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THE RELATIONSHIP OF UNEMPLOYMENT WITH HEALTH AND HEALTH BEHAVIOUR IN YOUNG MEN

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Thesis for the degree of Doctor of Philosophy

The City University

Social Statistics Research Unit

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1. ABSTRACT

Objectives - There were three main objectives in this investigation of the relationship of unemployment with ill health and hazardous health behaviour in young men. The first objective was to assess the role of direct and indirect health selection in explaining the relationship between unemployment and poor health: were men with pre-existing childhood chronic illnesses or greater vulnerability to illness more likely to experience adult unemployment? The second objective was to investigate whether the experience of unemployment was associated with deterioration in health behaviour. The third objective was to assess if the experience of unemployment resulted in deterioration of mental health.

Design and subjects - Data on men from a longitudinal birth cohort study, the National Child Development Study (NCDS) were used in these analyses. NCDS has collected data on all men and women born in one week in 1958 and living in Great Britain. Cohort members were followed up using interviews, self-completion questionnaires and medical examinations at birth and at ages 7, 11, 16, 23 and 33 years. Data were available for 4,999 men at age 33 years.

Methods - Logistic regression was used to investigate the risk of experiencing over one year of accumulated unemployment between ages 22 and 33 years, associated with having a pre-existing illness or vulnerability to illness prior to labour market entry. Accumulated and recent unemployment were used as exposure measures in logistic

regression models, where the dependent variables were measures of health behaviour and Body Mass Index (BMI). Cox regression was used to model accumulated and recent unemployment as time dependent covariates, where the dependent variable was onset age of symptoms of depression and anxiety that resulted in medical consultation.

Results - Both childhood chronic illnesses and childhood indicators of vulnerability to illness were associated with an increased risk of adult unemployment. Unemployment was associated with having a less healthy diet and a deterioration in health behaviours, including cigarette smoking, between age 16 and 33 years. Men who had been unemployed reported significantly higher levels of physical exercise in leisure time at age 33 years. Low BMI, but not obesity, was associated with greater amounts of accumulated unemployment. The experience of unemployment was associated with subsequent onset of symptoms of depression and anxiety, resulting in medical consultation. All analyses were adjusted for socioeconomic background and relevant measures of behaviour and health prior to the experience of unemployment.

Conclusions - Unemployment is associated with deterioration in some health behaviours and mental health. Men who experience unemployment are also more likely to have higher levels of pre-existing vulnerability to poor health. Some coping strategies for unemployment may be protective for health, but others may themselves be health risks. Further research into the relationship between unemployment and ill health should model the causal pathways from birth to middle and old age, in order to assess the accumulation of risks associated with unemployment.

2. INTRODUCTION

The association of unemployment with excess morbidity and mortality has been convincingly demonstrated by a number of studies conducted in various countries (Bartley, 1994). Here, the relationship of unemployment with health and health behaviours in young men from a longitudinal cohort of British births in 1958 is examined. By using longitudinal data, it was possible to investigate the role of circumstances and personal characteristics prior to the experience of unemployment as predisposing factors for both the risk of unemployment and the risk of ill-health.

Unemployment and Ill Health

The evidence for deterioration of mental health as a consequence of experiencing unemployment is compelling. School leavers who encountered unemployment have displayed worsening psychological health with increasing exposure to unemployment. The damaging effects of unemployment on mental health were subsequently reversed when these young people obtained employment (Banks and Jackson, 1982; Tiggeman and Winefield, 1984). The deterioration in psychological well-being with increasing length of unemployment does not continue indefinitely, as many unemployed people become habituated to the circumstances of unemployment. Several studies have shown that deterioration in psychological well-being ceases after 12 to 18 months of unemployment (Banks and Ullah, 1987; Hamilton *et al*, 1993; Warr and Jackson, 1985). However, even after cessation of deterioration, it has been shown that the level

of psychological well-being amongst unemployed men remains significantly worse when compared with men in employment from similar backgrounds (Warr and Jackson, 1987).

Not only the experience of unemployment, but also the threat of becoming unemployed has been associated with a deterioration in psychological well-being (Mattiasson *et al*, 1990). Job loss has been identified as a stressful event that is similar to bereavement in terms of its psychological consequences (Fagin and Little, 1984). It is unsurprising that job loss or the threat of unemployment has negative psychological consequences as employment has long been believed to provide non-financial benefits including a structured use of time, higher self-esteem and status (Jahoda, 1942; Jahoda, 1979). Warr (1987) has described the benefits of employment on psychological well-being using his 'vitamin theory', that identifies components of working life which positively reinforce individual identity and provide motivation for daily activities (Warr describes this as 'traction').

Financial hardship is likely to be a major reason for the link between excess morbidity and unemployment. During the 1980s men who experienced unemployment were not only more likely to be relatively financially disadvantaged during a period of unemployment, but also if they became re-employed afterwards. This is because after being unemployed, men were more likely to be employed in insecure jobs with low wages (Gregg and Wadsworth, 1995). A deterioration in both mental and physical health has been observed in people whose circumstances forced them to borrow money (White, 1991) indicating the effects of poverty on health. A study conducted in the USA

concluded that financial strain was the important mediating factor between unemployment and ill health (Kessler *et al*, 1988) and in a British study, the relationship between unemployment and psychological ill health was significantly diminished by adjustment for a measure of financial hardship (Rodgers, 1991). An important factor in the relationship between financial hardship and poor psychological health may be the increased social isolation and reduced frequency of leisure activities that are consequences of relative poverty (Clarke, 1978).

In addition to poor psychological health, unemployment has also been associated with excess physical morbidity and mortality. Excess mortality amongst those who were unemployed and seeking work has been observed in several countries, including Britain (Moser *et al,* 1984; Moser *et al,* 1990), Denmark (Iverson *et al*, 1987) and Finland (Martikainen, 1990). The mechanisms to explain the link between early mortality and unemployment are not fully understood. A direct link is through suicide, as higher rates of suicide (Moser *et al,* 1984) and attempted suicide (Platt and Kreitman, 1984) have been observed amongst the unemployed. This may, in part, be because vulnerable individuals may be more at risk of becoming unemployed and they are less likely to have the psychological and social resources that are required to cope with the experience of unemployment (Kessler *et al*, 1988). It is likely that the stress of unemployment can also directly influence physical health, as stress has negative neuroendocrine and immunological effects (Arnetz *et al*, 1991; Kaplan, 1991). Anticipation of job loss has been linked with deterioration of physical health, but in some studies this decline has not continued after unemployment has started (Beale and Nethercott, 1985). However,

increased cardiovascular risk factors have been observed at least two years after job loss (Arnetz *et al*, 1991).

The physical health of unemployed men may be affected by hazardous health behaviour. Unemployment has been associated with an increase in illegal drug use (Peck and Plant, 1986), heavier cigarette smoking (Cook *et al*, 1982; Morris *et al*, 1992) and higher levels of alcohol consumption (Wilson, 1980). The heavier drinking and other drinking problems observed amongst unemployed men, and those at risk of unemployment, may be a function of the higher levels of stress and feelings of powerlessness experienced by these men (Seeman and Seeman, 1992). While hazardous health behaviours may be responsible for some of the excess mortality observed in unemployed men, this is unlikely to be the full explaination. Morris *et al* (1994) found that the risk of early death was higher for unemployed men even after adjustment for drinking and smoking behaviour.

Uncertainty and debate continues over whether unemployment causes illness or whether those at a higher risk of unemployment were in poorer health prior to becoming unemployed (Clausen *et al*, 1993; Valkonen and Martikainen, 1992; White, 1991). Stern (1981) argued that only longitudinal data would be able to disentangle the causal relationships of unemployment and illness, whilst taking into account the effects of background characteristics on both risk of unemployment and risk of excess morbidity and mortality. Three broad hypotheses have been proposed to explain the relationship between ill health and unemployment and these may be described as: direct health

selection, indirect health selection; and causation. These hypotheses provide a useful analytic framework for research in this area.

Direct Health Selection - The direct health selection hypothesis asserts that poor health is the direct cause of an individual's unemployment. Direct health selection would require a disease to manifest itself prior to the experience of unemployment, as this disease would be the cause of job loss or it would prevent a job being obtained. Several possible mechanisms could explain direct health selection: functional limitation caused by the disease could directly prevent the sufferer doing his job as well as someone without the disease; a disease might result in more absence from work; or employers may discriminate against men who they know to have a condition (Robinson *et al*, 1989). Individually, or in combination, these factors could raise an individual's risk of losing a job or failing to obtain one.

Indirect Health Selection - The indirect health selection hypothesis argues that those at greatest risk of unemployment may also be more vulnerable to excess mortality and morbidity because of social and personal characteristics which independently affect both their risk of unemployment and of illness (Valkonen and Martikainen, 1992). Thus, there may be social and individual characteristics which put individuals at higher risk of both unemployment and ill-health. These characteristics should not include manifest symptoms of physical or mental illness that could themselves add to the risk of unemployment, as this would be 'direct health selection'.

Causation - The causation hypothesis explains the relationship between unemployment and ill health in terms of unemployment being the cause of a deterioration in health status. A number of mechanisms to explain this hypothesis have been proposed. The relative poverty resulting from ongoing unemployment has been associated with declining psychological health (Jackson and Warr, 1984) and a deterioration in physical health (White, 1991). The stressful nature of unemployment may affect not just mental health, but also physical health, possibly through chronically increased levels of anxiety (Kaplan, 1991). It has also been suggested that the experience of unemployment may lead to a deterioration in health related behaviours, such as alcohol consumption and cigarette smoking (Morris *et al,* 1992), which could ultimately result in ill-health.

A longitudinal perspective is invaluable in examining the relationship between unemployment and ill-health using a framework based upon the concepts of the direct health selection, indirect health selection and causation hypotheses. Some knowledge of the relative temporal sequencing of unemployment, onset of illness and changes in health related behaviours is desirable in understanding the aetiological processes which may be involved. Longitudinal data provides the opportunity to identify temporal sequences of events. To identify direct health selection, a disease should be diagnosed or symptoms should be present prior to any experience of unemployment. For example, consider a man with educational qualifications and a family background similar to his peers, but who was different because he had a chronic illness while they did not. If the chronically ill man was more likely to be unemployed *because* of the pre-existing illness than his peers, this would be a case of direct health selection. Indirect selection would require

that no diagnosis of chronic disease or symptoms of serious illness were present prior to the experience of unemployment. Individuals at greater risk of unemployment would indicate signs of vulnerability to illness, but should not actually be sick, as if they were sick prior to becoming unemployed, the direct selection argument could be applied. If a man's (disadvantaged) childhood circumstances resulted in both poor qualifications and greater vulnerability to illness, this may result in indirect selection. The poor qualifications may result in unemployment and then his vulnerability to illness could result in disease: this is indirect selection, as the vulnerability to illness can be detected prior to unemployment, but is not its cause. The causation hypothesis might be tested by identifying symptoms or diagnosis of disease that were first reported (or were exacerbated more than would be expected given initial date of onset), at a time after the onset of unemployment. The experience of unemployment should be shown to have caused illness that would not otherwise have developed at a given time.

Here, longitudinal data for male members of the National Child Development Study (NCDS) are used to investigate the relationship between unemployment and ill-health within a framework of the three hypotheses described previously. Longitudinal studies are particularly suited to the measurement of change, both individual change and environmental change. All members of the cohort are exposed to time dependent environmental and social changes, known as period effects (Goldstein, 1979): they experience time periods and their effects together as they are all the same age. The sharing of period effects lead to a certain amount of homogeneity within the members of this type of cohort, resulting in this population sharing some characteristics: these are

known as cohort effects. As cohort members are the same age at any time point, NCDS is a particularly powerful tool for studying changing characteristics and comparing different sub-groups at the same age, making it possible to identify age effects.

The investigation of temporal sequencing in NCDS is somewhat constrained by the structure of its data. Data collection was performed at discrete points in time, or 'sweeps', at ages: birth, 7, 11, 16, 23 and 33 years. Most data, including measurement of health and illness, are only available at certain cross-sectional time points, rather than as a continuous record. Exceptionally, some data are available that represent a continuous history, including the record of unemployment experience. In order to test the three unemployment and ill-health hypotheses, it is important to establish if illness or hazardous health behaviour pre-dated unemployment. As unemployment may be experienced at any age after labour market entry, measurements of health status and health behaviour prior to experience of any unemployment that apply to all men in the cohort, need to be taken at a point before labour market entry. Then it is possible to report health and health behaviour before it can be affected by any experience of unemployment. As the sweep of NCDS at age 16 years was conducted during the last year of compulsory schooling and thus pre-dates labour market entry by any of the cohort members, health and other personal characteristics collected by this sweep or by earlier sweeps, must pre-date any experience of unemployment. Thus, the health and social precursors of unemployment, as investigated here, largely come from measures collected during childhood up to age 16 years.

Socioeconomic Circumstances in Childhood

Previous research using longitudinal data has shown that higher risks of unemployment, ill health and hazardous health behaviours are associated with relative socioeconomic disadvantage during childhood (Wadsworth, 1991). It is important to consider the impact of childhood circumstances on risk for unemployment and health, and to look for independent relationships between unemployment and ill health beyond those that might be expected from continuities in disadvantage from childhood into adult life. NCDS provides access to prospectively collected data on childhood health and circumstances as well as adult health and unemployment data, for the same individuals. Childhood circumstances are considered throughout these analyses, as they are likely to be significant in relation to both adult unemployment and ill health. Unemployment has socioeconomic *outcomes*, for example, the experience of unemployment can result in downward social mobility (Gregg and Wadsworth, 1995). Measures of socioeconomic background are of particular importance here, as circumstances during childhood cannot be a consequence of the cohort member's own experience of unemployment, unlike measures in adult life after labour market entry which could be outcomes of previous unemployment.

The Labour Market Experience of NCDS Men to Age 33 Years

Between 1974, when NCDS men were 16 years of age and first able to enter the labour market, and 1991, when they were 33 years of age, there were significant variations in

job tenure, job security and the rate of unemployment in Great Britain (Gregg and Wadsworth, 1995). The vast majority of NCDS men entered the labour market just before or during the economic recession of the early 1980s. Strong cohort and period effects may be observed for these men, all born in 1958, and aged 23 years in 1981, as they all experienced the recession early in their working lives: it is important to consider the socioeconomic context within which these men experienced unemployment. Their relative ages of leaving full-time education may have had an unusually powerful effect as those who first entered the labour market when the recession was at its worst level may have had greater difficulty than might be expected in finding their first job. During this period of recession the unemployment rate was exceptionally high (Lawlor, 1990) and this is reflected in the unemployment rate amongst men in NCDS. Both the damaging effect of previous unemployment on job prospects (Gregg and Wadsworth, 1995) and the reduced number of vacancies due to the recession would have resulted in many men having to take, and remain in, 'undesirable jobs' (Burchell, 1994). For many men, the experience of working in these undesirable jobs may have even greater damaging consequences for psychological health (and possibly physical health) than the experience of unemployment (Burchell, 1994).

