4%).

### 1.1.2 Missing exposure data (Wave 3a)

When Wave 3 was restricted to those respondents who were *not* missing data on parental occupation it can be seen that the pattern of missing data was similar to that of attrition (see Table 6 column labeled Wave 3a restricted).

---

\* Attrition percentages calculated as:  $(1 - \text{response rate}/100) * 100$

Males and females had relatively similar proportions of missing parental occupation data. The younger age groups (34 years and under) had more missing parental occupation data than those who were 35+ years. Those reporting Asian ethnicity had significantly more missing parental occupation data (44%) compared to NZ/European (16.2%). Respondents who were 'never married' were also missing more parental occupation data (24.7%) than those who were married (15.8%). Table 6 also highlights that respondents who were missing parental occupation data were more likely to come from the most deprived areas (NZDepQ5) (a further loss of 29.8% of respondents giving an overall response rate of 51.55%), have no qualifications (25%), be in the lowest quintile for household income (30%) and wealth (28.4%) and be 'not employed but looking for work' (27.7%). This was a similar pattern to the percentage of attrition observed between Waves 1 and 3.

### **1.1.3 Missing outcome data (Wave 3b)**

The same pattern of missing data described above was observed when Wave 3a was restricted to those missing data on parental occupation *and* psychological distress/K10 data to create Wave 3b. Respondents who are <34 years of age, Asian ethnicity (47.4%), 'never married' (26.7%), living in the most deprived areas (32.6%), with no educational qualifications (27.6%), low income (33%) and wealth (30.9%) and 'not employed looking for work' (28.9%) had the higher proportions of missing psychological distress/K10 (outcome) data at Wave 3b.

**Table 6. Response rates from Wave 1 to Wave 3; and missing data from Wave 3 to restricted Waves 3a and 3b (by Wave 1 characteristics)**

Wave 1 characteristics	Wave 1	Wave 3		Wave 3a restricted *			Wave 3b restricted**		
	n= 23,240	n	W3/W1 %	n	W3a/W1 %	W3a/W3 %	n	W3b/W1 %	W3b/W3 %
<b>Sex</b>									
Female	12360	10215	82.65	8240	66.67	80.67	7980	64.56	78.12
Male	10880	8740	80.33	6990	64.25	79.98	6760	62.13	77.35
<b>Age at interview</b>									
0-14	1075†	725	67.44	515	47.91	71.03	500	46.51	68.97
15-24	3800	2650	69.74	1915	50.39	72.26	1870	49.21	70.57
25-34	3735	2930	78.45	2275	60.91	77.65	2215	59.30	75.60
35-44	4530	3900	86.09	3290	72.63	84.36	3185	70.31	81.67
45-54	3760	3330	88.56	2850	75.80	85.59	2735	72.74	82.13
55-64	2895	2580	89.12	2120	73.23	82.17	2050	70.81	79.46
65+	3445	2835	82.29	2275	66.04	80.25	2185	63.43	77.07
<b>Ethnicity</b>									
NZ/European	16930	14615	86.33	12245	72.33	83.78	11910	70.35	81.49
Maori	1395	965	69.18	770	55.20	79.79	715	51.25	74.09
Pacific	3080	2175	70.62	1475	47.89	67.82	1420	46.10	65.29
Asian	1420	875	61.62	490	34.51	56.00	460	32.39	52.57
Other	420	320	76.19	255	60.71	79.69	240	57.14	75.00
<b>Marital status</b>									
Divorced Widowed Separated	3750	3085	82.27	2450	65.33	79.42	2375	63.33	76.99
Married	11090	9710	87.56	8175	73.72	84.19	7895	71.19	81.31
Never Married	7320	5425	74.11	4085	55.81	75.30	3975	54.30	73.27

\* Wave 3a restricted to OSM's with data on parental occupation.

\*\*Wave 3b restricted to OSM's with data on both parental occupation and psychological distress/K10.

Do not have data on missing people.

† Includes OSM's who were age 13-14 at Wave 1 and subsequently turned 15 years of age at Wave 3 therefore interviewed as adults.

**Table 6: Continued**

	Wave 1 n= 23,240	Wave 3 n= 18,955		Wave 3a restricted * n= 15,230			Wave 3b restricted* n= 14,740		
	n	n	W3/W1 %	n	W3a/W1 %	W3a/W3 %	n	W3b/W1 %	W3b/W3 %
<b>NZ Deprivation</b>									
NZDepQ1(least)	4220	3700	87.68	3210	76.07	86.76	3110	73.70	84.05
NZDepQ2	4495	3880	86.32	3280	72.97	84.54	3175	70.63	81.83
NZDepQ3	3945	3290	83.40	2690	68.19	81.76	2615	66.29	79.48
NZDepQ4	5260	4180	79.47	3305	62.83	79.07	3200	60.84	76.56
NZDepQ5(most)	5325	3910	73.43	2745	51.55	70.20	2635	49.48	67.39
<b>Highest educ qual</b>									
No Qualification	5975	4760	79.67	3570	59.75	75.00	3445	57.66	72.37
School Qual	7125	6065	85.12	5040	70.74	83.10	4890	68.63	80.63
Post school vocational qual	6185	4990	80.68	4025	65.08	80.66	3885	62.81	77.86
Degree or Higher	2880	2415	83.85	2085	72.40	86.34	2010	69.79	83.23
<b>Household income</b>									
q1: low <- 21080	3785	2685	70.94	1880	49.67	70.02	1800	47.56	67.04
q2: 21080 <- 34010	5565	4440	79.78	3455	62.08	77.82	3330	59.84	75.00
q3: 34010 <- 49380	4680	3850	82.26	3075	65.71	79.87	2985	63.78	77.53
q4: 49380 <- 72280	4500	3850	85.56	3245	72.11	84.29	3135	69.67	81.43
q5: 72280 <- high	4705	4125	87.67	3580	76.09	86.79	3485	74.07	84.48
<b>Wealth</b>									
Q1: low <- 25590	6785	5590	82.39	4000	58.95	71.56	3860	56.89	69.05
Q2: 25590 <- 70315	3505	3255	92.87	2610	74.47	80.18	2520	71.90	77.42
Q3: 70315 <- 128090	3295	3085	93.63	2605	79.06	84.44	2545	77.24	82.50
Q4: 128090 <- 232935	3330	3165	95.05	2725	81.83	86.10	2635	79.13	83.25
Q5: 232935 - high	3325	3170	95.34	2775	83.46	87.54	2680	80.60	84.54
<b>Labour market activity</b>									
Working	13585	11590	85.31	9640	70.96	83.18	9360	68.90	80.76
Not employed, not looking for work	7965	6220	78.09	4775	59.95	76.77	4585	57.56	73.71
Not employed, looking for work	605	415	68.60	300	49.59	72.29	295	48.76	71.08
Under 15	420	380	90.48	270	64.29	71.05	260	61.90	68.42

## 1.2 Demographics

### 1.2.1 Sample characteristics by exposure

Table 7 presents the demographic and socioeconomic characteristics of the study population (n= 14,740) by childhood SEP exposure. There are a number of strong relationships which are important to describe here. Almost half of the study population (44%) came from a low childhood socioeconomic background, 25% from a medium and 31% from a high childhood socioeconomic background.

Respondents aged 44 years and under reported a parental occupation corresponding to higher childhood SEP compared to those aged 45 years and over. Conversely, respondents from the older birth cohort (1920-1950) reported lower levels of childhood SEP compared to those from the youngest birth cohort (1970-1990) who reported higher levels of childhood SEP. These results suggest that age may potentially confound the association between childhood SEP and psychological distress in adulthood. For this reason the results of multivariate analysis were adjusted for age and stratified by birth cohort.

With regards to ethnicity, there was a higher percentage of Maori respondents who reported a parental occupation corresponding to lower levels of childhood SEP (60.5%), compared to parental occupations corresponding to medium (19.8%) or high childhood SEP (19.8%). Pacific respondents also reported parental occupation corresponding to lower levels of childhood SEP (54.4%) compared to medium (23.3%) or high childhood SEP (22.2%). Conversely, Asian reported parental occupations corresponding to higher levels of childhood SEP (47.2%) compared to medium (17.5%) or low childhood SEP (35.4%).

Respondents living in the least deprived areas (NZDepQ1) reported higher childhood SEP backgrounds (38.7%) compared to those living in the most deprived areas, whereas a greater percentage reported coming from a lower socioeconomic background in childhood (52.8%). There was a very strong relationship found between adult educational qualifications and childhood SEP. A greater percentage of adults who reported 'no qualifications' came from a low childhood SEP (60.8%) whereas half of adults who reported having a degree or higher came from a high childhood SEP (52.4%).

The relationship between household income and childhood SEP also highlighted that those adults reporting a lower household income come from a low childhood socioeconomic background. Interestingly the relationship between wealth and childhood SEP was not very strong, which could be due to confounding of the association by age.