The inceased risk of unemployment due to the economic recession could have significant consequences for NCDS men. The men who experienced much early unemployment are more likely to experience future unemployment and accumulate more unemployment throughout their lives. This in turn, is likely to result in these men having to accept undesirable jobs and having to experience greater poverty, unless they can escape the

consequences of earlier unemployment. If a causal relationship between unemployment, and ill-health and deterioration in health behaviours is hypothesised, then the health of these men may also suffer as a consequence of the extra burden of unemployment. The economic recession will also have resulted in greater heterogeneity amongst those who experienced unemployment in the early 1980s. During a recession the workforce becomes more highly selected as employers are less likely to employ anyone with characteristics which they view as undesirable. This results in the pool of unemployed men being more heterogeneous, in health terms, than they would be in more economically buoyant times. Because of increased heterogeneity, this period of young adult life amongst NCDS men is of particular interest when considering the relationship between unemployment and ill-health: men were exposed to significant amounts of unemployment who would not have experienced this unemployment if had they entered the labour market at a different time. The men whose characteristics made them most vulnerable to unemployment (and perhaps more vulnerable to illness) were liable to experience more unemployment during this time of recession, and thus some effects of unemployment may be magnified in this analysis. But because even those men whose characteristics made less vulnerable to unemployment (and also possibly illness) were also likely to be unemployed during the recession, this permits an investigation of the consequences of unemployment for young men who were unlikely to have experienced such significant amounts of unemployment if they had entered the labour market at a time of higher demand for labour.

The research is divided into five areas of data analysis: an investigation of data quality was performed; and the subject matter was set in context by an investigation of patterns of unemployment and socioeconononomic precursors of unemployment. This is followed by the three broad areas of substantive investigation: childhood health and development; health behaviour and Body Mass Index; and mental health.

Outline of the Research

Data Quality - Attrition can be a problem when analysing longitudinal data sets such as NCDS, as not all cohort members are represented in every data collection sweep. Attrition arises from death, emigration and failure to trace, as well as refusal (Fox and Fogelman, 1990). For some variables, data may be missing even where a cohort member participated in the relevant sweep. This can be due to failure or refusal to answer a particular question or complete a survey instrument. Because the vast majority of the cohort was represented in the data collected during the early years of life (Fogelman, 1983), it is possible compare the early life characteristics of those who drop-out of the study with those who do not, thus estimating the effects of attrition on sample representativeness. Such analysis of sample representativeness was performed here.

The unemployment data used here were dependent on retrospective collection techniques: information about unemployment experienced in previous years was collected during two of the data collection sweeps. Because the quality of retrospectively collected data can be compromised due to deterioration of memory (Janson, 1990), the quality of the

unemployment data used here was investigated.

Experience of Unemployment - The experience of unemployment was investigated, as this was both an outcome and exposure measure for these analyses. Both timing of unemployment and amount of unemployment accumulated between age 16 years and 33 years were used for analysis.

Socioeconomic Precursors of Unemployment - Childhood characteristics describing the socioeconomic circumstances of the family of origin, are assessed as risk factors for adult unemployment. Thus the research is set in a relevant labour market context and the relation of unemployment with potential confounding variables for both unemployment and health are described. The independence, from the confounding variables, of the relationship of unemployment with health and health related behaviour can be established, as multivariate statistical techniques allow adjustment to be made for the potential confounding factors.

Childhood Health and Development - The relative timing of unemployment and measures of health and health related behaviour are available in NCDS data, and this can be exploited to test for the presence of direct health selection, indirect health selection and causation amongst young men. To test the direct health selection hypothesis, chronic illness and disability present at age 16 years, prior to labour market entry, is examined as a risk for subsequent unemployment. The presence of indirect health selection is sought through identification of indicators of vulnerability to ill-health that were present

prior to labour market entry (during childhood) and their association with future unemployment. Evidence of mechanisms that could explain the possible causal relationship of unemployment with ill-health are sought in an investigation of the deterioration of health related behaviours which were measured both prior to unemployment and afterwards. Evidence of unemployment directly resulting in deterioration of health (the causation hypothesis) is examined through the association of worsening psychological health status with increasing experience of unemployment.

In order to establish the presence and extent of direct health selection among NCDS men, the relationship between chronic illness and disability present in childhood up to age 16 years and subsequent experience of subsequent unemployment is examined. The alternative indirect health selection hypothesis is examined by investigating the relationship of childhood indicators of vulnerability for future physical and psychological illness with adult unemployment. The potential confounding effects of circumstances during childhood that could effect both health and risk of unemployment are taken into account in multivariate analyses to investigate both direct and indirect selection.

Health Behaviour and Body Mass Index - Health behaviours are examined both prior to and after the experience of unemployment to establish whether health behaviours deteriorated with increasing duration of unemployment. The relationships between unemployment, cigarette smoking, alcohol consumption, diet, exercise and Body Mass Index (BMI) are examined. Low and high BMI as a precursor and outcome of unemployment is considered as BMI can be considered as an indicator of various health

behaviours, as well as an indicator of health risk (obesity, as indicated by high BMI, may be considered a health risk). Both the effect of unemployment accumulated through early adult life and the possible acute effect of recent unemployment are considered; the relative strength of their association with health behaviour and BMI is investigated. Adjustment for socioeconomic background, educational attainment and health behaviours which pre-dated labour market entry was performed, to establish if the relationships of BMI and health related behaviour with unemployment are independent of these background characteristics. Conditional change models (Plewis, 1985) are used to investigate the possible deterioration in health behaviours that may be associated with the experience of unemployment. It could be argued that deterioration of health related behaviours with accumulating unemployment is a possible mechanism through which the causation hypothesis may operate: if unemployment leads to the take-up or exacerbation of hazardous behaviour, this may ultimately result in excess mortality or morbidity. If men who experienced unemployment exhibited higher levels of hazardous behaviours prior to the experience of unemployment, the indirect selection hypothesis may be more appropriate to explain the relationship between unemployment and ill-health through health related behaviour.

Mental Health - As this is a study of young men, mental health is a plausible area to investigate the possible causative association (causation hypothesis) between unemployment and worsening health: significantly lower levels of psychological well-being have been found amongst young unemployed men (Banks and Jackson, 1982), whilst poor physical health has been harder to identify in younger unemployed men

(West, 1994). The outcome measure used here is onset age of depression or mental problems (that eventually resulted in medical consultation). The exposure to recent and accumulated unemployment was modelled as time varying covariates using proportional hazards models (Cox, 1972). A measurement of pre-existing tendency to depression was taken at age 23 years using the malaise inventory (Rutter *et al*, 1970), and so it was possible to adjust for this. Adjustment was also made for potential socioeconomic confounding factors, present prior to the experience of any unemployment.

Accumulation of Risk

Although it is possible to describe the findings of the research in terms of the direct health selection, indirect health selection and causation hypotheses, it would be a gross over-simplification of the complex processes that produce the relationship between unemployment and ill health to use a single hypothesis as the complete explanation. The investigation of the relationship of childhood health and development with later unemployment does attempt to identify direct health selection and this is relatively straight-forward. Whilst the term 'indirect health selection' may be useful, it may also mislead the unwary. A more realistic description of the process by which 'indirect selection' results in excess mortality and morbidity is 'accumulation of risk'. Men from a relatively disadvantaged family background are more likely to continue to experience disadvantage as adults and are also more likely to accumulate health risks associated with that disadvantage throughout life (Johnson and Reed, 1996) including through a greater tendency to exhibit hazardous health related behaviour (Wadsworth, 1991). Set in this

context, there is little difference between the notions of 'causation' and 'accumulation of risk'; as both refer to health risk as a result of exposure to environmental factors.

This research examines the roles of the three hypotheses in explaining the associations between unemployment and poor health or health risks in young men. The contribution of pre-existing personal characteristics to both risk of ill-health and unemployment may provide additional information about the nature of the relationship of unemployment with excess mortality and morbidity. As this study considers young men, from birth through the earlier years of their working lives, it bears witness to the first stages of the potentially damaging 'unemployment-disadvantage feedback loop': disadvantage is a risk factor for unemployment and unemployment itself can result in relative socioeconomic disadvantage. This cycle of disadvantage may lead to rapid accumulation of health risks and vulnerable men from more disadvantaged backgrounds may accumulate excess health risks throughout their lives. Unemployment may be a significant factor in determining life time accumulation of health risks.

3. REVIEW OF THE LITERATURE

3.1 Socioeconomic Context for Unemployment 1974-1991

The economic and social context of unemployment experienced by NCDS men up to age 33 years is discussed here. Unemployment in Britain has different connotations at different times, therefore, it is important to consider the characteristics of unemployment during the period of relevance to this work: from 1974, when NCDS men were age 16 years, to 1991, when they were age 33 years. Within the economic context of this period, the men's background characteristics that were associated with unemployment are also discussed here to provide a description of the risk factors for unemployment that were relevant to NCDS men.

During the period 1974 to 1991, there were two significant economic recessions at the begining and end of the 1980s, and unemployment was seen as a significant problem. Jobs were becoming increasingly insecure and the vacancies typically taken by unemployed men were becoming more unstable and were more likely to offer lower wages (Gregg and Wadsworth, 1995). The economic recession at the beginning of the 1980s resulted in greater unemployment through increased numbers of men losing or leaving employment (Lawlor, 1990) and through men being less able to find a job if they were unemployed, either because they had lost a job, or because they had recently entered the labour market, for example from full-time education (Gregg and Wadsworth, 1995). This was also true of the recession at the end of the 1980s, but to a lesser extent (Gregg and Wadsworth, 1995). The effects of the early 1980s recession were likely to be particularly profound on NCDS men as many entered the labour market a few years prior

to this period and a significant proportion entered immediately prior to or during the recession, particularly those men who entered higher education and completed a first degree. The experience of unemployment was more likely to result in having to consider employment that was of limited duration (such as temporary work) and also lower rates of pay (Daniel, 1990; Gregg and Wadsworth, 1995), and this was particularly true for the less skilled or unqualified members of the workforce. The temporary or unstable nature of work also increased the risk of future unemployment: between 1975 and 1993 the median job tenure has fallen by around 20% (Gregg and Wadsworth, 1995) and this particularly affected less skilled men.

Risk Factors for Unemployment

Region of residence is an important factor in determining risk of unemployment, when there is considerable variation in local unemployment rates, as there was in the 1980s (Savage, 1989). This is largely due to differences in the local economies, different types of industry and different relative levels of employee skill requirements (Savage, 1989). Whilst the most highly skilled and qualified may have moved region to escape locally high unemployment rates, and greater risk of personal unemployment, men with lower levels of skill, the manual workers, were less likely to move region because of locally high rates of unemployment in the 1980s (Hughes and McCormick, 1994). As the relatively unskilled men were more likely to experience unemployment and were less likely to move areas to avoid unemployment, region of residence when they entered the labour market was a significant factor in their risk of experiencing unemployment.

Differences in local economies and unemployment rates not only affect an individual's risk of unemployment, but may also influence other life choices that he makes. In areas of higher unemployment there is some indication that men remain in full-time education for longer than they planned, because they perceived that there was little chance of them getting a job due to the depressed nature of the local economy at that time (Raffe & Willms, 1989).

It has been shown that material, educational, psychological, and cultural circumstances during childhood are related to many aspects of adult life opportunity (Douglas and Ross, 1986; Pilling, 1990; Wadsworth, 1991), including occupational attainment (Elias and Blanchflower, 1987) and unemployment risk (Payne *et al*, 1994). Family background has a significant influence on economic position in adult life (Kuh and Wadsworth, 1991) and therefore can influence unemployment risk. This process appears to work, at least in part, through educational attainment, as those from less advantaged family backgrounds (as indicated by lower social class) are less able or less likely to take advantage of educational opportunities. When those from relatively disadvantaged backgrounds are compared to their peers, who had the same type of education, the disadvantaged children tend to be less successful. An individual's chances of high educational attainment is strongly associated with their parents' own educational attainment, which in turn is associated with the parents' social class (Wadsworth, 1991). Children with parents of relatively high educational attainment are significantly more likely to pursue further or higher education, than those with parents with lower levels of educational attainment. Parental commitment to education may be a factor in determining this relationship, as

fathers' social class and commitment to education were associated with their children's early performance in primary school by Douglas (1964). The educational disadvantage of having a family of origin of lower social class continue into secondary education and the differences in educational attainment between those from lower and higher social classes are likely to become greater. Even after adjustment for pre-existing academic ability, those from lower social class backgrounds displayed a significantly worse performance in achieving qualifications through examinations, than those from families of a higher social class (Douglas *et al*, 1968).

Lower levels of attained educational qualifications are associated with an increased risk of unemployment (Glyn, 1995). This is partly because men with lower levels of educational attainment tend also to be less skilled workers (Nickell and Bell, 1995). Men with lower levels of qualifications are far less likely to augment their skills through training than more qualified men (Green, 1994). Men with lower levels of skill found themselves at an increasing disadvantage in the labour market as the 1980s progressed due to both economic and industrial change. The proliferation of new technology resulted in a reduction both in skill content of lower skill jobs and, more significantly, a reduction in the share of such jobs in the labour market; and at the same time, the skill content and labour market share of high skill jobs increased (Glyn, 1995). This was reflected in an expansion of job opportunities requiring higher levels of qualifications and, in real terms, a contraction of the number of jobs requiring fewer qualifications (Gittleman, 1994). In times of recession, employers are more likely to continue to employ the highly skilled employees (who can also undertake less skilled jobs). Those

men with lower skill levels tend to have a 'weaker attachment to firms' (Nickell and Bell, 1995), and for this reason have a far higher turnover rate. As a consequence of this they have far higher entry rates into unemployment. Once unemployed the men with lowest skill levels may have less incentives to return to work due to low wage levels: Nickell and Bell (1995) observed that in countries without unemployment benefit systems, the uneducated are less able to sustain unemployment and are forced into jobs with low pay. In Great Britain in the 1980s, some unskilled jobs could only be taken by those with other family members in employment, as the wages were so low that they would not be viable to support an individual or family without the contribution of another wage earner: unemployment benefit may have offered a similar or better standard of living than such a low paid job could (Gregg and Wadsworth, 1994). This phenomenon resulted in uneven distribution of employment between work-rich families and work-poor families with no earned income as all adult family members were unemployed and therefore more dependent on state benefits. This may have had the effect of intensifying financial hardship amongst the unemployed during this period.

Whilst educational attainment and training are important determinants of unemployment risk, the association between having a childhood as part of a lower social class family and unemployment does not appear to operate solely through poor educational attainment and lack of training. Family background appears to have an independent effect, beyond that of qualifications, in determining labour market performance: those with less advantaged backgrounds are less likely to have as much success in the labour market when compared with those with more privileged childhoods, even after

adjustment for educational attainment (Halsey *et al* , 1980). Economic inequality appears to be transmitted from one generation to the next by a process which begins in childhood. The family environment provides a growing individual with certain skills, knowledge, goals, attitudes and beliefs. Becker (1981) has described this process as a form of 'inheritance' where the family environment can impart positive characteristics such as commitment to education, as well as providing assets such as reputation and connections. More advantaged family environments are likely to be able to provide an individual with more assets, thereby better preparing them for competition in the labour market and reducing their risk of unemployment. This accumulation of assets is often referred to as 'human capital' and continues throughout life.

Previous experience of unemployment can result in a greater risk of future unemployment (Gershuny and Marsh, 1994), even taking into account an individual's personal characteristics that are risks for, or protective against, unemployment. Unemployment can be thought of as process that may erode human capital. Unemployment not only increases the risk of future unemployment, it is also likely to results in individuals having to accept relatively undesirable employment, given their level of human capital prior to the experience of unemployment (Gregg and Wadsworth, 1995). Unemployment is therefore both a cause and a consequence of lower levels of human capital.