**Table 7. Demographic and socioeconomic characteristics at Wave 3 of study sample by childhood SEP**

	All		Childhood SEP groups					
	N	col %	Low		Medium		High	
			N	row%	N	row%	N	row%
<b>Total</b>	14735	100	6515	44.21	3615	24.53	4605	31.25
<b>Demographic characteristics</b>								
<b>Sex</b>								
Female	7975	54.12	3590	45.02	1935	24.26	2450	30.72
Male	6760	45.88	2925	43.27	1680	24.85	2155	31.88
<b>Age at wave 3</b>								
15-24	2035	13.82	635	31.20	475	23.34	925	45.45
25-34	2020	13.71	750	37.13	475	23.51	795	39.36
35-44	3025	20.54	1265	41.82	755	24.96	1005	33.22
45-54	2925	19.86	1365	46.67	710	24.27	850	29.06
55-64	2235	15.17	1125	50.34	580	25.95	530	23.71
65+	2490	16.90	1380	55.42	610	24.50	500	20.08
<b>Birth cohort</b>								
1970-1990	4050	27.49	1385	34.20	950	23.46	1715	42.35
1950-1970	5955	40.41	2630	44.16	1470	24.69	1855	31.15
1920-1950	4730	32.10	2505	52.96	1190	25.16	1035	21.88
<b>Ethnicity</b>								
NZ/European	11985	81.31	5120	42.72	3070	25.62	3795	31.66
Maori	1340	9.09	810	60.45	265	19.78	265	19.78
Asian	720	4.88	255	35.42	125	17.36	340	47.22
Pacific	450	3.05	245	54.44	105	23.33	100	22.22
Other	245	1.66	85	34.69	55	22.45	105	42.86
<b>Marital status</b>								
Divorced Widowed Separated	2550	17.31	1325	51.96	630	24.71	595	23.33
Married	8025	54.46	3660	45.61	1980	24.67	2385	29.72
Never Married	4160	28.23	1530	36.78	1000	24.04	1630	39.18



**Table 7. continued**

	ALL	col%	Childhood SEP groups					
			Low		Medium		High	
			N	row%	N	row%	N	row%
<b>Socioeconomic characteristics</b>								
<b>NZ Deprivation</b>								
NZDepQ1(least)	3215	21.83	1210	37.64	760	23.64	1245	38.72
NZDepQ2	3150	21.39	1330	42.22	755	23.97	1065	33.81
NZDepQ3	2745	18.64	1190	43.35	695	25.32	860	31.33
NZDepQ4	3095	21.02	1450	46.85	760	24.56	885	28.59
NZDepQ5(most)	2520	17.11	1330	52.78	635	25.20	555	22.02
<b>Highest educ qual</b>								
No Qualification	3405	23.11	2070	60.79	810	23.79	525	15.42
School Qual	3925	26.64	1625	41.40	950	24.20	1350	34.39
Post school vocational qual	5170	35.09	2215	42.84	1395	26.98	1560	30.17
Degree or Higher	2235	15.17	610	27.29	455	20.36	1170	52.35
<b>Household income</b>								
q1: low -< 21080	1480	10.04	725	48.99	370	25.00	385	26.01
q2: 21080 -< 34010	3270	22.19	1690	51.68	805	24.62	775	23.70
q3: 34010 -< 49380	2825	19.17	1300	46.02	715	25.31	810	28.67
q4: 49380 -< 72280	3290	22.33	1405	42.71	820	24.92	1065	32.37
q5: 72280 -< high	3870	26.26	1400	36.18	900	23.26	1570	40.57
<b>Wealth</b>								
Q1: low -< 25590	3860	27.12	1560	40.41	910	23.58	1390	36.01
Q2: 25590 -< 70315	2520	17.70	1150	45.63	630	25.00	740	29.37
Q3: 70315 -< 128090	2540	17.84	1200	47.24	650	25.59	690	27.17
Q4: 128090 -< 232935	2635	18.51	1210	45.92	705	26.76	720	27.32
Q5: 232935 - high	2680	18.83	1190	44.40	600	22.39	890	33.21
<b>Labour market activity</b>								
Working	9905	67.24	4220	42.60	2420	24.43	3265	32.96
Not employed, not looking for work	4590	31.16	2200	47.93	1125	24.51	1265	27.56
Not employed, looking for work	235	1.60	100	42.55	65	27.66	70	29.79

To further aid understanding, Figure 7 presents five cumulative barcharts of childhood SEP by the adult SEP variables NZDep, education, household income, wealth and labour market activity. (corresponding numbers can be found in Table 7).

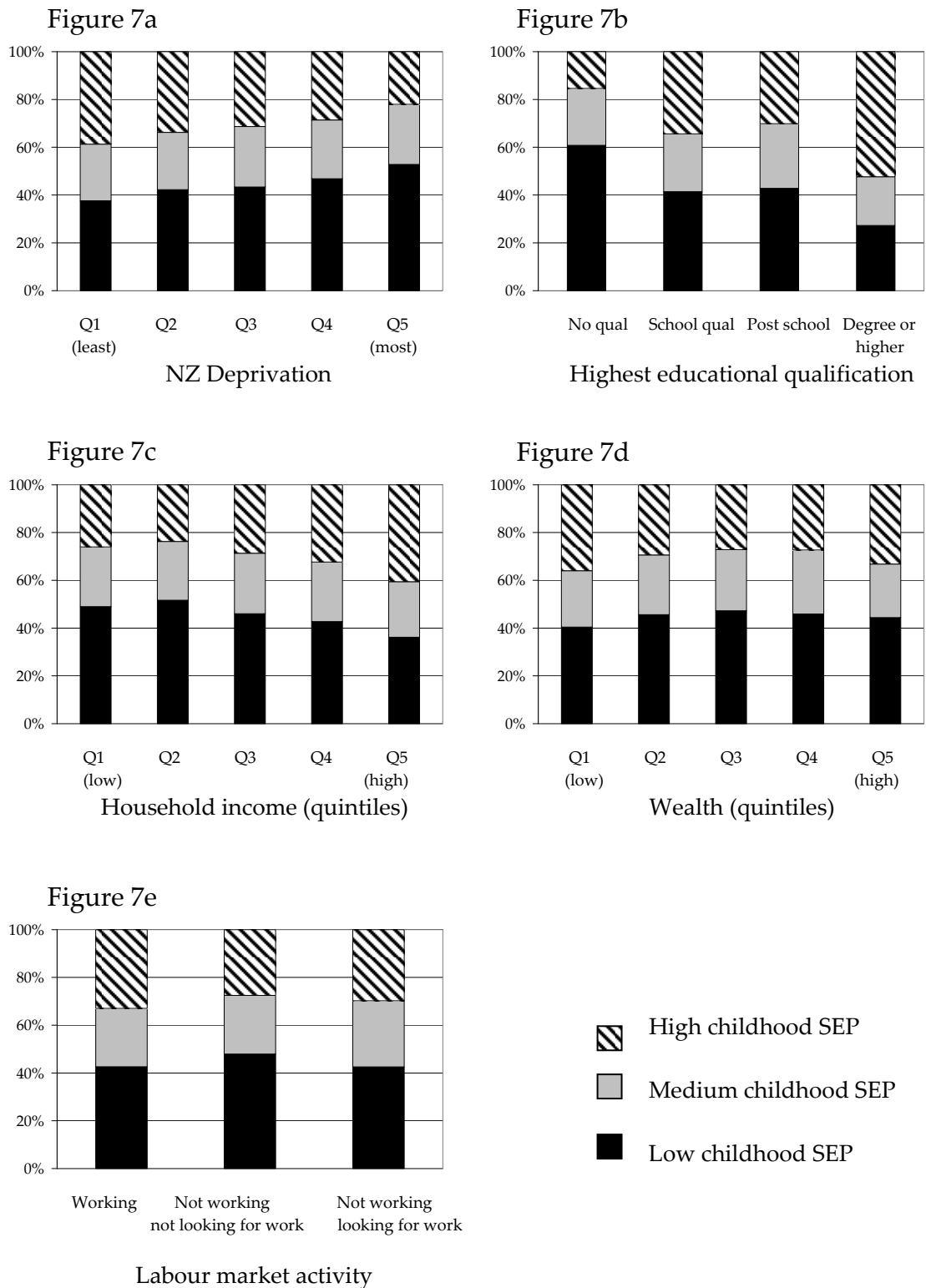
The first barchart (Figure 7a) shows that a higher proportion of participants with low childhood SEP live in the most deprived areas as adults. A linear relationship exists as you move from least (Q1) to most deprived (Q5) the proportion of adults reporting coming from a low childhood socioeconomic background increases, with over 50% of adults in the most deprived areas coming from a low childhood SEP. Conversely, as you move from least to most deprived areas, the proportion of respondents reporting a high childhood SEP decreases.

Figure 7b shows the strong relationship between educational qualifications and childhood SEP with 60% of those with 'no qualification' reporting coming from a low childhood socioeconomic background. This may be an age effect as this group will include younger adults who have not yet attained their highest educational qualification.

Figure 7c also shows a linear relationship between household income and childhood SEP. As you move from low to high income the proportion of adults reporting coming from a low childhood SEP decreases. Almost 50% of respondents in the lowest quintile report coming from a low childhood SEP, whilst less than 40% of respondents in the highest quintile report coming from a low childhood SEP.

The relationship with wealth is less obvious (figure 7d). These findings could also be due to age effects. Figure 7e shows a slightly higher proportion of adults who are 'not working and not looking for work' came from low childhood socioeconomic background. This could be due to birth cohort effects as this group includes older adults who are no longer in the work force i.e. retired and younger adults who are students.

**Figure 7. Cumulative barcharts of childhood SEP by adult NZDep, education, household income, wealth and labour market activity**



### **1.2.2 Sample characteristics by outcome**

The demographic and socioeconomic characteristics of the study sample in relation to psychological distress (K-10) are presented in Table 8. Nearly 80% of respondents experienced low levels of psychological distress compared to 20% who experienced moderate to high levels of psychological distress. Those respondents from a low childhood SEP had a marginally higher percentage of high psychological distress (21.47%) than those individuals from a medium (20.8%), or high childhood socioeconomic background (19.3%) in crude analysis.

Females made up slightly more than half of the sample (54.1%) and reported higher levels of psychological distress (22.51%) than males (18.4%). The sample was fairly evenly split over the six age groups, however higher levels of psychological distress were reported in those <35 years of age. Higher levels of psychological distress were also reported in the youngest birth cohort (1970-1990) (24.57%).

The majority of the sample was NZ/European (81.4%) however Pacific respondents reported higher levels of psychological distress than any of the other ethnic groups. Over half of the study members were married (54.48%) and this group reported lower levels of psychological distress than those who were divorced, widowed, separated or never married. Table 8 also shows there was a linear and monotonic relationship between adult socioeconomic variables NZ Dep, educational qualification, household wealth and labour market activity, and reporting moderate to high levels of psychological distress.

**Table 8. Demographics & socioeconomic characteristics by K10**

	All		Kessler Groups			
	N	col %	Low		Moderate to high	
			N	row %	N	row %
Total	14740	100	11700	79.38	3040	20.62
Childhood socioeconomic position						
Low	6520	44.23	5120	78.53	1400	21.47
Medium	3610	24.49	2860	79.22	750	20.78
High	4610	31.28	3720	80.69	890	19.31
Demographic characteristics						
Sex						
Female	7975	54.12	6180	77.49	1795	22.51
Male	6760	45.88	5515	81.58	1245	18.42
Age at interview						
15-24	2035	13.81	1500	73.71	535	26.29
25-34	2020	13.70	1555	76.98	465	23.02
35-44	3030	20.56	2380	78.55	650	21.45
45-54	2925	19.84	2400	82.05	525	17.95
55-64	2235	15.16	1860	83.22	375	16.78
65+	2495	16.93	2005	80.36	490	19.64
Birth cohort						
1970-1990	4050	27.49	3055	75.43	995	24.57
1950-1970	5955	40.41	4780	80.27	1175	19.73
1920-1950	4730	32.10	3865	81.71	865	18.29
Ethnicity						
NZ/European	11980	81.39	9665	80.68	2315	19.32
Maori	1340	9.10	995	74.25	345	25.75
Asian	720	4.89	545	75.69	175	24.31
Pacific	445	3.02	315	70.79	130	29.21
Other	235	1.60	170	72.34	65	27.66
Marital status						
Divorced Widowed Separated	2545	17.28	1925	75.64	620	24.36
Married	8025	54.48	6655	82.93	1370	17.07
Never Married	4160	28.24	3120	75.00	1040	25.00

**Table 8. Continued**

	All N	col %	Kessler Groups		Moderate to high N	row %
			N	Low row %		
Total	14725	100	11695	79.42	3030	20.58
Socioeconomic characteristics						
NZ Deprivation						
NZDepQ1(least)	3215	21.83	2775	86.31	440	13.69
NZDepQ2	3150	21.39	2585	82.06	565	17.94
NZDepQ3	2750	18.68	2185	79.45	565	20.55
NZDepQ4	3095	21.02	2330	75.28	765	24.72
NZDepQ5(most)	2515	17.08	1820	72.37	695	27.63
Highest educ qual						
No Qualification	3415	23.17	2600	76.13	815	23.87
School Qual	3920	26.59	3065	78.19	855	21.81
Post school vocational qual						
Degree or Higher	2235	15.16	1875	83.89	360	16.11
Household income						
q1: low <- 21080	1485	10.08	1055	71.04	430	28.96
q2: 21080 <- 34010	3270	22.19	2415	73.85	855	26.15
q3: 34010 <- 49380	2825	19.17	2180	77.17	645	22.83
q4: 49380 <- 72280	3290	22.33	2740	83.28	550	16.72
q5: 72280 <- high	3865	26.23	3310	85.64	555	14.36
Wealth						
Q1: low <- 25590	3860	27.13	2805	72.67	1055	27.33
Q2: 25590 <- 70315	2515	17.67	1915	76.14	600	23.86
Q3: 70315 <- 128090	2540	17.85	2065	81.30	475	18.70
Q4: 128090 <- 232935	2635	18.52	2205	83.68	430	16.32
Q5: 232935 - high	2680	18.83	2345	87.50	335	12.50
Labour market activity						
Working	9905	67.22	8165	82.43	1740	17.57
Not employed, not looking for work	4595	31.18	3385	73.67	1210	26.33
Not employed, looking for work	235	1.59	150	63.83	85	36.17

## 2 Logistic Regression

The results of my univariate and multivariate logistic regression analyses are presented in Table 9. Due to missing values on some covariates, all logistic regression is on 14,220 OSM's. Odds ratios (OR) and 95% confidence interval (CI) are shown for each variable relative to the referent group. In the crude univariate analyses (model 1), the odds of psychological distress were 16% higher among respondents from a lower childhood SEP compared to those from a high childhood SEP, with confidence intervals that did not include the null (OR 1.16, 95% CI 1.05-1.28).

After the potential confounders age, sex and ethnicity were added to the model (model 2), the relative odds of reporting psychological distress among those with low compared to high childhood SEP increased by 38% and remained significant, with participants from a low childhood SEP reporting 1.22 greater odds of psychological distress than participants from a high childhood SEP. These data demonstrate that the crude association between childhood SEP and psychological distress was negatively confounded by one or all of the confounders causing an underestimation of the crude association.

In the final model (model 3), respondents own SEP was adjusted for by adding NZDep, educational qualification, household income, wealth and labour market activity to model 2. Adding all of the adult SEP variables led to a 64% reduction in the excess odds ratio from model 2 (adjusted for confounding) resulting in an odds ratio of 1.08 that was no longer statistically significant with the confidence intervals including the null (95% CI 0.97 to 1.20).

**Table 9. Results of multivariable analysis**

	Model 1		Model 2		Model 3	
	OddsRatio/ 95% CI		OddsRatio/ 95% CI		OddsRatio/ 95% CI	
<b>Childhood socioeconomic position</b>						
Low	1.16	(1.05-1.28)	1.22	(1.10-1.35)	1.08	(0.97-1.20)
Medium	1.12	(1.01-1.26)	1.18	(1.06-1.33)	1.08	(0.96-1.21)
High (ref)	1.00		1.00		1.00	
<b>Age</b>						
15-24			1.00			
25-34			0.83	(0.72-0.97)	0.97	(0.82-1.15)
35-44			0.75	(0.65-0.86)	1.03	(0.87-1.22)
45-54			0.61	(0.53-0.71)	0.95	(0.79-1.13)
55-64			0.57	(0.49-0.67)	0.81	(0.66-0.98)
65+			0.71	(0.61-0.82)	0.64	(0.52-0.78)
<b>Sex</b>						
Male (ref)			1.00		1.00	
Female			1.27	(1.16-1.37)	1.17	(1.07-1.27)
<b>Ethnicity</b>						
NZ/European			1.00		1.00	
Maori			1.31	(1.14-1.51)	0.96	(0.83-1.12)
Pacific			1.51	(1.21-1.89)	1.02	(0.81-1.29)
Asian			1.32	(1.10-1.58)	1.05	(0.87-1.27)
Other			1.81	(1.35-2.42)	1.54	(1.14-2.08)
<b>NZ Deprivation</b>						
NZDepQ1(least)					1.00	
NZDepQ2					1.32	(1.14-1.51)
NZDepQ3					1.35	(1.17-1.56)
NZDepQ4					1.64	(1.43-1.88)
NZDepQ5(most)					1.61	(1.38-1.87)
<b>Highest educ qual</b>						
No Qualification					1.17	(1.00-1.37)
School Qual					1.09	(0.94-1.26)
Post school vocational qual					1.13	(0.98-1.30)
Degree or Higher					1.00	
<b>Household income</b>						
q1: low <- 21080					1.42	(1.21-1.67)
q2: 21080 <- 34010					1.44	(1.25-1.65)
q3: 34010 <- 49380					1.31	(1.14-1.50)
q4: 49380 <- 72280					1.02	(0.89-1.17)
q5: 72280 <- high					1.00	
<b>Wealth</b>						
Q1: low <- 25590					1.76	(1.48-2.08)
Q2: 25590 <- 70315					1.63	(1.39-1.92)
Q3: 70315 <- 128090					1.25	(1.07-1.47)
Q4: 128090 <- 232935					1.17	(1.07-1.38)
Q5: 232935 - high					1.00	
<b>Labour market activity</b>						
Working					1.00	
Not employed, not looking for work					1.65	(1.47-1.84)
Not employed, looking for work					1.78	(1.34-2.38)



### 3 Interactions

In order to test for any sex or birth cohort differences in my study population I stratified both models 2 and 3 by these two variables and the results are presented in Table 10. A Wald test of heterogeneity was then performed to test for any interaction of the odds ratio across levels of these variables.

#### 3.1 Sex

When the results from model 2 (adjusted for age, sex and ethnicity) were stratified by sex, the odds of psychological distress for low compared to high parental occupational class among males was 1.24 (95% CI 1.06-1.45) and 1.20 (95% CI 1.05-1.37) among females. Confidence intervals for both odds ratios excluded 1.0, but comparing the confidence intervals with each other they extensively overlap which is consistent with 'little' difference between 1.24 and 1.20. That is, there was no obvious evidence of any difference, or interaction, of the association of childhood SEP with psychological distress (adjusted for confounders) between males and females.

When the results from model 3 (adjusted for adult SEP) were stratified by sex the odds ratio reduced by 42% for males (OR= 1.14, 95% CI 0.97-1.34) and 75% for females (OR=1.05, 95%CI 0.91-1.20), and each confidence interval now included 1.0. A Wald test of heterogeneity of the fully adjusted OR by sex found non-significant differences for both low ( $p=0.44$ ) and medium childhood SEP ( $p=0.06$ ) each compared to the high childhood SEP group. That is, we cannot conclude with statistical confidence that the adjusted association of childhood SEP with psychological distress varies by sex.

## 3.2 Birth cohort

When the results from model 2 were stratified by birth cohort, the odds of psychological distress for low compared to high parental occupation class among the recent birth cohort was 1.27 (95% CI 1.07-1.52), the middle cohort 1.17 (95% CI 1.01-1.37) and the oldest birth cohort 1.25 (95% CI 1.02-1.52). Confidence intervals for all three odds ratios excluded 1.0, but comparing the confidence intervals with each other, they also extensively overlap. This too is consistent with 'little' difference between 1.27, 1.17 and 1.25. That is, there was no obvious evidence of any difference, or interaction, of the association of childhood SEP with psychological distress (adjusted for confounders) between birth cohorts.

When the results from model 3 (adjusted for adult SEP) were stratified by birth cohort, these odd ratios reduced by 41% in the recent birth cohort, 88% in the middle cohort, and 52% in the oldest cohort, and each confidence interval now included 1.0. A Wald test of heterogeneity of the fully adjusted OR by birth cohort found a non-significant difference across cohorts for both the low ( $p=0.34$ ) and medium childhood SEP groups ( $p=0.30$ ) each compared to the high childhood SEP group. That is, we also cannot conclude with statistical confidence that the adjusted association of childhood SEP with psychological distress varies by birth cohort.