3.2 Childhood Health and Development

An explanation for the relationship between unemployment and excess morbidity and mortality is that disease, or greater vulnerability to disease, may be more prevalent in men who will become unemployed: they are sick or more vulnerable to illness *before* they become unemployed. This phenomenon has been described in terms of direct health selection and indirect health selection. To examine health selection into unemployment, without using longitudinal data would be very unsatisfactory, as it must be established that symptoms of ill-health or vulnerability to illness were present prior to the onset of unemployment. This is vital, as it has been argued that unemployment can also result in poorer health (the causation hypothesis) through a number of mechanisms (Jahoda 1979; White 1991; Whelan 1992; Morris *et al*, 1992). This could produce an association that looked as if those in poor health were selected into unemployment, but could be due to the previous experience of unemployment (or job insecurity), which itself was a causal element in the development of illness. Previous unemployment is a risk factor for becoming unemployed (Gershuny and Marsh 1994), so previous experience of unemployment (or job insecurity) could have been involved in a causal process resulting in both the deterioration of health and also in an increased risk of future unemployment. The problem of previous unemployment influencing health status can be solved by considering health before labour market entry, during childhood, as this cannot be a consequence of unemployment or other labour market adversity. Thus, it is possible to examine health prior to any experience of unemployment and thereby assess the role of health selection, by considering health during childhood.

Direct Health Selection

The 'direct health selection' hypothesis asserts that poorer health itself increases the risk of unemployment (Cook 1985; Wagstaff 1986; Wadsworth 1986; Robinson *et al* 1989). It has been shown that unemployed men tend to be in poorer health prior to loss of employment than those who do not become unemployed, and that ill health is a risk for both initial job loss and and for reduced chances of re-employment (Clausen *et al* 1993). This may be because illness or disability makes men unable or less able to do certain jobs. Amongst young men only a small proportion would have a sufficiently severe mental or physical chronic illness or disability to prevent them from working in a field suitable for their level of qualifications and ability (Bell *et al*, 1988). Discrimination by employers is a plausible explanation for much direct health selection amongst young men, even where so called 'hidden' disabilities such as diabetes are concerned (Robinson *et al*, 1989).

There is evidence to suggest that 'direct health selection' is not the full explanation for the relationship between unemployment and ill health. If life threatening diseases were more prevalent in the unemployed than the employed, longitudinal data would show high mortality in the unemployed in the early periods of follow-up, with a sharp decline in mortality rate with increasing length of follow-up, as is found amongst the temporarily and permanently sick (Moser *et al*, 1990). Research using linked Census based data from England and Wales, the OPCS Longitudinal Study, (Moser *et al*, 1987) and from the Nordic countries (Martikainen, 1990; Iversen *et al*, 1987) have not identified this pattern

of mortality, making it unlikely that direct selection into unemployment of those with life-threatening disease can account for the relationship between unemployment and excess mortality.

Indirect Health Selection

The indirect health selection theory argues that those at greatest risk of unemployment may also be more vulnerable to excess mortality and morbidity because of social and personal characteristics independently of their experience of unemployment (Valkonen *et al*, 1992). There may be social and individual characteristics which put individuals at higher risk of both unemployment and ill-health. Unemployment is a greater risk for those young people who have previously experienced less favourable family circumstances and educational attainment (Power *et al*, 1991). Children who experience relative cultural and material disadvantage often have reduced opportunities throughout their lives (Pilling, 1990), and this may operate through poorer educational attainment and possibly through other forms of reduced human capital. Poor cultural and material circumstances in childhood have been associated with lower levels of subsequent educational attainment (Wadsworth, 1991). Men with poorer qualifications are at greater risk of labour market disadvantage, including an increased risk of experiencing unemployment (Payne *et al*, 1994; Glyn, 1995).

While childhood socioeconomic disadvantage has been shown to result in an increased risk of unemployment, disadvantage can also be linked with poorer health. There is a

higher prevalence of reported disease, symptoms of illness and indications of vulnerability to illness in the more disadvantaged groups, such as the lower social classes (Power *et al*, 1991). Therefore men from relatively socioeconomically disadvantaged backgrounds tend to be at greater risk of both poor health and unemployment. A disadvantaged background might increase the risk of excess morbidity and possibly mortality, and also independently result in an increased risk of unemployment.

If the 'indirect health selection' mechanism was the explanation for the relationship between unemployment and increased risk of ill health, unemployment would *not* be associated with pre-existing chronic illness or disability. If an illness or disability were present prior to unemployment, '*direct* health selection' could be the explanation for the unemployment. To identify 'indirect health selection', an indicator of vulnerability to both illness and unemployment in the future (after labour market entry) is required. This indicator of vulnerability would not, in itself, represent an illness or condition that could directly increase the risk of unemployment through the 'direct health selection' mechanism.

Recent work on early childhood health and development has indicated that the parameters for future physical health may be set during childhood and some early indicators are associated with excess morbidity and mortality in later adult life (Barker, 1994). These childhood indicators have been described as 'health potential' by Dahl & Kjœrsgaard (1993) as they do not necessarily represent actual illnesses during childhood. Height, or height for age (an indicator of growth rate) may be used as indicators of vulnerability to

future physical illness. Poor growth during early childhood has been shown to be associated with increased risks to adult health (Barker, 1994), and so can be considered as a measure of 'health potential'. While height and growth rate are partially inherited traits, they are also sensitive to socioeconomic circumstances in childhood (Tanner, 1955; Steckel, 1983) and to other aspects of early life (Preece, 1985). Shorter stature in adolescence has been associated with future experience of unemployment (West, 1994), and as shorter stature could, in part, be explained by poorer cultural and material circumstances during childhood, this provides evidence of 'indirect health selection' into unemployment: poorer conditions during childhood have the dual independent effects of reducing 'health potential' and are associated with an increased risk for future unemployment.

In considering indirect health selection, psychological health potential may also be important. Just as childhood indicators of vulnerability to future physical illness may be due to disadvantaged family circumstances that also result in increased risk of experiencing future unemployment, some manifestations of vulnerability to future psychological illness may also have their origins in poor family circumstances. These poor family circumstances during childhood may also increase the risk of future unemployment. The development of vulnerability during childhood, as may be identified through behavioural maladjustment, to later psychological health risk has been demonstrated (Harrington *et al*, 1994; Zoccolillo *et al*, 1992), and it has been shown to be a source of risk and protection in terms of adult life adversity (Cherry, 1974; Block & Gjerde, 1989), including labour market disadvantage. Since psychological aspects of

the experience of unemployment are considered an important health outcome (Banks and Jackson, 1982), pre-existing psychological vulnerability should be taken into account in a study of health and unemployment. The indicators of vulnerability to poor psychological 'health potential' in childhood should not represent actual childhood illness at that time, as an explanation using the 'direct health selection' argument could be applied.

As poor socioeconomic circumstances during childhood have been associated with both a higher risk of poor health and a higher risk of future unemployment, it is of value to examine the associations of childhood illness and vulnerability to illness with unemployment, after standardisation for conventional measures of childhood socioeconomic circumstances. This adjustment could indicate, in the case of childhood illness, that 'direct health selection' may be operating, as the illness might predict adult unemployment even after adjustment for socioeconomic background. In examining 'indirect health selection', adjustment for these potential confounding variables could reveal that men who become unemployed are more vulnerable to illness (but not sick) even after adjustment for their childhood circumstances.

3.3 Health Behaviour and Body Mass Index

Unemployment has been associated with hazardous health behaviours, including cigarette smoking (Cook *et al*, 1982) and heavy alcohol consumption (Wilson, 1980). These behaviours could be, at least partly, responsible for excess morbidity and mortality amongst unemployed men. There is some debate as to whether the hazardous health behaviours pre-date the unemployment or are consequences of experiencing unemployment (Bartley, 1994). Deterioration in health behaviours has been reported in young men (Hammarström *et al*, 1988), but this change has not been observed so clearly in older men (Morris *et al*, 1992) when they cease to be employed.

To examine health behaviour and unemployment, it is desirable to consider a number of behaviours as different men exhibit different combinations of hazardous behaviours (Mechanic, 1979). A single hazardous behaviour is unlikely to act as a satisfactory indicator for all of the major behaviours that are associated with health risk. Blaxter (1990), using the Health and Lifestyle Survey (HALS), identified four elements of lifestyle that could be thought of as voluntary and clearly associated with health, but comments that 'voluntary' may be a slightly misleading term as income and other socioeconomic characteristics may determine behaviour. For example the sort of food that men and their families can *afford* to buy, and what foods are locally available will strongly influence which foods are regularly consumed. The four voluntary behavioural elements are: - cigarette and alcohol consumption, physical exercise and diet. Weight control was also identified by Blaxter (1990) as an important 'behaviour', but this is not

in the same voluntary category as the other behavioural measures as there are also innate and acquired factors that influence body weight (Reaven 1988; Osei *et al*, 1991; Barker *et al,* 1993; Bjorntorp, 1991). Relative body weight is useful indicator of health and behaviour, as it is associated with morbidity (Belloc and Breslow, 1972) and can be used to predict mortality (Belloc and Breslow, 1972).

Cigarette Smoking

Unemployed men have been found to be more likely to smoke cigarettes than men in employment (Morris *et al,* 1992; Waldron and Lye, 1989; Lee *et al*, 1991; Cook *et al*, 1982). A strong class gradient for smoking is nearly always observed (Khosla and Low, 1972; Holm *et al*, 1976) just as there is for unemployment. Data from the British Regional Heart Study indicated that men who were unemployed and smokers were more likely to come from manual backgrounds and live in the North (Morris *et al*, 1994). Lee *et al* (1991) found that even though the gradient between smoking and social class was strong, it could not explain the association between unemployment and smoking: a greater proportion of the unemployed men from higher social classes were smokers than men in work who were from a lower social class; but overall, being in a lower social class was equated with a greater likelihood of being a smoker. But Lee *et al* (1991) also found that the unemployed and employed groups in the Scottish Heart and Health Study (SHHS) were very similar in their knowledge of the hazards associated with smoking cigarettes. This study indicated that unemployed smokers were more likely to have had fewer years of full-time education. The greater propensity to smoke amongst unemployed

men is independent of other factors associated with a greater tendency to smoke: age, social class and region (Cook *et al*, 1982). In disentangling the possible independent influence of unemployment on smoking behaviour, it is important to take account of region, social class of origin (own adult social class may also be a consequence of unemployment) and attained level of education.

The explanation for the higher prevalence of smokers amongst unemployed men remains unclear, as some studies have found that the experience of unemployment has resulted in men reducing the number of cigarettes that they smoked per day (Morris *et al,* 1992) and that the unemployed smokers were more likely to have started smoking at an earlier age (Lee *et al*, 1991). There is little evidence that men take-up smoking or increase their level of consumption during a period of unemployment. However, the data used by Morris *et al (*1992) and by Lee *et al* (1991) were collected from men in middle age for whom patterns of smoking behaviour may have been largely set in their earlier adult life. For some of these older men unemployment (or non-employment) may have been associated with declining health which may itself have been instrumental in persuading men to reduce or give up smoking (Morris *et al,* 1992). The relative poverty associated with unemployment may account for some reduction in quantity of cigarettes smoked.

In investigating the association between unemployment and smoking it may be of particular value to use life-long prospective data such as NCDS as it is possible to standardise the analysis for the initial level of smoking prior to the experience of unemployment: the initial level of smoking appears to affect the probability of an

individual giving up (Morris *et al,* 1992). The experience of unemployment in early adult life may set the pattern of behaviour for later life, so the processes of starting smoking or giving it up during this period, as a function of accumulated unemployment, may be of particular importance. It has also been argued that the relationship between unemployment and behaviours such as smoking may be time-dependent (Wagstaff,1986). Current unemployment experience may cause a temporary change in smoking behaviour; or the relationship may be more complicated, with a lag between becoming unemployed and behavioural change (Wagstaff, 1986). It is therefore of interest to examine the relative effects of recent and accumulated unemployment on smoking behaviour.

Alcohol Consumption

A higher level of alcohol consumption has been observed in young unemployed men (Winefield *et al*, 1993) and the level of consumption has been observed to increase following six or more months of unemployment (Power and Estaugh, 1990). Amongst older men, a relatively high level of alcohol consumption has been found to exist amongst those who would go on to experience non-employment, but they were more likely to decrease their alcohol intake rather than increase it upon loss of employment (Morris *et al*, 1992). These apparently contradictory findings may be due to patterns of heavier drinking being established in young adult life (possibly as a result of early unemployment), as in later life, Morris *et al* (1992) suggest that illness may have been responsible both for higher levels of job loss and for a greater tendency to reduce alcohol consumption amongst the heavier drinkers. The financial pressures associated with loss

of employment in later life may also contribute to reduced consumption (Morris and Cook, 1991).

Continuous heavy alcohol consumption is associated with an increased risk of liver disease, brain damage and deterioration in social adjustment (National Health and Medical Research Council, 1987). However, drinking alcohol , even before it is legal to do so, is seen as an important rite of passage for young men (Winefield *et al*, 1993) and in adult life drinking in company represents the epitome of socially acceptable behaviour. Low levels of alcohol consumption and complete abstinence have been observed amongst young unemployed Swedish men (Hammarström *et al*, 1988) and this may represent a degree of social isolation and financial hardship. Indeed, Power and Estaugh (1990) found that abstinence at age 16 years was more likely to be associated with subsequent unemployment than being an alcohol consumer. This was probably because the heavier drinkers were a less selected and more heterogeneous group. The association of abstinence and low alcohol consumption with unemployment is also worthy of investigation, alongside high levels of consumption. Drinking habits at age 16 years have been shown to be influenced by socioeconomic background (Hammarström *et al*, 1988; Winefield *et al*, 1993), so any analysis of alcohol consumption should standardise for the influence of socioeconomic background on both risk of unemployment and drinking behaviour.

Whilst a higher level of alcohol consumption at age 16 years found by Power and Estaugh (1990) did not appear to be a significant risk factor for teenage unemployment,

heavy consumption can become a risk for becoming unemployed in later life (National Health and Medical Research Council, 1987). Other studies have found that heavier alcohol consumption is associated with a higher risk of subsequent unemployment both in school leavers (Hammarström *et al*, 1988) and in middle-aged men (Morris *et al,* 1992). Heavy alcohol consumption may itself be a risk for subsequent experience of unemployment, but Hammarström *et al* (1988) also found that, even amongst relatively heavy drinkers, the experience of unemployment resulted in further deterioration of drinking habits (resulting in higher levels of consumption). In contrast, heavy drinkers who moved onto a training scheme were seen to moderate their consumption. Both the accumulation of unemployment and recent or current unemployment may influence the level of alcohol consumption exhibited by an individual at any given time.

An examination solely of amount of alcohol consumed may fail to identify a significant proportion of men with relatively hazardous drinking habits. Winefield *et al* (1992) reported that in a sample of young males, only 9% were classified as heavy drinkers, but 27% indulged in potentially dangerous 'binge drinking': high alcohol consumption over a relatively short time period. In order to identify a higher proportion of men with hazardous drinking practices, it is desirable to use, in addition to amount of alcohol consumed, another measure of drinking problems and attitudes to alcohol consumption as indicated by response to instruments such as the CAGE questionnaire (Liskow *et al*, 1995).

Exercise

Studies have shown that a low level of physical activity is associated with an increased risk of cardiovascular disease (Shaper and Wannamethee, 1991). Physical exercise during leisure time has been identified as an important factor in maintaining good health and it provides protection from conditions such as coronary heart disease (Morris *et al*, 1980). Blaxter (1990) states that there is general agreement that it is leisure time exercise that is particularly important for maintaining good health. Activity undertaken as part of paid work should be considered separately (Morris *et al*, 1980).

For young men, sporting or keep-fit activities are likely to be the most common forms of vigorous exercise. Blaxter (1990) reported that 17% of men under 40 years of age in the Health and Lifestyle Survey (HALS) claimed to have done some running or jogging during the two weeks prior to interview. The proportion undertaking such exercise amongst even younger men is likely to be higher. Such physical activity tends to be undertaken by a larger proportion of men from non-manual backgrounds and with higher levels of educational attainment (Blaxter, 1990). HALS also identified regional differences in levels of exercise: in the traditional industrial areas overall rates of exercise were lower and there was less of a differences in the amount of exercise reported by men from different social classes.