**Table 10. Models 2 and 3 stratified by sex and birth cohort**

	Model 2		Model 3	
<b>Stratified by sex</b>				
<b>Male (n= 7,690)</b>				
Low	1.24	(1.06-1.45)	1.14	(0.97-1.34)
Medium	1.30	(1.10-1.54)	1.21	(1.02-1.44)
High (ref)	1.00		1.00	
<b>Female (n= 6,530)</b>				
Low	1.20	(1.05-1.37)	1.05	(0.91-1.20)
Medium	1.10	(0.94-1.28)	0.99	(0.85-1.15)
High (ref)	1.00		1.00	
<b>Wald Test for interaction (p-value)</b>				
Low childhood SEP				0.44
Medium childhood SEP				0.06
<b>Stratified by birth cohort</b>				
<b>1970-1990 (n= 3,715)</b>				
Low	1.27	(1.07-1.52)	1.16	(0.97-1.39)
Medium	1.18	(0.97-1.44)	1.08	(0.88-1.32)
High (ref)	1.00		1.00	
<b>1950-1970 (n= 5,865)</b>				
Low	1.17	(1.01-1.37)	1.02	(0.87-1.20)
Medium	1.09	(0.92-1.31)	0.97	(0.80-1.16)
High (ref)	1.00		1.00	
<b>1920-1950 (n=4,635)</b>				
Low	1.25	(1.02-1.52)	1.12	(0.91-1.38)
Medium	1.33	(1.06-1.66)	1.23	(0.98-1.55)
High (ref)	1.00		1.00	
<b>Wald Test for interaction (p-value)</b>				
Low childhood SEP				0.34
Medium childhood SEP				0.30

# Chapter 5: Discussion

The interpretation of the results of any study requires a consideration of study limitations and potential sources of error. This chapter discusses the limitations and strengths of my study; this is then followed by a discussion on the interpretation of my results in the context of previous research on childhood SEP and mental health.

## 1 Summary of results

The key findings of this study are summarised below:

- Individuals from the lowest childhood socioeconomic backgrounds had 16% greater crude odds of psychological distress compared to those from the highest childhood socioeconomic backgrounds, in the crude analysis.
- This association increased by 38% and remained significant after adjusting for age, sex and ethnicity, suggesting that negative confounding led to an underestimation of the true strength of the association in the crude analysis.
- Adult SEP appeared to mediate almost two thirds (64%) of the association between childhood SEP and adult psychological distress.
- There was no difference in the association of childhood SEP and psychological distress between males and females.
- There was no difference in the association of childhood SEP and psychological distress by birth cohort.

## **2 Study Limitations**

The most significant limitation of my study is the potential for misclassification of childhood SEP exposure. This is in comparison to other published studies which have used prospective and sometimes repeated measurement of childhood SEP. The other main weakness of my study is the cross-sectional analytical- design.

### **2.1 Misclassification of childhood SEP**

No measurement of exposure or outcome is perfect. Measurement errors may lead to misclassification of participants with respect to their exposure status and/or outcome and can lead to bias in the results of the study. These errors (and any resulting misclassification) can be either random (non-differential) or systematic (differential, i.e. measurement error of outcome associated with level of exposure or vice versa). In my study there is more likely to be measurement error of childhood SEP rather than mental health outcome due to the incorrect recall of parental occupation by participants or the occupational classification scheme used to code and group parental occupation and thence class.

#### **2.1.1 Recall of parental occupation**

Due to the scarcity of life-course studies that offer extended follow-up of children into later life, most investigators examining the role of childhood social conditions have done so in cohorts of middle aged persons. In these studies parental information can be recalled retrospectively from as much as five decades earlier due to different ages (Lynch, Kaplan et al. 1997; Harper, Lynch et al. 2002; Singh-Manoux, Ferrie et al. 2004; Luo and Waite 2005).

During the face-to face interview at Wave 3 in SoFIE Health (2004-05), participants were asked to recall their parent's occupation when they were 10 years old which means in some older individuals this information was being recalled as far back as the 1930's, whereas, for others they only had to recall less than 10 years ago.

Recall bias of exposure may have occurred as participants were asked to recall their parent's occupation during the same interview as answering the K-10. If individuals had problems in the remembering and reporting of their exposures, and everyone in the study had similar difficulties, it would likely lead to non-differential misclassification of childhood SEP exposure.

However, there is the possibility that adults with a higher education and SEP of their own may have better recall which might lead to differential misclassification of exposure, given that adult SEP is associated with the outcome. Stated more directly, differential recall of parent's occupation by level of psychological distress is not implausible and would result in differential misclassification of exposure. The possible implication of this is that poorer recall of childhood SEP by lower SEP adults could result in a greater underestimation of the effects of childhood social class on adult health status. However, there is no empirical evidence of this and the exact direction and amount of bias will depend on many unknown variations in the sensitivity and specificity.

Whilst this study could be criticised for the use of retrospective reports of childhood SEP; evidence has shown that adults are able to accurately recall their parents SEP at the time of their childhood, up to five decades earlier (Krieger, Okamoto et al. 1998; Batty, Lawlor et al. 2005). Especially when using parent's main occupation (Chittleborough, Baum et al. 2008).

There is also the argument that using retrospective reports about a single age (e.g. when the child was 10 years old) or about short durations during childhood is an unreliable indicator of, and weak proxy for, more complete information spanning the entire childhood period (Poulton, Caspi et al. 2002). Due to the design of the SoFIE study it was not possible to use prospective repeated measures of childhood socioeconomic position to assess the socioeconomic environment during childhood.

A review by Lynch and Davey-Smith of early life socioeconomic factors and coronary heart disease found that in studies in which childhood social circumstances were measured prospectively, the relationship with CHD was generally stronger than those in which their exposure was recalled in adulthood (Davey Smith and Lynch 2004). If this was the case in my study then the results are probably, if not almost certainly underestimated due to measurement error of childhood socioeconomic conditions due to recall bias.

### **2.1.2 Occupational classification schemes**

A major problem in international comparative research on social class differentials and health is that different countries have different occupational classifications and ways of grouping occupations into broader social classes (Martikainen and Valkonen 1999). Galobardes et al point out that most occupational classification schemes, with some important exceptions, have not been recently updated and probably cannot account for today's occupational structure (Galobardes, Shaw et al. 2006). However, in my study I am interested in the measurement of historical and more recent occupations as the study respondents are aged between 15 and 80 years of age.

The participants in the SoFIE study had information on parental occupation coded using the 1999 version of the New Zealand Standard Classification of occupations (NZSCO99)(Statistics New Zealand 2001). These occupational codes were then coded into socioeconomic class by mapping to the 1996 version of the New Zealand Socioeconomic Index (NZSEI).

The NZSEI was used rather than the earlier Elley-Irving Scale (1972), as the Elley-Irving Index was designed specifically for use in educational research, was based on data for males only, restricted to ages 25-44 and each of the six Elley-Irving groups include a wide spread of NZSEI scores (Elley and Irving 1972). The NZSEI on the other hand is more up to date, has a more rigorous conceptual basis underlying the scales and has used more advanced statistically modeling when deriving scores for

the scales (Davis, McLeod et al. 1997). The 1996 version was used as opposed to the 1991 version as it includes part time and full time workers, adjusts for the understatement of income by the self-employed and includes the economically inactive such as retired or housewives.

Although using the NZSEI-96 classification scheme will allow for a more accurate portrayal of current social circumstances in New Zealand now, it may not well-characterise social conditions from the 1930's right through to 1980's due to changes in occupational structure. This is a particular limitation for this analysis. Over the decades covered there has been a decrease in manual occupations with a concomitant increase in low-level service occupations thereby altering the stratification that occupation generates in terms of SEP (Galobardes, Shaw et al. 2006).

As the meaning of socioeconomic categories changes with secular evolutions in education and labour market characteristics over time, using the NZSEI-96 in this study has meant enforcing current socioeconomic status levels on older respondent's parental occupations. This in turn may have led to non-differential misclassification of childhood SEP that is greater for older people i.e. errors in the classification of exposure unrelated to the individual's outcome status, and an underestimation of the effect. That said, as I have used a trichotomous measure of childhood SEP; historical changes in "status" of occupations would need to be substantial enough to cross the two thresholds that I've used to categorise my childhood SEP measure. Whilst this probably almost certainly occurs (e.g. tradesman status has changed over time), much of the shuffling in occupational status in the last 20-50 years is more than likely within the three levels of childhood SEP used.

### **2.1.3 Interviewer bias/ human error**

SoFIE is conducted using computer-assisted interviewing. In the field, interviews use laptop computers to administer an electronic questionnaire, face-to-face, in the



respondent's home. The occupation coders within SNZ are then responsible for classifying an occupation to the appropriate NZSCO99 code based on the respondent's response. This information is obtained from direct questioning asking for the occupation title of the respondent's parents. As there are no task/duties details asked for, which can make general descriptions easier to assign to a specific code, the interviewers are required to make judgments about what to code to a specific code and what to code to unidentifiable or out of scope (code 97 or 99).

This potential for human error exists at the respondent, interviewer, coder or analytical interpretation level and could lead to mismeasurement of parental occupation and thus misclassification of childhood SEP. This misclassification is likely to be non-differential and thus any effect would lead to an under estimation of the association between childhood SEP and psychological distress.

#### **2.1.4 Birth cohort effects**

Time is a fundamental concept in life course epidemiology, not just in terms of life-time (as indexed by the chronological age of individuals) but also in terms of historical time at the population level (as indexed by membership of a birth cohort) (Kuh and Ben-Shlomo 2004). As this study is based on subjects recruited throughout New Zealand and born during a wide range of time (1920-1990), the implication of birth cohort effects (generational differences) need to be taken into consideration when interpreting the association. That is effects that are specific to a group born at the same time but that differ between groups born at different times.

If childhood SEP is more accurately measured in the younger cohort due to using a contemporary occupational classification scheme (NZSCO99), and therefore there may be more measurement error in the older cohorts, this might spuriously generate a stronger association of childhood SEP with psychological distress among younger adults, or spuriously hide a 'truly' stronger association among older adults. If this is the case then again the odds ratios from my main analysis would probably, if not

almost certainly be underestimated more among the older adults (or older birth cohort) due to measurement error of childhood socioeconomic conditions.

In order to explore these possible effects the results were stratified by birth cohort (1970-1990, 1950-1970 and 1920-1950). Stratification showed the variations between the groups were modest and not statistically significant. Thus, it is possible that a stronger association among older adults is actually being missed.

## **2.2 Selection bias**

One of the main limitations of using longitudinal data and following population samples over time is that sample attrition may cause selection bias in the analysis population. The response rate at Wave 1 of SoFIE was estimated at 77% and between Waves 1 and 3 the attrition rate was approximately 18%, giving an estimated follow-up rate of 82% and a total response rate of 63%. The dataset used in my analysis was further restricted to those adults with full data on exposure and outcome.

Figure 6 in chapter 4 presented a flow diagram of this loss of respondents.

Approximately 20% of adults were lost from the study when restricted to those not missing childhood SEP data and a further 3% were lost when the dataset was restricted to those individuals' not missing childhood SEP and psychological distress/K10 data. Those OSM's with full data available for analysis represent 49% of the original study sample.

There is a limitation to restricting the dataset in this way and that is the possibility of introducing selection bias or systematic error into my results. If those individuals lost through attrition or missing data have a different childhood SEP-mental health association to those who have no missing data or are not lost to follow-up then selection bias may be introduced into the results.

Selection bias will arise if the exposure-outcome association among those excluded from analysis is different to those included. Individuals in the lowest childhood SEP groups are more likely to be lost to follow-up (attrition) or having missing exposure data, meaning this group may be under-represented in the total study sample. However, this alone will not create selection bias. If those adults from the lower childhood SEP group who are lost to follow-up or have missing exposure data are also those whom are at the highest risk of psychological distress (and those lost to follow-up among higher childhood SEP have similar psychological distress to those of higher childhood SEP in the study) then the study will underestimate the effect of low childhood SEP on risk of psychological distress. There is a risk of not being able to obtain information about childhood SEP from a substantial fraction of the very people who are most at risk of poor health.

It was not possible to directly estimate the extent and the pattern of 'missingness' or whether such bias occurred in this study as we did not have information on those individuals with missing data. However, for the results of my analysis to be pushed towards the null, we would need to see the exact opposite association of childhood SEP and psychological distress in the 50% of the original study sample who are missing, this seems implausible.

## **2.3 Confounding and mediation**

A major limitation of my study and many related studies is unmeasured confounding and mediation. The definition of confounding and mediation was discussed in section 1.4 in chapter 2. Confounders which were not measured in this study include a family history of mental illness, single-parent status in childhood and maternal age. There are a host of measures which could be classed as mediators in the association between childhood SEP and mental health status in adulthood. The main two mediators which have been considered in the published literature but not measured in this study are childhood health and current adult physical health. This

study was unable to adjust for childhood health or a family history of mental illness as this information was not collected in the SoFIE study and thus is a threat to the internal validity of my study.

So what does this unmeasured confounding and mediation mean for my results? The likely consequences of this unmeasured confounding and mediation is that it has probably led to an overestimate of the effect since I have not been able to adjust for them in my analysis. However, it is unlikely to affect my finding that two-thirds of the association of childhood SEP with psychological distress was mediated by adult SEP i.e. it is unlikely to affect the proportion accounted for by adult SEP.

Above I have described unmeasured confounding and mediation which is a threat to the internal validity of my study due to complete absence of information on them. There is however another important issue and that is the potential error in attributing two-thirds of the association of childhood SEP with psychological distress to the mediator adult SEP. Adult SEP is correlated with childhood SEP and other variables and thus it will be 'capturing' their contribution too. This is known as the fallibility of estimating direct and indirect effects (Cole and Hernan 2002).

## **2.4 Generalisability**

Generalisability or external validity, concerns whether the findings from this study are generalisable to other populations. A strength of this study compared to other cohort studies, is that it was based on a large population based panel study that is representative of the general New Zealand population. This is in contrast to previous research which has used non-nationally representative samples (Gilman, Kawachi et al. 2002; Poulton, Caspi et al. 2002; Gilman, Kawachi et al. 2003; Melchior, Moffitt et al. 2007) or specific sub-populations (Lynch, Kaplan et al. 1997; Harper, Lynch et al. 2002) and therefore lack generalisability to other populations. Although the results presented here are not weighted to the New Zealand population they

should be generalisable to the majority of the current population in New Zealand. Generalising the findings to other countries and other time periods however may be more difficult.

Harper has stressed “studies assessing the effects of socioeconomic factors on health, particularly across the life course, should pay close attention to the particular historical, geographical and cultural circumstances pertaining to the cohort being studied” (Harper, Lynch et al. 2002). An understanding of the context is needed to be able to better understand the mechanisms through which the economic and social environment affect health throughout life and how this socioeconomic context differs between countries and time periods.

## **2.5 Study design**

A major limitation of this study is the cross-sectional analytical design. The ‘gold standard’ study design for life course studies is longitudinal which allows for repeated prospective measures. Although SoFIE is a longitudinal study and therefore a dataset that is suited to life course analyses we currently only have access to Wave 3 health data and therefore have no repeat measures of exposure or outcome.

### **3 Study strengths**

A key strength of my study is the measurement of adult SEP which uses five indicators of socioeconomic position allowing me to be able to comprehensively adjust for the mediating effects of adult SEP. Another key strength is the reliability of the Kessler-10 questionnaire as an instrument for measuring non-specific psychological distress in the population.

#### **3.1 Measure of adult SEP**

In order to fully account for the mediating effects of adult SEP in the relationship between childhood SEP and mental health in adulthood it was crucial to have a comprehensive measure of adult socioeconomic circumstances. This was achieved by using five individual measures of adult SEP (education, household income, NZDeprivation, wealth and labour market activity), which is a relative strength of this study.

Much of the previous research has been confined to a single indicator such as occupation or education for measuring adult SEP, potentially soaking up unmeasured confounding of SEP (Poulton, Caspi et al. 2002; Gilman, Kawachi et al. 2003; Gilman, Kawachi et al. 2003; Singh-Manoux, Ferrie et al. 2004; Melchior, Moffitt et al. 2007; Power, Atherton et al. 2007).

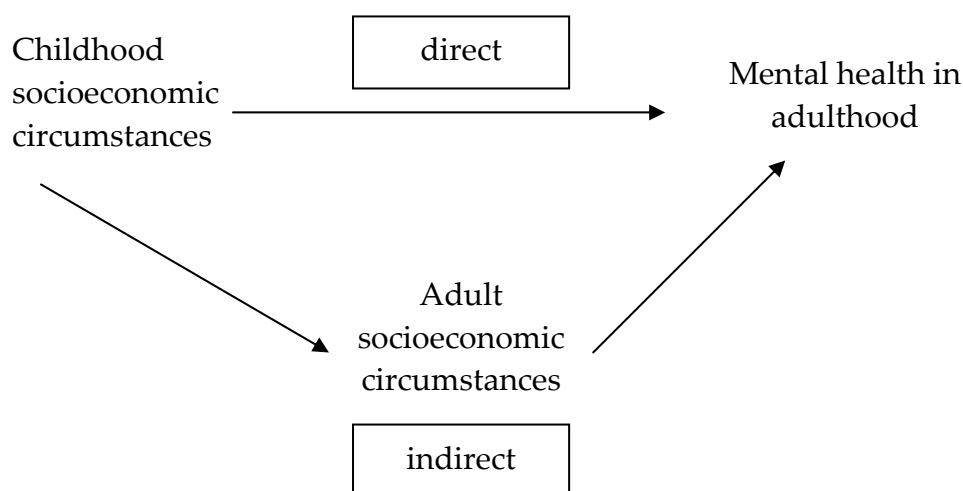
#### **3.2 Reliability of the Kessler-10**

The main findings of this study are specific to a general measure of psychological distress. The Kessler-10 is a common instrument used to screen for non-specific psychological distress in population surveys (Kessler 2002). High and very high scores on the K10 are strongly associated with clinical diagnoses of depression and anxiety (Andrews and Slade 2001, Furukawa 2003).

The K10 used in SoFIE asks about mental health in the four weeks prior to interview, so it is possible that the prevalence of psychological distress has been underestimated. However, the prevalence of low psychological distress across a number of demographic and socioeconomic measures were similar to that found in the recent New Zealand Mental Health Survey and the 2006/07 Health Survey (Oakley Browne, Wells et al. 2006) (Ministry of Health 2008).

## 4 Interpreting the study results

This results of my analysis found that the relationship between childhood socioeconomic background and psychological distress in adulthood was largely explained by current adult SEP. This is consistent with a “pathways” interpretation within the life course framework which views the early or distal socioeconomic environment as being important for adult health, either through its direct influence on health or mediated through proximal socioeconomic circumstances, in this case contemporaneous adult SEP. My results suggest that childhood socioeconomic circumstances are important because they affect adult socioeconomic position which in turn influences mental health status i.e. the indirect pathway is stronger than the direct pathway (Figure 8).



**Figure 8. Direct and indirect pathways**



The pathways or underlying mechanisms which were discussed in Chapter 2 (see Figure 2) are however still not fully understood. Does social disadvantage during childhood or early development affect psychological development, which in turn affects adult SEP? Do children from disadvantage families engage less in education during childhood and adolescence, which in turn affects adult SEP? Do adults from low SES backgrounds experience more stressful events throughout the life course and thus suffer poorer mental health in adulthood? Whilst the answers to these questions are outside the scope of this dissertation they form part of the bigger life course jigsaw of which this study provides a small piece. This dissertation set out to answer three research questions which are discussed below in context of previous research.