Morris *et al* (1992) found that middle aged men who ceased to be employed were already more likely to be relatively physically inactive even while still in a job, when

compared with those who were continuously employed. However, a significant proportion of the inactive men were also suffering from an illness that resulted in their leaving work. Amongst the men who were not ill, there was no significant difference in exercise levels between those who ceased working and those who did not. But these were older men, and the higher levels of physical exercise observed in younger men (Blaxter, 1990) may reveal greater differences between those who experience unemployment and those who do not.

Diet

Detailed measurement of dietary intake including exact quantity of food consumed and a detailed analysis of its chemical constituents is not easy to achieve within the context of large scale survey research. For this reason, both NCDS and the Health and Lifestyle Survey collected dietary data that described the frequency of consumption of certain food types. Blaxter (1990) reports that the dietary indicators based on frequency of consumption of certain food types were as indicative of diet as more complex sugar or fat consumption variables. Seven of these indicators from HALS were used to construct a score representing the healthiness of the diet as approved by nutritionists. Six of these seven dietary indicators are available in NCDS data at age 23 years, making it possible to construct a similar score for NCDS men. HALS found that men had worse dietary habits than women and to get an accurate indication of the healthiness of a man's diet it was important to consider the dietary score, rather than looking at consumption of individual indicator foodstuffs.

British diet is associated with class, education and region: men from manual backgrounds, from the North of the country or with lower levels of educational attainment are more likely to have a relatively poor diet (Cox *et at*, 1987). All of these risk factors for having a poor diet are also risk factors for unemployment, so a significant proportion of men may have poorer diets prior to experiencing any unemployment. Regional cultural differences are also likely to account for significant variation in the healthiness of men's diets and in some areas these cultural differences in diet have been found to be associated with geographical area independently of socio-economic and socio-demographic factors (Forsyth *et at*, 1994).

Any deterioration in dietary healthiness that is associated with the experience of unemployment may be due the increased economic hardship experienced during a period of unemployment. It has been recognised by several studies that unemployment results in economic hardship and as a consequence, the unemployed find it harder to feed themselves and their families adequately as numerous demands are made on a relatively small budget (Ross and Mirowsky, 1995). Unemployed men and their families who live in some poorer areas may find it particularly difficult to afford to eat healthily. A study conducted in the West of Scotland found that in some poorer areas, there were price disincentives to eating healthy food. Healthier foods were less expensive and more readily available in the more affluent areas (Sooman *et at*, 1993).

Body Mass Index

To assess relative body weight, one method of standardisation is by using a Body Mass Index (BMI): the most widely used is Quetelet's index which is defined as weight(Kg)/height^2(cm). This index increases with increasing adiposity, but, for adults, is little affected by relative height (Khosla and Low, 1967; Garrow and Webster, 1985).

Being overweight and weight gain have been linked with unemployment (Morris *et al*, 1994; Morris *et al*, 1992), and with excess mortality and morbidity (Baird, 1994). Even moderate obesity greatly increases the risk of disability due to cardiovascular disease or musculoskeletal illness and decreased life expectancy (Baird, 1994). Whilst there are genetic factors which pre-dispose some men to obesity (Jorgensen *et al*, 1995), socioeconomic and behavioural factors are also important determinants of relative body weight (Tavani *et al*, 1994). A higher BMI has been associated with lower socioeconomic status (Sorensen, 1996; Tavani *et al*, 1994) and with lower levels of educational attainment and poor performance at school (Lissau and Sorensen, 1993). Cigarette smokers have been shown to have a tendency to lower BMI when compared with non-smokers (Tavani *et al*, 1994), possibly because fat oxidation increases with increasing nicotine uptake (Jensen *et al*, 1995). Regular physical exercise is also associated with lower BMI (Jorgensen *et al*, 1995). While diet seems to be likely candidate for explaining a tendency to obesity, the relationship between BMI and food intake is not straightforward. Some studies have found no significant relationship between calorific intake and BMI (Tavani *et al*, 1994; Jorgensen *et al*, 1995).

Many of the background characteristics that are risk factors for obesity are also risks for unemployment and so are potential confounders. A greater tendency to obesity is associated with a recognised metabolic syndrome that is also characterised by insulin resistance, hypertension and lipid abnormalities (Reaven, 1988). This syndrome appears to manifest itself to different degrees, resulting from the complex interaction of genetic predisposition (Osei *et al*, 1991), early life factors (Barker *et al*, 1993) and adverse psycho-social factors (Bjorntorp, 1991) that may be associated with family circumstances that also represent an increased risk for unemployment. Unemployment itself may also result in a greater risk of obesity, as the stress that is associated with unemployment is a plausible mechanism to explain some of the weight increase that has been observed in unemployed men: the social stress of low economic status has been linked with the distribution of central body fat (Georges *et al*, 1993).

The health behaviours described above and BMI may have associations with unemployment because family background characteristics are associated both with an increased risk of unemployment and with the behaviour, so they are confounders. Again, longitudinal data can be used to determine if unemployment results in a deterioration of behaviour, as it is possible to adjust for pre-existing socioeconomic characteristics and for measures of health behaviour prior to the experience of unemployment.

3.4 Mental Health

A causal relationship between unemployment and ill health, in young men, is most likely to be identified if mental health is used as the outcome measure. NCDS provides data that can be used to test the causation hypothesis in relation to mental health, using information about reported use of health services for symptoms of anxiety and depression. To establish the direction of causality, it is important to consider the temporal pattern of unemployment and psychological morbidity.

There is a wealth of evidence to support a link between unemployment and lower levels of psychological well-being. In most studies, unemployed men of all ages have had lower levels of psychological well-being when compared with similar men who were not unemployed (Warr, 1985). The association between unemployment and lower levels of well-being amongst young men has been observed by Banks and Jackson (1982), West and Sweeting (forthcoming), Hammarström *et al*, (1988) and others. A similar association in mixed age populations and amongst older men, has been reported by many researchers, including Kessler *et al.* (1987), Viinamaki *et al.* (1993), and Lahelma (1992).

There is some debate surrounding the respective roles of selection and causation in explaining the relationship between unemployment and poor psychological well-being. This is largely because those who become unemployed may have poorer psychological health prior to becoming unemployed. In some studies previous (unmeasured)

experience of unemployment may have affected mental health. Clausen *et al.* (1993) asserted that health selection into long-term unemployment seemed to explain a substantial part of the excess mental morbidity found amongst unemployed people in Southern Norway: this was because only the healthier individuals reported re-employment after a spell of unemployment. However, this study was cross-sectional and could not adequately account for the potentially damaging effects of previous unemployment experience and there are likely to have been difficulties in estimating the role and extent of health selection. By examining the effects of unemployment in young people, at the beginning of their working lives it is possible to avoid the problem of not having adjusted for the unobserved effect of previous unemployment. In two separate studies of young people conducted by Banks and Jackson (1982) and Tiggeman and Winefield (1984), a deterioration in mental health was observed on leaving full-time education amongst those who became unemployed, and not amongst those who continued in education or found jobs. Pre-existing poor mental health could not account for this deterioration. Furthermore, mental health was seen to improve again when these young people found jobs. Whilst there will be some mental health selection into unemployment, the onset of psychological morbidity around a time when an individual was experiencing unemployment is likely to indicate the damaging effect of unemployment on health as defined by the causation hypothesis. Kessler *et al.* (1987) concluded that unemployment had a substantial deleterious influence on somatisation, anxiety and depression that could not be explained by health selection.

In examining any relationship between unemployment and poor mental health, the

temporal proximity of the onset of symptoms and the experience of unemployment is likely to be of considerable importance. Unlike some physical illnesses, psychological state can be responsive to changes in the environmental conditions, causing relatively rapid improvement or deterioration in psychological well-being. Several studies (Ross and Mirowsky, 1995; Banks and Jackson, 1982; Tiggeman and Winefield, 1984; and Corti, 1994) have reported that mental health improves when a period of unemployment ends, if an individual obtains satisfactory employment. Also, whilst deterioration in psychological well-being initially increases with increasing time spent unemployed, this does not continue indefinitely. Many unemployed people appear to become habituated to the circumstances of unemployment. Several studies have shown that deterioration in psychological well-being ceases after 12 to 18 months of unemployment (Banks and Ullah, 1987; Hamilton *et al*, 1993; Warr and Jackson, 1985). But after cessation of deterioration, it has been shown that the level of psychological well-being amongst unemployed men remains significantly worse when compared with men in employment from similar backgrounds (Warr and Jackson, 1987). Both the amount and relative timing of unemployment may influence psychological state at any given time.

Because unemployment is often part of a history of general labour market disadvantage, including low quality employment, it may also be important to consider the impact of this on mental health. There is evidence that several forms of labour market disadvantage, other than the experience of unemployment, may result in a deterioration of psychological well-being. Graetz (1993) argues that the quality of the job, and an individual's satisfaction with their job, is crucially important in understanding the

relationship between labour market position and health. Graetz has interpreted his results as indicating that what happens in the workplace has more impact on mental health than simply success or failure in finding and keeping a job. An important factor in the negative effect on mental health of some jobs, may be the occasional or constant threat or anticipation of unemployment. The threat of unemployment as a cause of deterioration in health has been observed in office staff (Ferrie *et al*, 1995) and in general working populations (Burchell, 1994). The effects of both job insecurity and unemployment itself on mental health are likely to be observed in men who have experienced unemployment: a greater number of discrete episodes of unemployment may indicate a less secure employment career (Bartley *et al*, 1996). Any deterioration in mental health observed in men who were unemployed may have its origins in previous or current job insecurity, but unemployment itself is also likely to contribute to deterioration (Banks and Jackson, 1982; Tiggeman and Winefield, 1984).

A plausible reason for unemployment resulting in deteriorating mental health is because unemployment represents a stressful life event, or even a series of such events. Job loss has been described as a form of bereavement (Fagin, 1984) and clearly increases stress levels in the majority of individuals who incur such a loss. Some stress may be because unemployment is associated with relative (and possibly absolute) poverty, as the majority of unemployed men are forced to live on government benefits. The real value of these benefits fell during the 1980s, increasing levels of financial hardship for unemployed men and their families during this period (Sinfield, 1993). It has been shown that financial hardship can cause psycho-physiological distress (Pearlin *et al*, 1981) and

increased malaise (Ross and Huber, 1985), indicating the link between poverty and symptoms of anxiety and depression. White (1991) also found that unemployed men who reported financial problems, were also more likely to report that they were in poorer health.

The link between unemployment and poor mental health has been approached from several different theoretical perspectives. One of these, which is consistent with the poverty and stress based explanation, is Jahoda's deprivation theory (Jahoda, 1981, 1982), which states that employment supplies material (income) and psychological benefits. The psychological benefits are: an imposed time structure; regular social contact; provides goals and objectives; it induces physical and mental activity; and employment also defines status and identity. All of these factors can lead to increased levels of psychological well-being, and so it is logical that the removal of employment, resulting in the removal of some or all of these beneficial factors, could result in diminished psychological well-being. In itself, the deprivation theory is somewhat incomplete in explaining the association between poor mental health and labour market adversity, as it cannot account for the damaging effect of job insecurity (Ferrie *et al*, 1995).

An alternative to deprivation theory has been called agency theory (Fryer and Payne, 1983; Fryer, 1986), which states that psychological health is protected if individuals are able to identify and pursue personal goals, whether or not these goals are associated with being employed. Damage to psychological health may ensue if an individual is unable to identify and pursue goals: unemployment (or its threat) may prevent a man continuing

to pursue long held goals associated with his idea of employment career. Unlike deprivation theory, agency theory can be used to explain why psychological well-being does not continue declining indefinitely in ongoing unemployment (Banks and Ullah, 1987; Hamilton *et al*, 1993; Warr and Jackson, 1985). Men's goals can change and be adapted to the circumstances of unemployment, even though employment deprivation continues. Fineman (1987) reported that psychological well-being increased in some unemployed men when they gave up the stressful search for work and were no longer doing unsatisfactory and unpredictable work.

In addition to agency theory, the importance of being able to identify and (successfully) pursue personal goals is also relevant to the concept of 'learned helplessness' (Seligman, 1975). The learned helplessness theory asserts that the inability to control outcomes can result in anxiety and eventually depression. Using a modification of the original theory, Abramson *et al*, (1978) identified three causal dimensions that could modulate the outcome and severity of learned helplessness. These were, that internal causal attribution could lead to self-blame and result in reduced self-esteem and heightened depressive affect; if the causal attribution was stable, then the depressive response would be more likely to persist; and a global (rather than specific) view of failure may lead men to feel that they are likely to fail in other important areas of life, not just in job seeking. Learned helplessness may have potentially serious consequences for mental health, as Abramson, *et al* (1989) propose that 'hopelessness depression', as a clinical manifestation of learned helplessness, is a sub-type of depressive illness; and hopelessness depression may be triggered by events, such as unemployment, in vulnerable individuals.

Warr's (1987) vitamin model, like agency theory and the learned helplessness theory, draws no sharp distinction between employment and unemployment, but is concerned with the quality of the individual's environment. Just as there can be good and bad work, there may be good and bad unemployment, but in the majority of cases unemployment is less likely to offer the opportunities that work could. Warr (1987) divides environmental conditions into nine categories and likens these to vitamins. They are divided into two groups and the first contains three categories: availability of money, physical security and valued social position. These are assumed to resemble vitamins C and E. This is because these vitamins and environmental conditions are increasingly beneficial with increasing dose; at very high doses, an increase in benefit may cease, but these vitamins and environmental conditions do not actually become harmful. The second group, likened to vitamins A and D, contains: opportunity for control, opportunity for skill use, externally generated goals, variety, environmental clarity and opportunity for interpersonal contact. Vitamins A and D differ from C and E in that while they are beneficial at low doses, they actually become harmful at high doses. The (unfavourable) experience of unemployment would result in a low dose of the vitamin C and E categories and doses of the A and D categories that may be too low *or* too high. Warr (1987) claims that the poor 'diet' of environmental conditions that is associated with the experience of unemployment. can influence mental health as it may result in lower affective well-being, and limited support for competence, autonomy and aspiration.

The final hypothetical model described here, that has been used to explain the relationship between unemployment and poor mental health, is Erikson's life-span

development theory (Erikson, 1959). This is based on Freudian psychoanalytic concepts and describes psychosocial development throughout life in terms of eight successive developmental stages. Each developmental stage has associated psychological conflicts which must be resolved before it is possible to advance to the next developmental stage. The eight developmental stages are: infancy, early childhood, play age, school age, adolescence, young adult, adulthood, and mature age. Passing through the fifth (adolescent) stage involves acquiring a satisfactory identity, and anything that prevents this will impair healthy psychological development. As an occupation tends to form an important element of identity in men, unemployment in early adult life has been seen as a threat to development and therefore a risk factor for poor psychological health as defined by the Erikson's life-span development theory (Taylor and Gurney, 1984).

Vulnerability to Psychological Morbidity

In examining the relationship between unemployment and mental health, it is necessary to consider pre-existing vulnerability to psychological morbidity. Also, deterioration in mental health can only be observed where a baseline measurement of pre-existing mental health exists, or measures which predict mental health. Adverse material and cultural circumstances during childhood have been identified as risks for poorer psychological health (Cohen *et al*, 1990; Dunn, 1988) and also as independent risk factors for future unemployment (Montgomery *et al*, 1995). Poorer mental health in childhood, defined in terms of depression and conduct disorders, not only have negative consequences in terms of adult mental health (Harrington *et al,* 1994; Zoccolillo *et al*, 1992) but are also

risks for adult labour market adversity (Cherry, 1976; Block and Gjerde, 1989), which will result in an increased risk of unemployment. Childhood behavioural maladjustment is associated with a greater risk for adult psychiatric disorders (Rogers, 1990) and adult neurosis (Warren, 1965; Pritchard and Graham, 1966; Robins, 1966; Mellsop, 1972; Kandel and Davies, 1986). Clearly, in an investigation of unemployment and mental health, it is important to consider the effect of childhood circumstances and behavioural maladjustment, as they are associated with both unemployment risk and risk of poorer mental health in adult life. Educational attainment is also relevant as this provides more information about background characteristics and unemployment risk: poor educational performance is associated with a more disadvantaged background (Douglas et al, 1968; Pilling, 1990; Wadsworth, 1991) and also with an increased risk of unemployment (Payne *et al.* 1994).

Geographical region is likely to be a significant confounding factor when considering the relationship between unemployment and mental health, especially where mental health is measured in terms of health service use. Variation in the buoyancy and type of local economies has a significant impact on regional unemployment rates (Montgomery *et al*, 1996) and local unemployment rates have been related to mental health in terms of psychiatric admissions: Areas with higher unemployment rates tend to have a higher prevalence of psychiatric cases (Kammerling and Oconnor, 1993). General regional socioeconomic disadvantage, rather than specifically unemployment, has also been linked to higher psychiatric admission rates (Gunnell *et al*, 1995). However, local rates of psychiatric illness based on use of health services or admission rates may also vary

because of regional variation in the provision and delivery of health service facilities. Another factor that may influence regional variation in the association between mental health and unemployment, is the economic context in which the unemployment occurs. Turner (1995) reported that the severity and incidence of depression is disproportionally higher in areas with higher unemployment rates and argues that this is because in areas of high unemployment, those who are unemployed have fewer opportunities for re-employment and this has a further detrimental affect on mental health than unemployment in an area where there is greater chance of re-employment.

When considering pre-existing vulnerability to depression and anxiety, the most powerful measure is likely to be measures of psychological state at the start of the period in adult life when the relationship between unemployment and mental health is being investigated. It has been suggested that unemployment results in existing psychiatric disorders being uncovered by the social dislocations that are associated with the experience of unemployment (Catalano *et al*, 1981, 1985). Platt (1984) has discussed the possibilities of unemployment being a precipitating factor in mental health deterioration (where parasuicide is the outcome) or it may represent a vulnerability factor. Where unemployment is a vulnerability factor, the experience of unemployment locates people in a context where they are more likely to be exposed to risk factors for poor mental health.

4. SUBJECTS AND MEASURES

4.1 The National Child Development Study

The National Child Development Study (NCDS) is an ongoing longitudinal of all those living in Great Britain who were born between the 3rd and 9th of March 1958. NCDS has its origins in the Perinatal Mortality Survey (PMS), which was designed to examine obstetric and gynaecological factors associated with perinatal mortality (Butler and Bonham, 1963). The PMS collected data about the births of 17,414 infants to parents in Great Britain and this represented 98% of births in the target week (Butler and Alberman, 1969). Midwives completed questionnaires and information was taken from medical records. Sets of questionnaires were also distributed to departments, such as premature baby units, where babies were likely to be admitted or might die after birth.

There have been five attempts to trace all members of the original cohort as part of NCDS data collection exercises at ages 7 years (1965), 11 years (1969), 16 years (1974), 23 years (1981) and 33 years (1991). In 1965, 1969 and 1974, an attempt was made to recruit all immigrants to Great Britain, who were born in the target week, into the study. By age 33 years the target population was 15,666 individuals, of whom 13,444 were traced (85.8%). 11,633 responded to the fifth sweep of NCDS, NCDS5, representing a response rate of 86.5% amongst those who were traced. The representativeness of NCDS5 data has been investigated using the earlier data and the cohort remains representative of the population, the only marked losses being from the relatively small ethnic minority and immigrant groups (Ferri, 1993).

The data collection sweeps conducted at ages 7, 11 and 16 years, under the auspices of the National Children's Bureau, collected information from parents, who were interviewed by health visitors; from teachers, who completed questionnaires; and through medical examinations conducted by school health services (Shepherd, 1985). The cohort members completed ability tests and at age 16 years filled in a self-completion questionnaire.

At ages 23 and 33 years data collection included interviews carried out by professional survey research interviewers and cohort members filled in self-completion questionnaires (Ekinsmyth *et al*, 1992). The earlier survey was the responsibility of the National Children's Bureau, and the Social Statistics Research Unit, City University was responsible for data collection at age 33 years.

4.2 Measures

Unemployment

At age 23 years, cohort members reported month by month employment status from age 16 years to age 23 years. These data were collected using a retrospective 'activity diary' where other economic and educational activities, as well as other significant life events, were recorded. The unemployment record was coded to provided a monthly employment status indicator between ages 16 and 23 years. Unemployment was defined as all periods when a respondent was not in employment or full-time education and was seeking work.

At age 33 years, details of the timing and duration of any unemployment experienced between ages 16 and 33 years were collected. Information about the beginning and ending dates of spells of unemployment were recorded using self-completion questionnaires. Unemployment was defined as unemployed and seeking work. Other activity categories, such as full-time education, were offered as alternatives to unemployment in the questionnaire.

ACCNCDS software (Elias, 1993) was used to convert the unemployment data collected at age 33 years into a month by month data matrix: each month between ages 16 and 33 years was represented by a binary variable to indicate if the respondent was unemployed. Where the unemployment records collected at age 33 years were incomplete, those collected at age 23 years were incorporated. The month by month unemployment history

was coded into summary variables as described in subsequent chapters.

Circumstances of Family of Origin

Social Class - Two measures of Registrar-General's social class based on the father's occupation were used. The first when the cohort member was born and the second when he was aged 16 years. Where the father was not present, the mother's own social class was used. Social classes I and II were combined for analysis.

Crowding - The measure of crowding was based on the number of persons per room, excluding kitchens and bathrooms, when the cohort members were age 7 years. The variable was divided into three categories: up to one person per room; more than one to one and a half persons per room; and more than one and a half persons per room. The last category represents the most crowded households and therefore the most disadvantaged group.

Anthropometric Measurements

Height at age 7 years - Measured to the nearest inch without shoes by a school doctor.

Height at age 16 years - Measured in centimetres without shoes by a school doctor.

Height at age 23 years - Height self-reported in an interview.

Height at age 33 years - Height without shoes measured using a stadiometer by professional research interviewers.

Parental height - The heights of cohort members' parents were self-reported when the cohort member was aged 11 years.

Weight at age 16 years - Weight in kilograms measured by a school doctor.

Weight at age 23 years - weight self-reported in an interview.

Weight at age 33 years - Weight without shoes measured using electronic scales by professional research interviewers.

Body Mass Index - BMI was calculated for men at ages 16 and 33 years using Quetelet's index (Khosla and Low, 1967), which is defined as weight(Kg)/height^2(cm).

Health and Psychological Measurements

Bristol Social Adjustment Guide at age 11 years - The Bristol Social Adjustment Guide (BSAG) was designed to describe the child's behaviour in particular settings (Stott, 1969). Teachers completed the BSAG for study members at age 11 years to assess the child's behaviour and attitudes. The BSAG may be divided into 'Syndrome' scores to give a quantitative assessment of behaviour. The summed syndrome scores used for

these analyses indicate the total amount of behavioural deviance or maladjustment in terms of unforthcomingness, withdrawal, depression, anxiety for acceptance by adults, hostility towards adults, 'writing off' of adults and adult standards, anxiety for acceptance by children, hostility towards children, restlessness, 'inconsequential' behaviour, miscellaneous symptoms and miscellaneous nervous symptoms. The BSAG score has a range from 0 to 56 symptoms.

Chronic illness and disability at age 16 years - Severity of all physical and mental chronic illnesses and disabilities at age 16 years was assessed by a school doctor, based on medical examination, parental report and medical records. The doctor reported his opinion of the severity of all conditions present at age 16 years. A single ordered categorical variable was constructed to measure the severity of disability or chronic illness; where more than one condition was present, the most severe was indicated. The 4 categories of this variables are: no condition; condition present, but no disability; slight disability; and moderate to severe disability.

Malaise Inventory at age 23 years - Rutter's 24 item Malaise Inventory (Grant *et al*, 1990) was used to assess levels of anxiety and depression at age 23 years. The Inventory was (self) completed by the respondent during the course of an interview.

Symptoms of depression and anxiety between ages 24 and 33 years - During the interview conducted at age 33 years, men were asked if they had been referred to a specialist or consulted a doctor or specialist for any of the following problems: feeling low,

depressed, sad; feeling generally anxious, jittery; feeling anxious or scared about objects or situations; feeling overexcited, overconfident; other feelings of worry, tension, anxiety, depression or nerves. The age that the problem first started was recorded and where there was more than one problem, the earliest onset age was used. Cases who reported onset prior to age 24 years were excluded from the analysis.

Health Behaviour

Cigarette smoking - Men were classified as smokers or non-smokers at age 33 based on reported number of cigarettes smoked per day during the interview. At age 16 years the number of cigarettes smoked per week was reported in a self-completion questionnaire.

Alcohol consumption - Measures of alcohol consumption were based on the number of units consumed during the week prior to interview at ages 16 and 33 years, as reported to the interviewer at age 33 years and by self-completion questionnaire at age 16 years. A unit was equivalent to half a pint of beer; a single measure of spirits; or a glass of wine. The indicators for alcohol consumption used were: no alcohol consumed in the previous week and the top fifth of the alcohol consumption distribution.

Drinking problems at age 33 years-The standard CAGE questionnaire (Liskow *et al,* 1995) items were used to identify those who had a drink problem: three or more positive responses to the CAGE questionnaire were used to indicate a drink problem. The CAGE questions were asked as part of the interview at age 33 years.

Leisure exercise at age 16 years - Respondents were asked, as part of the self-completion questionnaire, how often they: played outdoor games and sports; went swimming; played indoor games and sports (e.g. basket-ball, badminton, gymnastics, etc.). The possible response categories were: often; sometimes; never or hardly ever; and like to but no chance. A score for leisure exercise at age 16 years was constructed; each 'often' response was scored 2, and each 'sometimes' response was scored 1.

Leisure exercise at age 33 years - As part of the interview at age 33 years, respondents were asked how often they: take part in competitive sports of any sort; go to 'keep fit' or aerobics classes; take part in circuit training, weight training or other repeated exercises - at home or at a gym; go running or jogging; go swimming; go cycling; go for walks; take part in water sports; take part in outdoor sports; go dancing; take part in any other sport or leisure activity which involves physical exercise. The definition of high levels of exercise was where exercise was reported every day or most days and the low value was where exercise was undertaken less than twice a month.

Diet at age 33 years - The interview at age 33 years included several questions on frequency of consumption of various food types. The dietary score constructed for these analyses (fully described in the statistical methods section) used the following dietary criteria: predominantly wholemeal/brown bread; fresh fruit at least once a day in summer; salads/raw vegetables at least once a week in winter; chips not more than twice a week; fried food (excluding chips) not more than twice a week; not eating

sweets/biscuits every day. The questions about bread type most often consumed listed 7 specific bread types, as well as an 'other' category and asked the respondent to rank the types in terms of which were most often consumed. The response categories for all of the other food frequency questions were: more than once a day; once a day; 3-6 days a week; 1 or 2 days a week; less than one day a week; or never. Information about sweets (including chocolates) and biscuits was collected using two separate food frequency questions.

Education

Age of leaving full-time education - This was defined using a three category ordinal variable. The categories were: up to age 16 years (the end of compulsory education); ages 17 to 18 years; and age 19 years or over.

Qualifications - Two variables were created to represent the highest level of qualification attained gained through education or training, using data collected by the interview at age 33 years. The first was concerned with qualifications attained before age 23 years and the second with qualifications attained up to age 33 years. These variables were grouped into 6 ordinal categories indicating highest qualification achieved: no qualifications; low level qualifications; 'O' Level or equivalent qualifications; 'A' Level or equivalent qualifications; Further qualifications below university level; university degree and equivalents.

Region

Geographical region at ages 7 and 16 years - Region of residence in Great Britain was divided into 11 areas: North Western, Scotland, Northern, Wales, Midlands, East and West Riding, North Midlands, South Western, London and the South East, Eastern, Southern.

Geographical region at age 33 years - Due to changes in regional coding in NCDS, the region variable at age 33 years does not have identical categories, when compared with the earlier region variables. The 11 regional categories were: North Western, Scotland, Northern, Wales, West Midlands, East Midlands, Yorkshire and Humberside, South Western, South East, London, East Anglia.

5. PLAN OF THE ANALYSIS

The specific aims of the research are described in this chapter, beginning with issues of data quality, then moving to the socioeconomic context of unemployment amongst NCDS men, and concluding with the substantive areas of the research. The statistical methods are reported in the following chapter.

5.1 Data Quality

Before proceeding with the substantive analysis, it was important to conduct an investigation into possible sources of bias in the data. This investigation was divided into two areas: attrition/non-response and recall bias.

Non Response Bias

Missing data is a problem encountered in most censuses and surveys. NCDS is no exception to this, as it has missing data at both the variable and case level, at every data collection sweep (Ferri, 1993). As missing data takes several different forms, some form of classification is useful. Rubin (1976) proposed the following terminology to describe missing data: where there is no systematic pattern of missing values, the data are missing at random (MAR); if data are collected without systematic bias for inclusion or exclusion of cases, the data are observed at random (OAR); and if missing values are both MAR and OAR, then these data are missing completely at random (MCAR). An important consequence of missing data is that it can lead to exclusion of a group of cases, which have some characteristic(s) in common, from analysis and this may alter the substantive

findings of the research. This significant form of recall bias has been described as nonignorable (Little and Rubin, 1987).

In NCDS, the pattern of cohort members' characteristics who have not participated in one or more data collection sweeps is unlikely to be entirely random (Ferri, 1993). There is a risk that this could bias the results of analysis. For example, those more likely to have one or more missing values may also be more likely to have experienced unemployment. This could result in an underestimation of the amount of unemployment experienced by the cohort. The socioeconomic characteristics and experience of unemployment is investigated before and after the exclusion of cases with one or more variables (other than for unemployment and indicators of socioeconomic characteristics) with a missing value.

The response to NCDS was highest in childhood and so childhood socioeconomic characteristics are used to investigate response bias, in terms of key variables: it is possible to compare the characteristics of those who are excluded from analysis with those who are not. Unemployment data are also used in the investigation of non-response, as all substantive analyses use the unemployment data collected at NCDS5. In the event of serious (nonignorable) response bias being discovered, it may be necessary to use an application to handle and reduce the consequences of this bias. If it were nesessary, a likelihood-based method could be used to reduce the bias caused by attrition in logistic regression models (Fitzmaurice *et al*, 1996).

Recall Bias

In an investigation concerned with unemployment, it is desirable to evaluate the reliability of the unemployment data. The measurement of health and health behaviour, both as a precursor to, and outcome of, the experience of unemployment is largely based on a series of cross-sectional measurements. This is because NCDS, in common with most other longitudinal surveys, has not measured health continuously, instead it has taken snapshots at each sweep of data collection. However, NCDS can supply a continuous measure of unemployment throughout early adult life. This means that instead of simply observing a relationship between unemployment at one point in time with health and health behaviours, it is possible to examine the consequences of the timing, duration and long-term accumulation of unemployment. Although NCDS does supply a continuous longitudinal record of unemployment, these data were collected at only two points in time: the unemployment histories were collected retrospectively. Thus, the unemployment data may be subject to recall bias (Moss and Goldstein, 1979), making an investigation of this possible source of bias desirable.