#### **4.1 What is the crude association of childhood SEP and adult mental health status?**

The results of this study found that individuals from the lowest childhood socioeconomic backgrounds had a 16% greater odds of experiencing moderate to high psychological distress compared to those individuals from the highest childhood socioeconomic backgrounds. This finding was stronger than reported by Power et al (2007) but not as strong as reported by Gilman et al (2002). The US study population in this latter study however had higher levels of depression than a nationally representative study.

## **4.2 What is the association of childhood SEP and adult mental health status after adjusting for common confounders e.g. age, sex and ethnicity?**

The results of my study demonstrated that once the confounder's age, sex and ethnicity were adjusted for, the association between childhood SEP and psychological distress increased and remained significant. The residual effect of childhood SEP strengthened by 38% after adjusting for the selected confounders. It can therefore be concluded that one or more of these additional covariates (age, sex and ethnicity) were negative confounders.

This finding is consistent with the international literature. Gilman et al (2002), controlled for a greater number of confounders (including family history of mental disorders, mothers age, single parent status, age, sex and ethnicity) and found the association of childhood SEP and depression remained significant after adjustment; with the residual effect of childhood SEP strengthening by an average of 18%.

Other studies have also found that the residual association of childhood SEP with adult mental health status remains statistically significant after adjusting for confounding (Gilman, Kawachi et al. 2003; Singh-Manoux, Ferrie et al. 2004; Power, Atherton et al. 2007). Unlike my study however these studies do not provide an unadjusted estimate to allow us to calculate the percentage reduction in the strength of the association once confounders are adjusted for.

### **4.3 How much of the above association is mediated by adult SEP?**

The results of my analysis found that most of the observed association between childhood SEP and psychological distress in adulthood disappeared when adjusted for adult SEP which was theorised as a mediator. This is consistent with the 'pathways' model; current SEP represents a more immediate and accumulated influence on health than the more distal influence of early life circumstances which exert their influence through a mediated pathway.

Almost two-thirds (64%) of the association of childhood SEP with current psychological distress in adulthood was explained by contemporaneous adult SEP. This is a larger proportion than found in other studies. Gilman et al (2002) found between 9 and 24 % of the association between childhood SEP and depression (life time diagnosis) was accounted for by adult SEP. Power et al's study (2007) found that adult SEP accounted for about a third (36%) of the association between childhood SEP and adult depressive symptoms and anxiety. With regards to the residual association of childhood SEP, unlike Gilman (2002) and Power (2007) I did not find that childhood SEP was significantly associated with psychological distress independently of adult SEP.

So what might explain this finding? There is the possibility that measurement error of childhood SEP may have underestimated the excess risk of psychological distress in those from a lower childhood SEP however it is unclear whether a more precise measure of childhood SEP would have made any difference the two-thirds being explained by adult SEP. Conversely, it may be that the complete range of adult SEP measures I had actually also captured the effects of other correlated mediating variables e.g. psychological factors (Cole and Hernan 2002).

## 4.4 Interactions of sex and birth cohort

In my analysis I used stratification to explore the interactions of sex and birth cohort as my *a priori* theory was that there could be a stronger association found in females and a difference in association by birth cohort. Women have an increased prevalence of moderate, high and very high probability of an anxiety or depressive disorders compared to men, especially between the ages of 15 to 24. (Ministry of Health 2008). However, my results showed no evidence of a stronger association in females compared to males or evidence of a difference in association by birth cohort. The only other study to explore interactions of sex was Gilman et al (2002). Their findings were consistent with mine and they failed to find a stronger association in females compared to male.

## Chapter 6: Conclusions

The main goal of this dissertation was to ascertain whether an association exists between childhood socioeconomic position (SEP) and adult mental health status, and if so how much of the association is mediated by adult socioeconomic position. This was achieved by performing a review of the results from existing studies which have investigated this association, followed by data analysis from Wave 3 of the SoFIE Study. The association between childhood SEP (indexed by parental occupation) and psychological distress (assessed using the Kessler 10) in over 14,000 New Zealand adults was analysed before and after adjusting for the mediators, adult education, income, NZDep, labour force status and wealth.

The results of the literature review and my analysis indicate there is an association between childhood SEP and adult mental health and that a large part of the association is mediated by adult SEP. The results of the studies reviewed in Chapter 2 of the literature review suggest that on average about 40% of the association between childhood SEP and adult mental health can be “explained” by adult SEP. Using SoFIE-Health data with multiple measures of adult socioeconomic position and in the New Zealand context; my own analysis in Chapter 3 suggested about 64% of the association between childhood SEP and psychological distress is mediated by adult socioeconomic position.

These findings are consistent with the evidence that socioeconomic circumstances in adulthood (income, deprivation, wealth, labour force status, education) are important determinants of inequalities in adult mental health (Dohrenwend, Levav et al. 1992; Poulton, Caspi et al. 2002; Fryers, Melzer et al. 2003; Muntaner, Eaton et al. 2004; Skapinakis, Weich et al. 2006).

My study suggests that this adult association mediates much of the observed association of childhood SEP and mental health, consistent with a life course

“pathways” interpretation. These pathways are complex and adult SEP is only one possible mediator of the association between childhood socioeconomic circumstances and adult mental health.

This dissertation has investigated childhood SEP and its impact on adult mental health however it does not tell us about the specific processes involved. Research now needs to identify the key mechanisms that bring about this longitudinal association. For example, does the occupation and educational level of parents (and thereby childhood SEP) adversely influence developmental processes during childhood or adolescence which in turn impact adult socioeconomic circumstance and mental health? Or some other mechanism that is ‘captured’ by, or correlated with adult socioeconomic position. In order to answer these further questions a current New Zealand birth cohort study is needed that collects detailed information on social and economic factors across the life course such as the Dunedin Multidisciplinary Health and Development Study (Poulton, Caspi et al. 2002).

Starting this year is *Growing Up in New Zealand*. A new longitudinal study of 7,800 children New Zealand-born children who will be followed from before they are born until they become adults (about 20 years old). It is the first longitudinal study in New Zealand to start collecting information about children before their birth and also the first to interview the child’s father (or mother’s partner) as well as the mother. It also aims for proportionate representation of all ethnic groups in New Zealand. It will collect information on the child’s family, neighbourhood, health and development and education, and routine health information (University of Auckland 2009)

The data collected will reflect the developmental stage of the child, factors in the wider context and changes in over time. Information collected will include parental physical health and well-being and mental health before and after birth. It will also collect information on childhood cognitive, emotional and psychical developmental and well-being. This will allow researchers to explore research questions similar to

mine but over the life course which will provide more information on the complex pathways involved.

It is important therefore that the New Zealand government continues to support current birth cohort and longitudinal studies in this country to enable further research to elucidate the complex life course pathways between childhood adversity and its impact on future health status in adulthood.

Finally, even though we do not have a complete understanding of these pathways, the findings of this and other research on the life course effects of childhood SEP, provides evidence for improving the socioeconomic conditions of children. Not only could this have a long-term benefit for adult health but it may also be an influential means for reducing inequalities in mental health.

## References

- Amato, P. R. (1991). Parental Absence during Childhood and Depression in Later Life. *The Sociological Quarterly* 32(4): 543-556.
- American Psychiatric Association Task Force on DMS IV (2000). Diagnostic and Statistical Manual of Mental Disorders: DMS-IV-TR, 4th edition. Washington DC.
- Andrews, G. and T. Slade (2001). Interpreting scores on the Kessler Psychological Distress Scale (K10). *Australian and New Zealand Journal of Public Health* 25(6): 494-497.
- Aseltine, R. H., Jr. (1996). Pathways Linking Parental Divorce With Adolescent Depression. *Journal of Health and Social Behavior* 37(2): 133-148.
- Batty, G. D., D. A. Lawlor, et al. (2005). Accuracy of adults' recall of childhood social class: findings from the Aberdeen children of the 1950s study. *Journal of Epidemiology and Community Health* 59(10): 898-903.
- Batty, G. D., S. M. B. Morton, et al. (2004). The Aberdeen Children of the 1950s cohort study: background, methods and follow-up information on a new resource for the study of life course and intergenerational influences on health. *Paediatric & Perinatal Epidemiology* 18(3): 221-239.
- Beardslee, W. R. M. D., M. B. M. D. Keller, et al. (1993). The Impact of Parental Affective Disorder on Depression in Offspring: A Longitudinal Follow-up in a Nonreferred Sample. *Journal of the American Academy of Child & Adolescent Psychiatry* 32(4): 723-730.
- Bifulco, A. T., G. W. Brown, et al. (1987). Childhood loss of parent, lack of adequate parental care and adult depression: a replication. *Journal of Affective Disorders* 12(2): 115-128.
- Bradley, R. H. and R. F. Corwyn (2002). Socioeconomic Status and Child development. *Annual Review of Psychology* 53(1): 371-399.
- Carter, K., M. Hayward, et al. (2008). SoFIE Health Baseline Report: Study design and associations of social factors and health in Waves 1 to 3. SoFIE Health Report. Wellington, Univeristy of Otago.
- Carter, K. N., T. Blakely, et al. (2009). What is the association between wealth and mental health? *Journal of Epidemiology and Community Health* 63(3): 221-226.
- Cherlin, A. J., P. L. Chase-Lansdale, et al. (1998). Effects of Parental Divorce on Mental Health Throughout the Life Course. *American Sociological Review* 63(2): 239-249.
- Chittleborough, C. R., F. Baum, et al. (2008). Missing data on retrospective recall of early-life socio-economic position in surveillance systems: An additional disadvantage? *Public Health* 122(11): 1152-1166.
- Chittleborough, C. R., F. E. Baum, et al. (2006). A life-course approach to measuring socioeconomic position in population health surveillance systems. *Journal of Epidemiology and Community Health* 60(11): 981-992.