Continuous unemployment data were first collected from NCDS cohort members between August 1981 and March 1982 when the cohort members were 23 years of age. These data were collected as part of the cohort member interview that formed part of NCDS4 and was conducted by professional social survey research interviewers. The interviews were usually conducted in the cohort members' homes. The first section of the interview consisted of an event 'diary' that recorded patterns of education,

employment, marital status and childbearing on a month by month basis. The 'diary' covered the period from March 1974, when the cohort members had their 16th birthday to December 1981, when they were 23 years of age. Interviewers were instructed to prompt the respondents with questions about the dates of key events such as marriage, the birth of children and school leaving. Key dates were used as necessary to assist recall. All periods when the respondent was not in employment or full-time education and was seeking work were recorded as unemployment. It was not necessary to be registered as unemployed or to have been unemployed for a minimum period. The 'diary' data collected at age 23 years were coded and computerised, providing a month by month record of unemployment experience between ages 16 years and 23 years, beginning in May, 1974.

Continuous unemployment data were collected for a second time as part of the fifth sweep of NCDS, NCDS5. The main fieldwork for this survey was conducted between May and December 1991, when the cohort members were 33 years of age. The method used to collect the retrospective unemployment history was not identical to that used for NCDS4. A self-completion questionnaire, 'Your life since 1974', was posted to respondents prior to their interview and they were asked to complete it prior to the interviewer's visit. Whilst the questionnaire began with a calendar as in NCDS4, this was only as an aid to memory for cohort members and would not be coded. Respondents were asked to complete five separate sections on relationships and marriage; children; employment; periods not working, including unemployment; and housing. For unemployment, only periods of one month or more were recorded. The definition of

unemployment was: not in paid work: unemployed and seeking work. The 'not in a job section' offered alternative reasons for being out of the labour force including: government training schemes and full-time education. The questionnaire recorded the start and end date of each bout of unemployment in the 'Not in a job' section. The questionnaire was concerned with the time period beginning in 1974, when cohort members were 16 years of age, and ending in 1991, when they were 33 years of age. The data were converted to give a month by month account of unemployment for this period by the method described previously.

One of the descriptions of status offered by the 'Not in a job' section of the NCDS5 questionnaire was 'full-time housework or child-care' which could be chosen as an alternative to 'unemployment' to describe a period of non-employment. Because many women who said that this was what they were doing during a period of non-employment, it was felt that this instrument could not be used in isolation to measure unemployment amongst women. Many women involved in home or child care would accept a job if one could be found. Because this instrument is likely to be a poor measure of job-seeking amongst women with children and because the project of which this work forms part was not concerned with women, they have been excluded from the analysis of response bias reported here.

The experience of unemployment reported at ages 23 years and 33 years can be compared to ascertain the presence of recall bias and examine some of its manifestations. As unemployment history between ages 16 years and 23 years was recorded twice, it was

possible to compare the two accounts. The period chosen for comparison began in May 1974, when the coded event history data collected by NCDS4 began and it ended in July 1981. July 1981 was chosen as this pre-dated NCDS4 fieldwork and would not be subject to reduced response due to the exclusion of respondents who had already completed the interview.

5.2 Timing and Duration of Unemployment from 1974 to 1991

It is necessary to describe the distribution of unemployment amongst NCDS cohort members so that an individual's or group's unemployment experience can be considered in the context of the entire cohort's experience. Only periods of unemployment of at least three months in duration will be used in this description, to avoid the potential problem of bias described previously. The overall proportion of men who experienced any unemployment between ages 16 to 33 years will be shown, as well as a description of the distribution of amount of unemployment experienced by cohort members over the relevant period. The timing of unemployment experience in population terms is also shown, as there are periods when the risk of unemployment is higher for proportions of the population, due to labour market or other effects.

While it is possible to describe the distribution of unemployment in terms of the entire cohort as outlined above, this could present a slightly misleading picture because all of the cohort members were not at risk of being or becoming unemployed for the entire period between 1974 and 1991. Cohort members could leave full-time education from age 16 years, when compulsory education ended, to some time in the early twenties, or in some cases even later, when higher education can end. Because of this large variability in age of leaving full-time education, this is one of the largest determinants of the amount of time at risk of being or becoming unemployed between ages 16 to 33 years. NCDS cohort members were divided into three groups to broadly describe their age of labour market entry, based on their age of leaving full-time education. The three

groups were: those who left school at age 16 years, leaving at the minimum age; those who left between ages 17 and 18 years of age, who may have stayed on at school or gone on to further education; and those who left at age 19 years or older, most of this group would have followed more 'academic' routes through university or polytechnic educations. By considering the characteristics of each of the three groups separately, a far more accurate picture of unemployment experience for cohort members will be produced. In each of the groups the period of being at risk of being or becoming unemployed will be far more similar and in addition to this, clearly, the educational characteristics and education/employment trajectories of cohort members in each group will be far less heterogeneous. The investigation of timing and duration of unemployment, as outlined above for the whole cohort, will be performed separately for each of the three groups.

5.3 Social Precursors of Unemployment

Elements of socioeconomic background have been shown to be protective or risk factors for both poor health and unemployment. It is important to identify associations between socioeconomic background and unemployment as this could explain some of the association between unemployment and poor health. Knowledge of the association of these measures of background characteristics with unemployment assists with the identification of potential confounding variables in the unemployment and ill health relationship.

As the age of leaving full-time education significantly determines amount of time at risk of unemployment between ages 16 and 33 years, unemployment was only defined during a period of time when the majority of the cohort were at risk of unemployment. This period begins at age 22 years, when the majority of the cohort had left full-time education and had entered the labour market.

All background characteristics investigated, pre-dated labour market entry, to ensure that the measures of these characteristics could not themselves be outcomes of unemployment experience: unemployment could result in relative poverty and thus alter social conditions and unemployment experienced by the cohort member could have a direct affect on the measurement of the cohort members' own social class. Social class at the time of cohort members' birth is used to indicate the families' general socioeconomic circumstances. Crowding at age 7 years was used as an indicator of social disadvantage

to provide a more accurate measure of standard of living, in addition to social class. As educational qualifications are related both to ability, background and employment, these are included in the analysis of social precursors of unemployment. Only qualifications obtained prior to labour market entry are included in the analysis.

These family background and social characteristics are evaluated as risk factors for unemployment in terms of their univariate relationship with subsequent unemployment and in terms of their association with unemployment independently of each other through multivariate analysis.

5.4 Childhood Health and Development

Direct Health Selection

To determine the extent to which pre-existing childhood illness is related to subsequent unemployment, illness is defined as chronic illness or disability that was present at age 16 years, therefore pre-dating labour market entry. This is an attempt to consider the concept of 'direct health selection', that pre-existing poor health results in greater risk of unemployment. The association between this measure of illness and disability and subsequent unemployment is assessed by using the standardised unemployment exposure period, beginning at age 22 years, as detailed previously. The relationship is investigated in univariate terms as well as after adjustment for the social background factors, as these may be related to both unemployment and childhood health.

Indirect Health Selection

To investigate 'indirect health selection', the hypothesis that states that men who are at greater risk of becoming unemployed are also at greater risk of future illness (independently of the experience of unemployment), without actually being ill prior to the experience of unemployment, it is necessary to identify measures of vulnerability to illness. Short stature at age 7 years has been shown to be a measure of vulnerability to future physical illness. A high score on the Bristol Social Adjustment Guide (BSAG) has been chosen as the indicator of vulnerability to future psychological ill health. Both

measures of vulnerability to future ill health are taken prior to labour market entry and could therefore not be caused by unemployment. The relationships between the measures of vulnerability and subsequent unemployment (the standardised period of unemployment as detailed previously) are investigated both individually and after adjustment for the socioeconomic background characteristics. The measures of vulnerability to physical and psychological ill health are modelled together to investigate whether their relationships with unemployment are independent of each other.

Height is determined partly through genetic inheritance and partly through environmental factors. Adjustment for parents' heights represents an attempt to focus on the environmental determinants of the cohort members' height at age 7 years. There is a respectable probability that the phenotype of a cohort member's parents, in respect to their height, will be significantly due to the parent's genotype, and in turn, genetic material related to parental height expression is likely to be found in the cohort member's genotype (Gale, 1980). Adjusting for parental height should remove some of the genetically determined variance in the cohort members heights.

To ensure that any relationship found between the measures of health vulnerability and unemployment represent indirect health selection and not direct health selection, it is necessary to take into account chronic illness present prior to labour market entry. The measures of vulnerability to future illness could also represent an outcome of present or past illness. The multiple logistic regression analyses of the relationship between the measures of vulnerability and unemployment were adjusted for chronic illness and

disability at age 16 years. In a separate model, cases with a moderate to severe disability or chronic illness were excluded from the analysis. If the relationship between unemployment and vulnerability to future health remains, this indicates that the relationship is not due to those who are identified as more vulnerable to illness also being sick when they enter the labour market: they were vulnerable to future illness without actually being sick at age 16 years.

Height itself could be a risk or protective factor for unemployment: employers could, for example, discriminate against short men. Those with short stature at age 7 years may be at greater risk of future unemployment because they are more likely to become short adults. To asertain that the relationship between short stature at age 7 years with unemployment is not due to shorter height as an adult, an additional model is required: the analysis is repeated, but height both at age 7 years and full attained adult height are included in the model. If the relationship between height at age 7 years and unemployment remains significant and independent of fully attained adult height, then the relationship is unlikely to be due to employers tending to select taller men, as this selection would be made on the basis of adult height. This could also show that if short stature at age 7 years predicts future unemployment and adult short stature does not, that the phenomenon that is associated with increased risk of future unemployment is slow growth to age 7 years, rather than height *per se*.

5.5 Health Behaviour and Body Mass Index

A possible explanation for the association between unemployment and ill-health is that unemployment may result in the deterioration of health behaviours. Here, the relationships between accumulated unemployment experienced between ages 16 and 33 years and recent unemployment at age 33 years, with cigarette smoking, alcohol consumption, physical exercise, diet and Body Mass Index (BMI) are examined. Cigarette smoking, alcohol consumption, physical exercise and dietary habits represent 'voluntary' behaviours that are undoubtedly associated with health (Blaxter, 1990). BMI represents a measurement of relative body weight, standardised for height: high BMI indicates a that man is overweight and low BMI indicates that he is underweight. While body weight is not necessarily a direct product of voluntary behaviour, it is certainly associated with health (Belloc and Breslow, 1972) and is often an outcome of health behaviours. For each of the behaviours and BMI, the relationships with both accumulated unemployment to age 33 years and with unemployment experienced during the 12 months prior to interview at age 33 years are investigated. The relative strengths of association of amount of accumulated unemployment and recent unemployment with health behaviours and BMI are investigated.

Cigarette Smoking

Unemployment could result in the deterioration of smoking habits through unemployed men being more likely to take up smoking, and less likely to give it with increasing

experience of unemployment (whether they started before or during a period of unemployment). To establish if the experience of unemployment results in a higher risk of being a regular cigarette smoker at age 33 years, it is necessary to adjust for socio-economic and other background characteristics that may be associated with both a higher risk of unemployment and a greater propensity for cigarette smoking. Social class of the cohort member's parents when he was 16 years of age is used to indicate socioeconomic background. Later social class based on the cohort member's own employment is not used, as this could also be an outcome of unemployment (Gershuny and Marsh, 1994). Attained qualifications and age of leaving full-time education are both associated with risk of unemployment, as well as with the likelihood of being a smoker. Region of residence prior to labour market entry is also important as a potential confounder, as there are powerful regional influences on health behaviour (Blaxter, 1990).

As the possible influence of unemployment experience on smoking behaviour is being considered, smoking behaviour prior to the risk of unemployment is also an important factor. Age 16 years is the only time when all of the cohort would not have experienced unemployment, as this is prior to labour market entry. Number of cigarettes smoked on a regular basis at age 16 years is used to describe smoking behaviour prior to any experience of unemployment. The number of cigarettes smoked is used to indicate strength of smoking habit: a heavy smoker may be less likely to give up smoking than an occasional experimental smoker (Morris *et al,* 1992).

Alcohol Consumption

High alcohol consumption and abstinence are both considered, as both have been associated with unemployment (Winefield *et al*, 1993; Morris *et al*, 1992). As unemployment is associated with both high and low alcohol consumption, it would not be appropriate to investigate this relationship as a linear term. The relationship between alcohol consumption and unemployment is investigated using two measurements of alcohol use. The first measurement used is amount of alcohol consumed in the week prior to interview at age 33 years. Drinking problems may not be identified by simply considering alcohol consumption cross-sectionally, as some men with such problems may be abstemious for much of the time with bouts of 'binge drinking'. To identify drinking problems, the standard CAGE (Liskow *et al*, 1995) questionnaire items were used.

As for cigarette smoking, background socioeconomic characteristics (prior to labour market entry), qualifications, age of leaving full-time education and region of residence are potential confounding factors that are adjusted for using multivariate modelling. As a measure of patterns of drinking behaviour that were established or developing prior to labour marker entry and possible experience of unemployment, alcohol consumption at age 16 years was used.

Exercise

To examine the relationship between exercise and unemployment, frequency of exercise at age 33 years is used. Physical exercise during leisure time has been identified as a protective factor against coronary heart disease (Morris *et al*, 1980). If men who experienced unemployment were less likely to participate in regular physical exercise, this might increase their risk of excess mortality. As unemployment could also be associated with more exercise, due to increased leisure time during a spell of unemployment, both high levels and low levels of exercise are considered as outcome measures. Changes in behavioural patterns that could be attributed to the experience of unemployment is of particular interest here so, levels of exercise prior to labour market entry at age 16 years are also investigated. The effects of educational and socioeconomic background factors as potential confounders are taken into account as these could influence both unemployment risk and patterns of physical exercise.

Diet

Were men who were unemployed more likely to have a less healthy diet at age 33 years than those who were not? If the experience of unemployment was associated with a poor diet, this might be another reason why excess mortality is associated with unemployment. Unlike the other measures of health related behaviour used in these analyses, there was no measurement of dietary practices prior to labour market entry, at age 16 years and so it was not possible to investigate change in diet between ages 16 and 33 years. But, as

British dietary habits are significantly associated with social class, region and education (Cox *et al*, 1987), by adjusting for these family of origin factors, diet at age 33 years is evaluated relative to family of origin and thus the possible effects of exposure to unemployment may be observed. Diet is defined in terms of a score which reflects the 'healthiness' of the diet based on dietary habits approved by nutritionists (Blaxter, 1990).

Body Mass Index

A low or high BMI could provide evidence of the consequences of health behaviours that may be associated with unemployment and indicate future health risk. The association of both high and low BMI values at age 33 years with accumulated unemployment and recent unemployment at age 33 years are investigated as indicators of health behaviour outcome. By using BMI at age 16 years as an explanatory variable, in addition to the measurements of region, class and education, the additional risk of an extreme BMI value after the experience of unemployment is examined. Adjustment is also made for frequency of leisure time exercise, dietary habit at age 33 years and cigarette smoking at age 33 years, as all of these behavioural factors are likely to influence BMI. By adjusting for these, any remaining relationship between unemployment and BMI is more likely to be due to other factors, such as the stress of unemployment resulting in metabolic changes that affect body mass.

5.6 Mental Health

The question to be examined in this section is whether unemployment results in the deterioration of mental health. Poor mental health was defined as symptoms of depression and anxiety that were of sufficient severity to result in medical consultation. As a causal relationship was being sought, adjustment was made for pre-existing risks for both unemployment and poor mental health.

A major problem in demonstrating that a relationship may be causal, can be showing that the unemployment pre-dated the deterioration of mental health. If this cannot be shown, it could be argued that the association between poor mental health and unemployment was a result of indirect health selection, or that men with poor pre-existing mental health were selected into unemployment because of their psychological characteristics. In a data set such as NCDS, it would not be appropriate to assume that a measure of poor mental health at age 33 years, amongst those who had experienced unemployment represented a health 'outcome' that was due to that experience of unemployment: poor mental health in these men may have existed prior to exposure to unemployment. To solve this problem two measurements which have a temporal context are required: a date of onset for poor mental health and measures of unemployment exposure that pre-date the onset of poor mental health. Here, unemployment was modelled as a time dependent covariate, using proportional hazards models (Cox, 1972), with deterioration in mental health as the dependent variable. Modelling exposure to unemployment as a time dependent covariate also solves a second problem. Re-employment can result in an improvement

in mental health (Ross and Mirowsky, 1995; Banks and Jackson, 1982; Tiggeman and Winefield, 1984; and Corti, 1994), so the damaging effects of unemployment may be obscured if mental health is measured some time after the experience of unemployment where the respondents have been employed subsequently. Recent unemployment modelled as a time dependent covariate allows the impact of recent unemployment on mental health to be estimated.

At age 33 years, NCDS men were asked if they had suffered from symptoms of depression and anxiety that had resulted in a medical consultation with a GP or with a specialist since age 23 years. If they had, they reported the age at which the problem first started (not the age of consultation): this onset age represented the mental health outcome. The exposure measure of accumulated unemployment that was used was the sum of all unemployment experienced from age 16 years up to and including that experienced in the year before the age of onset for mental health problems. For men who had not reported having these symptoms, unemployment was accumulated up to and including that experienced at age 32 years. Because the onset age is relatively imprecise, unemployment is only accumulated as a time dependent covariate up to the end of the previous year to ensure that it does pre-date onset, thus this is probably a conservative estimate of unemployment prior to onset. Recent unemployment is modelled as any unemployment experienced in the 12 months prior to the start of the year of onset.

Potential confounding factors were adjusted for in the analyses to ensure that they were not the cause of both unemployment and poorer mental health. A measure of childhood

circumstances (social class) and qualifications attained were included as both represent risk or protective factors for unemployment and mental health. Region was included to account for regional variation in health service provision and local economies. Pre-existing vulnerably to depression and anxiety was represented by a childhood measure of behavioural maladjustment and a measure of depression that was taken at age 23 years.

As the adult measure of pre-existing depressive tendency was taken at age 23 years, the onset ages had to be after age 23 years. For this reason men with onset ages before age 24 years were excluded from the analysis. While accumulated unemployment was measured from age 16 years to age 32 years, recent unemployment was only measured from age 23 years to age 32 years, as risk of onset was only possible at ages 24 to 33 years. As proportional hazards models were used, the model calculated the risk of onset as a function of the time dependent covariates, and the time-related hazard function (Allison, 1984).

6. STATISTICAL METHODS

Unless otherwise stated, data analysis was conducted using SPSS (Norusis, 1990), release 5.0, in a SunOs 5.4 Unix environment. Some data analysis was performed using Stata (Stata, 1993) in a Unix environment and some using SPSS for Windows, release 6.0 (Norusis, 1993): where these software packages were used, it is specifically identified in the text. NCDS unemployment history data were produced using the PC version of the ACCNCDS (Elias 1993) software. Other NCDS data were extracted from the SIR longitudinal database held at the Social Statistics Research Unit, City University.

6.1 Data Quality

Non Response Bias

To investigate changes in the characteristics of the sample used for the analyses when cases with missing data required by the analyses were removed, two sub-groups of the men with unemployment data from NCDS5 were defined: those who were included in most of the analyses and those who were excluded due to missing data. The cases who were excluded from almost all of the analysis did not have some, or all, of the following information: medical data at age 7 years, medical data at age 16 years, qualifications attained by age 23 years. These variables were chosen as they were required by most of the analyses performed.

The two sub-groups of men were compared by crosstabulation: characteristics of the full sample of men and the reduced sample used in the analysis were compared. The

comparisons were made on the basis of: amount of unemployment experienced between ages 16 and 33 years; age of leaving full-time education; social class at birth; and number of persons per room in the household at age 7 years.

Recall Bias in the Unemployment Data

Differences in total number of months of unemployment reported for the studied period provides a general indication of differences between data collected in 1991 and 1981. Only cases which responded fully to the diary section of the interview at NCDS4 and the 'Your life since 1974' questionnaire at NCDS5 were included in these analyses. The total number of months of unemployment reported for the study period as reported at NCDS4 was subtracted from the total number of months reported for the same period at NCDS5. It is assumed that the data collected at NCDS4, when cohort members were 23 years of age, are likely to be the more accurate record of unemployment between ages 16 and 23 years as it is closer in time than the data collected by NCDS5 at age 33 years. Any difference between amount of unemployment recorded at NCDS4 and NCDS5, will indicate poor memory of events at age 33 years. For some comparisons, cases who did not report any unemployment up to age 23 years, as indicated by NCDS4 data, were excluded to focus on the cases who were 'at risk' of forgetting their unemployment.

Definition of Unemployment

The shorter bouts of unemployment, of less that than three consecutive month's duration, were found to provide a poorly defined record of unemployment. This may be due to poor recall and differences in the definition of unemployment by the survey instrument at NCDS4 and NCDS5.

To overcome the problems associated with short bouts of unemployment, only episodes of unemployment of three consecutive months or longer were defined as unemployment for all further analyses. Unemployment of less than three consecutive months was excluded from the unemployment history data set.

6.2 Timing and Duration of Unemployment from 1974 to 1991

All men with valid unemployment history and age of leaving full-time education data were included in the initial analysis to describe the timing and duration of unemployment from age 16 (1974) to age 33 (1991). The overall proportion of men who had experienced any unemployment between ages 16 and 33 years was shown using frequency counts. The proportion in each of the three ages of leaving full-time education groups was shown using cross tabulation. The distribution of the number of years of unemployment accumulated between ages 16 and 33 years is shown by frequency count: the total number of months of unemployment was recoded into years. This accumulation of unemployment was then recoded into an ordinal categorical variable with four values: no unemployment, up to 12 months, 13 to 36 months and 37 months or more. The distribution of accumulated unemployment was broken down by age of leaving full-time education.

Unemployment experience over time was shown by dividing the entire period of early adult life, 1974 to 1991, into six periods, each of three years in duration. The experience of being unemployed in each period was reported for the entire group and for each of the age of leaving full-time education groups.

6.3 Social Precursors of Unemployment

Unemployment, as an outcome variable for this analysis, was defined as over one year of unemployment between ages 22 and 32 years. Information on unemployment before age 22 years was not used, because a high proportion of cohort members were in full-time education up to that age, and therefore not at risk of unemployment. Unemployment data for 1991, when the cohort was 33 years of age, were not used in this analysis as interviews were conducted throughout 1991. The unemployment outcome variable comprised the total number of months of unemployment between ages 22 and 32 years, grouped into those with up to 12 months of unemployment (including those who had not been unemployed), and those with over 12 months of unemployment. This coding for unemployment was chosen as the recession of the early 1980s resulted in a great deal of heterogeneity amongst those who experienced any unemployment, therefore we felt that it would be more appropriate to identify 'long-term' unemployment. All men in the analysis were at risk of being or becoming unemployed during the study period; those men not at risk of being, or becoming, unemployed for at least 7 years were excluded.

The relation of unemployment with social class at birth; home crowding at age 7 years; highest educational qualification attained prior to labour market entry; and geographical region of residence at age 7 years, were examined by cross tabulation and logistic regression Further analysis controlling for all of the variables was carried out using multiple logistic regression.

For the logistic regression, all variables were categorical and were entered into the logistic model as binary dummies. Cases with values missing for any variable were excluded from all analyses.

6.4 Childhood Health and Development

Unemployment was defined as the dichotomous variable detailed previously under 'social precursors of unemployment'. Cases with values missing for any variable were again excluded from all analyses: the total number of cases used here was identical to the number used when investigating the social precursors of unemployment.

Direct Health Selection

The relationship between chronic illness and disability at age 16 years (one variable) and unemployment was investigated by cross tabulation and logistic regression, and was further investigated using a multiple logistic regression model that was adjusted for the potential confounding variables defined in the 'social precursors of unemployment' section. The chronic illness and disability variable was entered into the regressions as dummy variables and men with no condition at age 16 years were chosen as the baseline category.

Indirect Health Selection

The relationship of unemployment with height at age 7 years and Bristol Social Adjustment Guide (BSAG) score at age 11 years was examined by logistic regression, in which height and BSAG score were included as linear terms. Height and BSAG score were also recoded into groups which were as close to fifths of the distributions as

possible. In the case of height, it was not possible to recode into exact fifths due to rounding to the nearest inch prior to conversion to centimetres. The relationship of these group variables with unemployment was also examined using logistic regression and crosstabulation to provide a more descriptive analysis. The group variables were entered as binary dummies. Further analysis to control for the potential confounders was carried out using multiple logistic regression: one model included height at age 7 years and BSAG score as linear terms and in a second model, these measures were entered as group variables.

The adjusted models included the heights of cohort members' biological parents, in addition to the other socioeconomic background, qualifications and region variables. The parental heights were entered as linear terms. All cases included in the analysis had height data available for both biological parents.

Disability and Chronic illness

To determine if childhood disability and chronic illness could account for the relationship of height at age 7 years and BSAG score with unemployment, the multiple logistic regression model, adjusted for the potential confounding variables and parental height, with height and BSAG score entered as linear terms, was used with the chronic illness and disability variable entered as binary dummies. This was further tested by a second model, which had the same structure as the adjusted model used to investigate indirect health selection, but this time the cases with a moderate to severe disability or chronic

illness at age 16 years were excluded from the analysis.

Adult Height and Childhood Growth

To assess the relative associations of height at age 7 years and adult height, measured at age 23 years, with unemployment, a multiple logistic regression model, adjusted for class at birth, crowding, region, attained qualifications, parental heights, height at age 7 years and height at age 23 years. The dichotomous measure of over one year of accumulated unemployment between ages 22 and 32 years was used as the dependent variable. All heights were entered as linear terms. As all cases with any missing values were excluded, the total number of cases in this analysis was slightly less than for previous analyses of precursors of unemployment; this is due to the inclusion of the height variable at age 23 years, for which there were additional cases with missing values.

6.5 Health Behaviour and Body Mass Index

The relationship of recent and accumulated unemployment with cigarette smoking, alcohol consumption, exercise in leisure time, diet and Body Mass Index (BMI) were investigated. The experience of unemployment was represented by two group variables and these were the two measures of exposure used here. Accumulated unemployment between ages 16 and 33 years was grouped into four categories: no unemployment; one to 12 months of unemployment; 13 to 36 months; over 36 months. The independent effect of unemployment around the time of the interview at age 33 years was also investigated. Recent unemployment was defined as unemployment experienced during the 12 months prior to interview at age 33 years using a binary variable. The relationship between the accumulated unemployment and the recent unemployment variables was investigated by cross tabulation. Three separate multivariate models were used to investigate each of the dependent variables, all controlling for the same potential confounding variables: one to examine the effect of accumulated unemployment; one to examine recent unemployment; and a third model to compare the relative influences of recent and accumulated unemployment in the same model.

The relationships of cigarette smoking, alcohol consumption, exercise in leisure time and BMI at ages 16 and 33 years with amount of unemployment experienced and recent unemployment at age 33 years were examined by cross tabulation and logistic regression. The relationship of diet at age 33 years with the measures of unemployment was also examined, but an investigation of dietary change was not possible due to lack of dietary

data at age 16 years. Rather than using mean values, separate low and high measures of alcohol consumption, exercise and BMI were analysed, as unemployment may be associated with both extremes of the distributions. Separate multiple logistic regression models were used to investigate the health behaviour and BMI outcomes measures at age 33 years, while adjusting for confounding variables. Categorical variables were entered into the logistic models as binary dummies.

In order to model change in smoking, alcohol consumption, exercise and BMI, between ages 16 and 33 years, the behaviour at age 33 years was modelled as the dependent variable. The dependent variables were binary variables to indicate behavioural or BMI status at age 33 years.

A more detailed measure of the same behaviour or BMI at age 16 years (as a continuous distribution) was included in the model as an explanatory variable. Such an approach is often referred to as conditional change modelling, as it conditions on initial state by including it as an explanatory variable (Plewis, 1985). This approach is used because marked changes in distributions are likely to be taking place between ages 16 and 33 years.

All models were adjusted for the following potential confounding variables: social class at age 16 years; region of residence at age 16 years; highest level of achieved qualifications by age 33 years; and age of leaving full-time eduction.

Cigarette Smoking

The dependent variable used for this set of models indicated whether cohort members had defined themselves as smokers at age 33 years. Number of cigarettes regularly smoked per week at age 16 years was included as an indicator of level of smoking prior to the experience of unemployment.

Alcohol Consumption

Three separate sets of logistic models with different dependent variables were used to investigate alcohol consumption. Number of units of alcohol consumed in the week prior to interview at age 16 years was used as the measure of consumption prior to any possible experience of unemployment. A unit was equivalent to half a pint of beer; a single measure of spirits; or a glass of wine. The first model used 'no alcohol consumed in the week prior to interview at age 33 years' as an indicator of a low level of consumption. The second set of models used the top fifth of the alcohol consumption distribution (in units) to identify higher levels of consumption. The third set of logistic models had problem drinking defined by the standard CAGE questionnaire items (Liskow *et al*, 1995) as its dependent variable. The CAGE score is dichotomised as three or more positive responses indicates the subject is likely to have a drinking problem. The CAGE questionnaire was not used at age 16 years, so it was not possible to examine *change*, alcohol consumption at age 16 years was also included in this model as an indicator of early drinking habits.

Exercise

Two sets of multiple logistic regression models were used to examine high and low levels of exercise in leisure time at age 33 years. The dependent variable was based on reported frequency of exercise. The high value used is exercise every day or most days and the low value is exercise less than twice a month. A score for amount of exercise was constructed for the age 16 year data, based on three questions asking about frequency of: outdoor games and sports; swimming; and indoor games and sports that are physically active. Each question had 'often', 'sometimes' and 'never' response categories and in the derived score each 'often' added two and each 'sometimes' added one to the overall score. The continuous score at age 16 years was used in the multiple logistic regression models and the top and bottom fifths of the distribution were used for the univariate analyses.

Diet

Unlike the other models used for analysis of health behaviour, the dietary data were analysed with an ordered polytomous logistic regression model using Stata software (Stata, 1993). There was no measurement of dietary change, but the following potential confounding variables were included in the models: social class at age 16 years; region of residence at age 16 years highest level of achieved qualifications by age 33 years; and age of leaving full-time eduction.

A dietary score based on frequency of food types consumed was created. This score attempted to replicate one used by Blaxter (1990) that was used in the analysis of the Health and Lifestyle Survey data. A value of one was added to the score for each of the following six criteria that were met by cohort members dietary habits, as they reported eating:

predominantly wholemeal/brown bread

fresh fruit at least once a day in summer

salads/raw vegetables at least once a week in winter

chips not more than twice a week

fried food (excluding chips) not more than twice a week

not eating sweets/biscuits every day

The dietary score used here did not included one of Blaxter's (1990) items as it was not available from the NCDS data, this was: eating low fat/polyunsaturated spreads rather than butter and higher fat spreads. For analysis, the scoring was reversed, so that a high score represented poorer dietary habits and a low score indicated good dietary habits. For univariate analysis, those cohort members who reported two or less of the good dietary habits listed above, were classified as having poor diets. Blaxter (1990) used the same definition of poor diet. The continuous dietary score was the dependent variable in the ordered polytomous logistic regression model.