- Cole, S. R. and M. A. Hernan (2002). Fallibility in estimating direct effects. *International Journal of Epidemiology* 31(1): 163-165.
- Collings, S. and P. Ellis (1997). Biological, social and economic risk factors Mental Health in New Zealand from a Public Health Perspective. S. Collings and P. Ellis. Wellington, Public Health Group, Ministry of Health: 39-82.
- Davey Smith, G., C. Hart, et al. (1998). Education and occupational social class: which is the more important indicator of mortality risk? *Journal of Epidemiology and Community Health* 52(3): 153-160.
- Davey Smith, G. and J. Lynch (2004). Life course approaches to socioeconomic differentials in health. A Life course approach to chronic disease epidemiology. D. Kuh and Y. Ben-Shlomo, Oxford University Press: 77-115.
- Davis, P., G. Jenkin, et al. (2003). New Zealand Socio-economic Index 1996: An update and revision of the New Zealand Socio-economic Index of Occupational Status *Australian & New Zealand Journal of Public Health*.
- Davis, P., G. Jenkin, et al. (2004). Method: The New Zealand Socio-economic Index of Occupational Status: methodological revision and imputation for missing data. *Australian & New Zealand Journal of Public Health* 28(2): 113-119.
- Davis, P., K. McLeod, et al. (1997). The New Zealand Socioeconomic Index of Occupational Status (NZSEI). Wellington, Statistics New Zealand.
- Disley, B. (1997). An Overview of Mental Health in New Zealand. Mental Health in New Zealand from a Public Health Perspective. P. Ellis and S. Collings, Ministry of Health: 3-7.
- Dohrenwend, B. P., I. Levav, et al. (1992). Socioeconomic Status and Psychiatric Disorders: The Causation-Selection Issue. *Science* 255(5047): 946.
- Downey, G. and J. C. Coyne (1990). Children of Depressed Parents: An Integrative Review. *Psychological Bulletin* 108(1): 50-76.
- Elley, W. B. and J. C. Irving (1972). A Socio-economic index for New Zealand based on levels of education and income from the 1996 census. *New Zealand Journal of Educational Studies* 7(2): 153-167.
- Elley, W. B. and J. C. Irving (1976). Revised socio-economic index for New Zealand. *New Zealand Journal of Educational Studies* 11: 25-33.
- Fryers, T., D. Melzer, et al. (2003). Social inequalities and the common mental disorders: A systematic review of the evidence. *Social Psychiatry & Psychiatric Epidemiology* 38(5): 229.
- Galobardes, B., J. Lynch, et al. (2007). Measuring socioeconomic position in health research. *British Medical Bulletin* 81-82(1): 21-37.
- Galobardes, B., J. W. Lynch, et al. (2008). Is the association between childhood socioeconomic circumstances and cause-specific mortality established? Update of a systematic review. *Journal of Epidemiology and Community Health* 62(5): 387-390.
- Galobardes, B., M. Shaw, et al. (2006). Indicators of socioeconomic position. *Methods in Social Epidemiology*. J. Michael Oakes and J. Kaufman, S., Jossey-Bass: 47-858.
- Galobardes, B., M. Shaw, et al. (2006). Indicators of socioeconomic position (part 1). *Journal of Epidemiology and Community Health* 60(1): 7-12.

- Gilman, S. E. (2003). Review: there is marked socioeconomic inequality in persistent depression. *Evidence based Mental Health* 6(3): 75-.
- Gilman, S. E., I. Kawachi, et al. (2003). Socio-economic status, family disruption and residential stability in childhood: relation to onset, recurrence and remission of major depression. *Psychological Medicine* 33(8): 1341.
- Gilman, S. E., I. Kawachi, et al. (2002). Socioeconomic status in childhood and the lifetime risk of major depression. *International Journal of Epidemiology* 31(2): 359-367.
- Gilman, S. E., I. Kawachi, et al. (2003). Family Disruption in Childhood and Risk of Adult Depression. *American Journal Psychiatry* 160(5): 939-946.
- Goodman, S. H. and I. H. Gotlib (1999). Risk for Psychopathology in the Children of Depressed Mothers: A Developmental Model for Understanding Mechanisms of Transmission. *Psychological Review* 106(3): 458-490.
- Graham, H. and C. Power (2004). Childhood disadvantage and health inequalities: a framework for policy based on lifecourse research. *Child: Care, Health & Development* 30(6): 671-678.
- Harper, S., J. Lynch, et al. (2002). Life course socioeconomic conditions and adult psychosocial functioning. *International Journal of Epidemiology* 31(2): 395-403.
- Hauser, R. M. (1994). Measuring Socioeconomic Status in Studies of Child Development. *Child Development* 65(6): 1541-1545.
- Hope, S., C. Power, et al. (1999). Does financial hardship account for elevated psychological distress in lone mothers? *Social Science & Medicine* 49: 1637-1649.
- Kessler, R. C., G. Andrews, et al. (2002). Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychological Medicine* 32(06): 959-976.
- Kessler, R. C., C. G. Davis, et al. (1997). Childhood adversity and adult psychiatric disorder in the US National Comorbidity Survey. *Psychological Medicine* 27(05): 1101-1119.
- Krieger, N., A. Okamoto, et al. (1998). Adult Female Twins' Recall of Childhood Social Class and Father's Education: A Validation Study for Public Health Research. *American Journal of Epidemiology* 147(7): 704-708.
- Krieger, N., D. R. Williams, et al. (1997). Measuring Social Class in US Public Health Research: Concepts, Methodologies, and Guidelines. *Annual Review Public Health* 18(1): 341-378.
- Kuh, D. and Y. Ben-Shlomo (2004). Introduction: a life course approach to the aetiology of adult chronic disease. *A Life Course Approach to Chronic Disease Epidemiology*. D. Kuh and Y. Ben-Shlomo: 3-14.
- Kuh, D., Y. Ben-Shlomo, et al. (2003). Life course epidemiology. *Journal of Epidemiology and Community Health* 57(10): 778-783.
- Laaksonen, E., P. Martikainen, et al. (2007). Socioeconomic circumstances and common mental disorders among Finnish and British public sector employees: evidence from the Helsinki Health Study and the Whitehall II Study. *International Journal of Epidemiology* 36(4): 776-786.
- Laaksonen, M., O. Rahkonen, et al. (2005). Socioeconomic Position and Self-Rated Health: The Contribution of Childhood Socioeconomic Circumstances, Adult

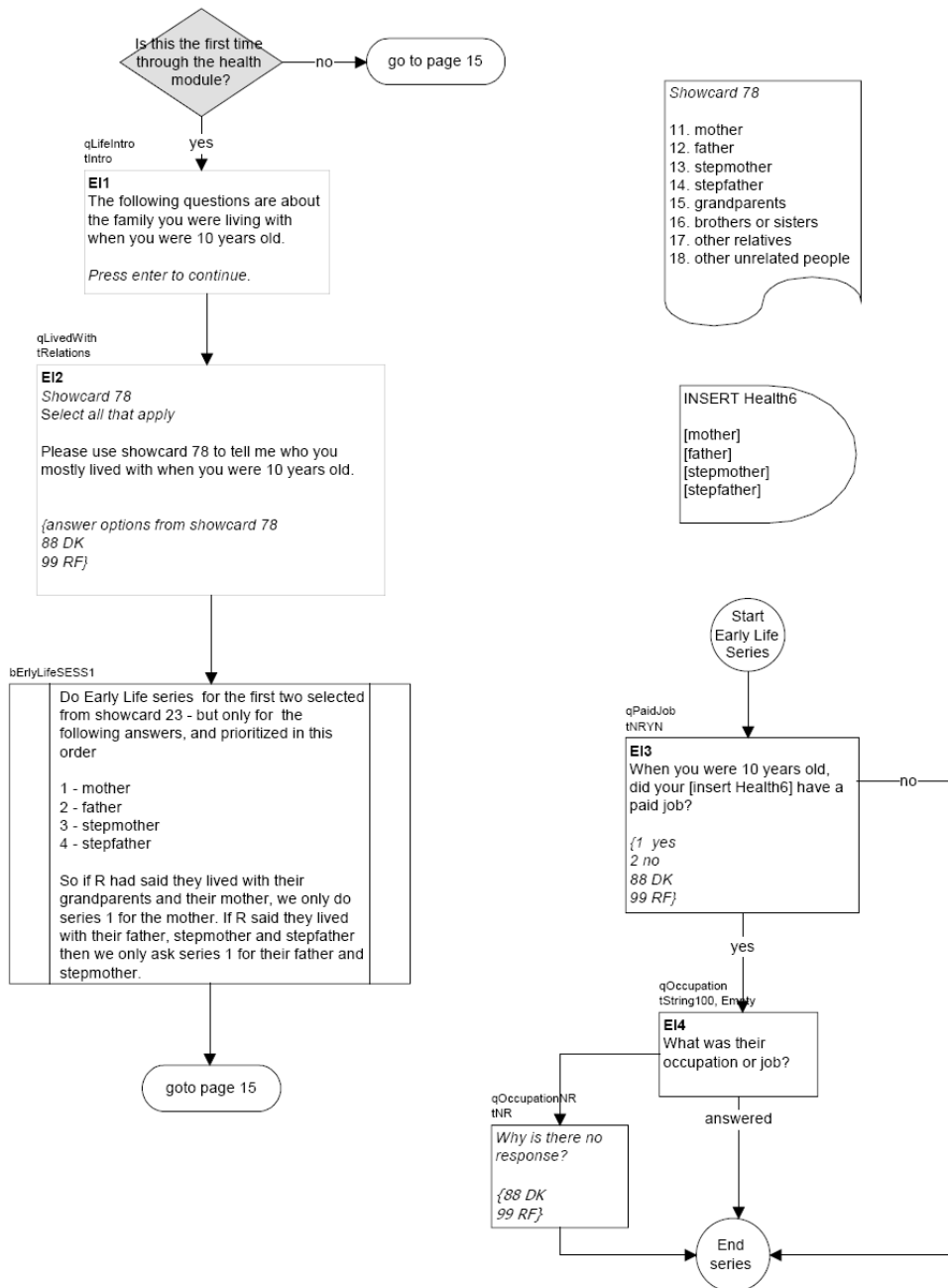
- Socioeconomic Status, and Material Resources. *American Journal of Public Health* 95(8): 1403-1409.
- Lorant, V., C. Croux, et al. (2007). Depression and socio-economic risk factors: 7-year longitudinal population study. *British Journal of Psychiatry* 190(4): 293-298.
- Lorant, V., D. Deliege, et al. (2003). Socioeconomic Inequalities in Depression: A Meta-Analysis. *American Journal of Epidemiology* 157(2): 98-112.
- Luo, Y. and L. Waite, J. (2005). The Impact of Childhood and Adult SES on Physical, Mental, and Cognitive Well-Being in Later Life. *The Journals of Gerontology* 60B(2): S93.
- Lynch, J. W., G. A. Kaplan, et al. (1997). Why do poor people behave poorly? Variation in adult health behaviours and psychosocial characteristics by stages of the socioeconomic lifecourse. *Social Science & Medicine* 44(6): 809-819.
- Martikainen, P. and T. Valkonen (1999). Bias related to the exclusion of the economically inactive in studies on social class differences in mortality. *International Journal of Epidemiology* 28(5): 899-904.
- Maughan, B. and G. McCarthy (1997). Childhood adversities and psychosocial disorders. *British Medical Bulletin* 53(1): 156-169.
- McDowell, I. (2006). *Measuring Health: a guide to rating scales and questionnaires*, Oxford University Press.
- McLeod, D. (2004). General practitioner recognition of mental illness in the absence of a 'gold standard'. *Australian & New Zealand Journal of Psychiatry* 38(10): 789-794.
- Melchior, M., T. E. Moffitt, et al. (2007). Why Do Children from Socioeconomically Disadvantaged Families Suffer from Poor Health When They Reach Adulthood? A Life-Course Study. *American Journal of Epidemiology* 166(8): 966-974.
- Miech, R. A., A. Caspi, et al. (1999). Low Socioeconomic Status and Mental Disorders: A Longitudinal Study of Selection and Causation During Young Adulthood. *The American Journal of Sociology* 104(4): 1096-1131.
- Ministry of Health (2008). *A Portrait of Health. Key Results of the 2006/07 New Zealand Health Survey*. Wellington, Ministry of Health.
- Moody-Ayers, S., K. Lindquist, et al. (2007). Childhood Social and Economic Well-Being and Health in Older Age. *American Journal of Epidemiology* 166(9): 1059-1067.
- Muntaner, C., W. Eaton, W., et al. (2004). Socioeconomic position and major mental disorders. *Epidemiologic Reviews* 25: 53-62.
- Murphy, J., M. (2002). Symptom Scales and Diagnostic Schedules in Adult Psychiatry. *Textbook in Psychiatric Epidemiology*. M. Tsuang, T. and M. Toehn, John Wiley & Sons, Inc: 307.
- Oakley Browne, M., J. Wells, et al. (2006). *Te Rau Hinengaro: The New Zealand Mental Health Survey*. Wellington, Ministry of Health.
- Poulton, R., A. Caspi, et al. (2002). Association between children's experience of socioeconomic disadvantage and adult health: a life-course study. *The Lancet* 360(9346): 1640-1645.

- Power, C., K. Atherton, et al. (2007). Life-course influences on health in British adults: effects of socio-economic position in childhood and adulthood. *International Journal of Epidemiology* 36(3): 532-539.
- Power, C., E. Hypponen, et al. (2005). Socioeconomic Position in Childhood and Early Adult Life and Risk of Mortality: A Prospective Study of the Mothers of the 1958 British Birth Cohort. *American Journal of Public Health* 95(8): 1396-1402.
- Power, C. and O. Manor (1992). Explaining social class differences in psychological health among young adults: a longitudinal perspective. *Social Psychiatry & Psychiatric Epidemiology* 27: 284-291.
- Power, C. and S. Matthews (1997). Origins of health inequalities in a national population sample. *The Lancet* 350(9091): 1584-1589.
- Power, C., S. A. Stansfeld, et al. (2002). Childhood and adulthood risk factors for socio-economic differentials in psychological distress: evidence from the 1958 British birth cohort. *Social Science & Medicine* 55(11): 1989-2004.
- Repetti, R. L., S. E. Taylor, et al. (2002). Risky Families: Family Social Environments and the Mental and Physical Health of Offspring. *Psychological Bulletin* 128(2): 330-366.
- Rothman, K., J. and S. Greenland (1998). *Modern Epidemiology*. Philadelphia, Lippincott-Raven.
- Sadowski, H., B. Ugarte, et al. (1999). Early life family disadvantages and major depression in adulthood. *The British Journal of Psychiatry* 174(2): 112-120.
- Salmond, C. and P. Crampton (2002). NZDep2001 Index of Deprivation. Wellington, Department of Public Health Wellington School of Medicine and Health Sciences.
- Singh-Manoux, A., J. E. Ferrie, et al. (2004). Socioeconomic trajectories across the life course and health outcomes in midlife: evidence for the accumulation hypothesis? *International Journal of Epidemiology* 33(5): 1072-1079.
- Skapinakis, P., S. Weich, et al. (2006). Socio-economic position and common mental disorders: Longitudinal study in the general population in the UK. *British Journal of Psychiatry* 189(2): 109-117.
- Stansfeld, S., J. Head, et al. (2008). Social position, early deprivation and the development of attachment. *Social Psychiatry and Psychiatric Epidemiology* 45: 516-526.
- Stansfeld, S. A., J. Head, et al. (2003). Social inequalities in depressive symptoms and physical functioning in the Whitehall II study: exploring a common cause explanation. *Journal of Epidemiology and Community Health* 57(5): 361-367.
- Stansfeld, S. A., J. Head, et al. (1998). Explaining social class differences in depression and well-being. *Social Psychiatry & Psychiatric Epidemiology* 33(1): 1.
- Statistics New Zealand (2001). NZ Standard Classification of Occupation 1999, Statistics New Zealand.
- University of Auckland. (2009). "Growing up in New Zealand." Retrieved 26/02/2009, from <http://www.growingup.co.nz/>.
- Veijola, J., P. Puukka, et al. (1998). Sex differences in the association between childhood experiences and adult depression. *Psychological Medicine* 28(01): 21-27.

- Wadsworth, M. (1999). Early life. Social Determinants of Health. M. D. Marmot and R. G. Wikinson. New York, Oxford University Press: 44-63.
- Wakefield, J. C. (1992). The Concept of Mental Disorder: On the Boundary Between Biological Facts and Social Values. *American Psychologist* 47(3): 373-388.
- Weich, S. and G. Lewis (1998). Material standard of living, social class, and the prevalence of the common mental disorders in Great Britain. *Journal of Epidemiology and Community Health* 52(1): 8-14.
- Weich, S. and G. Lewis (1998). Poverty, unemployment, and common mental disorders: population based cohort study. *British Medical Journal* 317(7151): 115-119.
- World Health Organisation. "The ICD-10 Classification of Mental and Behavioural Disorders: Clinical descriptions and diagnostic guidelines." Retrieved 16/2/2009, from <http://www.who.int/classifications/icd/en/bluebook.pdf>.
- World Health Organisation. (1948). "Preamble to the Constitution of the World Health Organisation as adopted by the International Health Conference." Retrieved 16/2/09, from <http://www.who.int/about/definition/en/print.html>.
- World health Organisation (2004). The International Statistical Classification of Diseases and Related Health Problems, Tenth Revision. Geneva.
- World Health Organisation. (2007). "What is mental health?" Retrieved 13/11/2008, from <http://www.who.int/features/qa/62/en/index.html>.
- World Health Organisation (2008). The global burden of disease: 2004 update. Geneva, World Health Organisation.

# Appendix A

Flow chart of questions used to assess parental occupation in the SoFIE Health module (Source: Statistics New Zealand)



## Appendix B

Mapping of 2 digit NZSCO99 codes to NZSEI96 codes:

NZSCO99	Description	NZSEI
11	Legislators and Administrators	65
12	Corporate Managers	55
21	Physical, Maths & Engineering Professionals	58
22	Life Science and Health Professionals	59
23	Teaching Professionals	53
24	Other Professionals	61
31	Physical Science & Engineering Ass Professionals	48
32	Life Science & Health Associate Professionals	42
33	Other Associate Professionals	46
41	Office Clerks	31
42	Customer Services Clerks	28
51	Personal and Protective Services Workers	24
52	Salespersons, Demonstrators and Models	22
61	Market Agricultural and Fishery Workers	30
71	Building Trades Workers	36
72	Metal and Machinery Trades Workers	35
73	Precision Trades Workers	34
74	Other Craft and Related Trades Workers	26
81	Industrial Plant Operators	32
82	Stationary Machine Operators and Assemblers	20
83	Industrial Plant Operators	27
84	Building and Related Workers	29
91	Labourers and Related Service Workers	20
97	Response unidentifiable	.
99	Response outside scope or not stated	.

# Appendix C

## KESSLER-10 QUESTIONNAIRE

How have you been feeling during the **past 4 weeks**?

**(Circle One Number on Each Line)**

	<u>All</u> of the <u>Time</u>	<u>Most</u> of the <u>Time</u>	<u>Some</u> of the <u>Time</u>	<u>A Little</u> of the <u>Time</u>	<u>None</u> of the <u>Time</u>
1. How much of the time have you felt tired out for no good reason? .....	1	2	3	4	5
2. How often did you feel nervous? .....	1	2	3	4	5
3. How often did you feel so nervous that nothing could calm you down? .....	1	2	3	4	5
4. How often did you feel hopeless? .....	1	2	3	4	5
5. How often did you feel restless or fidgety? .....	1	2	3	4	5
6. How often did you feel so restless or fidgety that you could not sit still? .....	1	2	3	4	5
7. How often did you feel depressed? .....	1	2	3	4	5
8. How often did you feel so depressed that nothing could cheer you up? .....	1	2	3	4	5
9. How often did you feel everything was an effort? .....	1	2	3	4	5
10. How often did you feel worthless? .....	1	2	3	4	5