Body Mass Index

Two sets of multiple logistic regression models were used to examine high and low BMI at age 33 years. The two extremes of the distribution were defined as the top and bottom fifths of BMI at age 33 years. The continuous BMI distribution at age 16 years was included to represent BMI prior to any possible experience of unemployment. Additional adjustment was made for other potential confounding factors. These were number of cigarettes smoked at ages 16 and 33 years, dietary score at age 33 years and frequency of leisure time exercise at age 33 years. The top and bottom fifths of the BMI distribution at age 16 years were used in the univariate analyses.

6.6 Mental Health

Recent and accumulated unemployment as risk factors for symptoms of anxiety and depression that resulted in medical consultation were examined, to test the hypothesis that unemployment pre-dates poor mental health and that it may have a causal role in the deterioration of mental health. All analyses here were performed using SPSS for Windows, release 6.0 (Norusis, 1993) to utilise the proportional hazards, with time dependent covariates, modelling capability.

At NCDS5 respondents reported symptoms of anxiety and depression that resulted in medical consultation, and the age at which they first experienced these symptoms. This age of onset was used as the mental health outcome variable. Where men reported symptoms with different onset ages, the earliest age was used. Cases with an onset age of 23 years or younger were excluded from the analysis, as it was not possible to adequately adjust for their pre-existing mental health.

Unemployment was defined as two time dependent covariates. Accumulated unemployment was represented by an ordinal group variable with the following categories of months of unemployment between age 16 years and the end of the year prior to the onset age being considered: 0, 1-12, 13-36 and over 36 months. As this variable is time dependent, it is recalculated for each year. Recent unemployment was defined as any unemployment experienced in the year prior to the year of onset age. For each age of onset the appropriate time dependent covariates represent employment

experience up to the end of the previous year from age 23 years (for onset age 24 years) to age 32 years (for onset age 33 years). The univariate relationship between the unemployment variables and onset age was investigated by crosstabulation. For each successive age group, cases with an earlier onset were excluded from the risk set.

The univariate relationship between the potential confounding variables and the outcome variable was investigated using crosstabulation and Cox regression; these were social class at birth, qualifications attained by age 23 years, region of residence at age 33 years, BSAG score (Stott, 1969) at age 11 years and Malaise Inventory (Grant *et al*, 1990) score at age 23 years. For descriptive purposes, the BSAG score and the Malaise Inventory score were divided into fifths. Due to the skewed distribution, it was not possible to divide these into perfect fifths. For the Cox regression procedure, one variable indicated if onset had occurred and another indicated age of onset.

Five separate Cox regression analyses were performed to investigate the relationship between unemployment and age of onset of symptoms of anxiety and depression. Recent and accumulated unemployment were modelled separately as time dependent covariates in two models. Then both of these measures of accumulated and recent unemployment were included in a third model to investigate their independent association with the outcome variable. Adjustment was made for the potential confounding variables in all models. Social class at birth, qualifications attained by age 23 years and region of residence at age 33 years were modelled as binary dummies. Investigation of the relationships between the earlier measures of mental health and later symptoms of

depression and anxiety indicated that the Malaise Inventory (Grant *et al*, 1990) score should be modelled as a continuous variable, while BSAG score fifths were modelled as binary dummy variables.

Two further Cox regression models were executed where recent and accumulated unemployment were modelled as time dependent covariates in two separate analyses. The potential confounding variables were included in both models in the form previously described. Men with a Malaise Inventory score of 8 or more, an indicator of clinical levels of depression (Power *et al*, 1991), were excluded from these analyses. These men were excluded to ascertain the role of pre-existing vulnerability in explaining the relationship between unemployment and deterioration in mental health.

RESULTS AND DISCUSSION

7. DATA QUALITY

Non response bias was investigated to ascertain the representativeness of the sample used for analysis, when compared with the entire cohort. Not all cases participated in every round of data collection due to attrition and refusal. Cases with other forms of missing data were also excluded from the analyses. Recall bias in the unemployment data was investigated to assess the quality of the unemployment variables.

Results

Non Response Bias

Significant differences were found when men excluded, due to one or more items of missing data, were compared with those who had complete data for all of the specified variables using the chi-squared test. Table 1 shows that the men with missing data were slightly more likely to have experienced some unemployment between ages 16 and 33 years, 57.7% had never been unemployed, while 60.9% of those with complete data were never unemployed. The men with missing data were more likely to have left school at age 16 years: 67.3% compared with 62.4% of those with complete data. Those who were born into families of lower social class were more likely to have missing values, as 9% were from social class V, compared with 6.7% of those with complete data. Crowding at age 7 years was the variable most weakly predictive for tendency to non response, but those with the most disadvantaged conditions, from the most crowded households, were

slightly more likely to be non-responders: 17.8% were from the most crowded conditions, while 16.2% of those with complete data were living in the most crowded conditions at age 7 years.

Variable	Missing data		No missing data		sig
	n	%	n	%	
Unemployment 16-33 years					0.015
0	1583	57.7	1373	60.9	
1 - 12	628	22.9	519	23.0	
13- 36	333	12.1	240	10.6	
37 +	199	7.7	124	5.5	
Age of leaving full time education					0.001
16	1846	67.3	1407.	62.4	
17 - 18	421	15.3	376	16.7	
19 +	476	17.4	473	21.0	
Social class at birth					0.007
I, II	419	18.3	441	19.5	
III nm	214	9.3	258	11.4	
III m	1166	50.9	1149	50.9	
IV	285	12.4	256	11.3	
V	206	9.0	152	6.7	
Persons /room at age 7 years					0.242
<1	1208	61.2	1382	61.3	
>1 - 1.5	413	20.9	508	22.5	
>1.5	352	17.8	366	16.2	
Total n			2256		

Table 1. Distribution for unemployment and demographic variables by inclusion in sample. Compared using the chi-squared test. The two groups are mutually exclusive.

Variable	Full		Partial	
	n	%	n	%
Unemployment 16-33 years				
0	2956	59.1	1373	60.9
1 - 12	1147	22.9	519	23.0
13- 36	573	11.5	240	10.6
37 +	323	6.5	124	5.5
Age of leaving full time education				
16	3253	65.1	1407	62.4
17 - 18	797	15.9	376	16.7
19 +	949	19.0	473	21.0
Social class at birth				
I, II	860	18.9	441	19.5
III nm	472	10.4	258	11.4
III m	2315	50.9	1149	50.9
IV	541	11.9	256	11.3
V	358	7.9	152	6.7
Persons /room at age 7 years				
<1	2590	61.2	1382	61.3
>1 - 1.5	921	21.8	508	22.5
>1.5	718	17.0	366	16.2
Total n	4999	(max)	2256	(total)

Table 2. Distribution for unemployment and demographic variables in the full and reduced samples. The full sample (containing cases with and without any missing data) contains the partial sample (all cases have complete data).

Table 2 provides descriptions of the distributions of the indicator variables for two groups of men. The full sample includes all men with data at age 33 years, while the partial sample does not include men with missing values for any of the key variables. The overall characteristics of the partial sample, that was used for most of the analyses, were only slightly different to the full sample.

Recall Bias in the Unemployment Data

Cohort members were asked for details of the timing and duration of all unemployment previously experienced both at ages 23 years and 33 years. These data were used to make a comparison of the month by month accounts of unemployment reported at ages 23 years and 33 years, and this revealed significant differences.

Overall, 59.7% of respondents reported the same number of months of unemployment between ages 16 and 23 years, when reported at age 23 years and age 33 years (see table 3). However, if respondents who did not report experiencing unemployment at NCDS4 are excluded from the analysis, only 6.4% reported the same number of months of unemployment at ages 23 and 33 years. The greatest tendency was for unemployment to be under-reported at age 33 years. Overall, 29.7% reported less unemployment at 33 years, compared to what they reported at age 23 years. Of those who reported some unemployment at age 23 years, 74.1% said that they experienced less unemployment at age 33 years when compared to what they reported at age 23 years. Over-reporting unemployment at age 33 years was less common: 9.9% overall and 19.6% of those who

said they had experienced unemployment at age 23 years reported more unemployment at age 33 years.

The unemployment data were re-analysed with bouts of unemployment lasting for less than three consecutive months being excluded. In the entire sample, the proportion with no discrepancy between number of months reported at ages 23 and 33 years increased to 70.7% (table 4). Amongst the reduced sample containing only those who reported any unemployment at age 23 years, the proportion not giving discrepant reports at age 33 years had risen from 6.4% (in the sample including the shorter bouts of unemployment) to 32.3%.

Difference (months)	All cases		Unemployment reported at NCDS4	
	n	%	n	%
-66 to -4	663	13.9	663	35.6
-3 to -1	716	15.8	716	38.5
0	2712	59.7	120	6.4
1 to 3	270	5.9	225	12.1
4 to 87	183	4.0	138	7.5
Total	4544	100.0	1862	100.0

Table 3. The difference in number of months of unemployment between ages 16 years and 23 years when reported at age 23 years and again at age 33 years.

Difference (months)	All cases n	%	Unemployment reported at NCDS4 n	%
-66 to -4	600	13.2	600	32.2
-3 to -1	284	6.3	284	15.3
0	3211	70.7	602	32.3
1 to 3	218	4.8	188	10.1
4 to 87	231	5.1	188	10.1
Total	4544	100.0	1862	100.0

Table 4. The difference in number of months of unemployment between ages 16 years and 23 years when reported at age 23 years and again at age 33 years. Unemployment bouts of less than 3 consecutive months are excluded.

Discussion

Non Response Bias

Exclusion of the men with one or more missing values for the relevant variables resulted in the loss of a higher proportion of men from lower social class family backgrounds, with lower levels of education and with a greater accumulation of unemployment between ages 16 and 33 years.

This pattern of non response is consistent with earlier analysis of non response in NCDS, that showed the most disadvantaged groups tended to be somewhat under-represented (Power *et al* 1991; Ferri, 1993). It seems probable that age of leaving full-time education is most significantly associated with response, when compared with the other variables, for a combination of reasons. Age of leaving full-time education is, in part, an outcome of social background; men from a lower social class background are less likely to perform well in education and more likely to leave full-time education at a younger age (Banks *et al*, 1992). Age of leaving full-time education is related to educational performance and so it is also a good indicator of the cohort members' own personal characteristics. Those with literacy problems, who would be more likely to leave school at a younger age, might also be less likely to keep in touch with NCDS as this requires use of literacy skills. It has also been shown that poorer educational performance is associated with a greater opposition to authority (Banks *et al*, 1992). Some may have viewed participation in NCDS surveys as assisting those in authority or as giving information about themselves to the 'establishment', and so this may be another reason for lower response from men who left full-time education at a relatively early age. Age of leaving full-time education may also be the most powerfully predictive indicator of response because it is reasonably accurately recorded: the information was recorded at more than one time point, so it could be checked and it was less likely to be missing as a derived variable, not depending on data from a single source.

Whilst variables describing the cohort members' own characteristics, such as age of leaving full-time education, are clearly very useful for examining non response bias, they

are not perfect because they are subject to differential non response bias themselves. Ideally, all characteristics to investigate bias should be complete for all of the men to be investigated. The most complete data record is the birth data, where social class of family is available, but not relevant characteristics for the cohort member himself. Later data on the cohort members' own characteristics, such as qualifications attained, may be more useful to describe respondents, but is itself subject to non response bias, as the most disadvantaged groups were less likely to have responded to this question, so it could not be used to measure the difference between respondents and non respondents. Thus the measure of crowding at age 7 years may underestimate the difference, in terms of crowding, between respondents and non respondents.

The sub-set of NCDS data being investigated here for non response bias only includes men for whom there was unemployment data at the fifth sweep of NCDS, which is in itself a subset of NCDS data that has been subject to non response, with those with lower qualifications and the most disadvantaged more likely to have dropped-out of the study (Power *et al* 1991; Ferri, 1993). Even though non response has resulted in some bias, the study has remained largely representative (Power *et al* 1991; Ferri, 1993). Men from the most disadvantaged backgrounds and those most likely to experience significantly more unemployment are somewhat under-represented, therefore, the analyses performed here may present a conservative estimate of unemployment experience for this cohort. For this reason, the full details of the relationship between the precursors and outcomes of unemployment may be underestimated for the most disadvantaged men and those with the greatest experience of unemployment. Most large population data-sets with so much

life-long details of their subjects are likely to suffer from this sort of non response bias. The results presented here should be viewed as conservative estimates of the effects of the precursors and outcomes of unemployment.

Recall Bias in the Unemployment Data

The unemployment data covering the period between age 16 and 23 years collected at NCDS4, when cohort members were 23 years old, is assumed to be the more accurate record than the 33 year record for the same period, as memory is more likely to deteriorate over time than to improve (Moss and Goldstein, 1979). The amount of unemployment reported had a greater tendency to be under reported at age 33 years, when compared to the record collected at age 23 years. A smaller proportion reported additional time unemployed at age 33 years.

Whilst faulty memory may be the reason for under reporting previous unemployment at age 33 years, differences in data collection methods may also have resulted in discrepancies between the records of unemployment collected at age 23 years and age 33 years. At NCDS4, unemployment was recorded even if its duration was for less than one month. Whereas, at NCDS5 unemployment should only have been recorded if it was for a period of one month (consecutively) or longer. Periods of non-employment between terms of higher of further education may also have been recorded differently by individuals at each of the two round of data collection. At NCDS4 these periods would have been coded as full-time education by the interviewers and at NCDS5, respondents

may have reported them as unemployment.

As there was evidence that significant amounts of unemployment reported at NCDS4 were not subsequently reported at NCDS5, the value of the unemployment data collected at NCDS4 is highlighted. The most complete record of unemployment can be obtained by combining the data collected at both time points, thus including in the unemployment history, the bouts that were reported at NCDS4, but not at NCDS5.

Unemployment bouts of less than three consecutive months in duration were less likely to be reliably and consistently reported at NCDS4 and NCDS5 for three probable reasons. The first reason is that shorter bouts of unemployment were simply less likely to be remembered and reported as they were relatively insignificant episodes in the respondents' lives. A second reason for under reporting of short spells of unemployment at NCDS5 is that whilst the respondent may remember the event, the dates for a short spell of unemployment may not have been remembered and recorded in the self-completion questionnaire (at NCDS4 the record was completed with interviewer assistance, and so, with probing, may have also been more complete for that reason). Shorter bouts of unemployment were probably more likely to be increasingly accurately reported if experienced at a time increasingly close to (before) the time of data collection, thus possibly introducing further bias into the unemployment data. The third reason for possible inconsistency in the reports of unemployment at NCDS4 and NCDS5, was due to differences in the definition of unemployment. Holiday periods during full-time education, for example whilst at university, may have been more likely to have been

recorded as unemployment at NCDS5, whilst at NCDS4 the interviewer collected data should have been coded as 'in full-time education' for the same period. This problem could have systematically increased bias, as the amount of unemployment reported by those who had been in further or higher full-time education in the data collected at NCDS5 may have been inflated by the relatively long holidays (where unemployment was reported) during further or higher full-time education. This would not be the case who left full-time education at an earlier age.

In order to minimise bias and optimise accuracy of the unemployment data, a single unemployment history data set was constructed using the information collected both at NCDS4 and NCDS5, and this data set was used for all subsequent analysis. A month by month unemployment status history was constructed and where unemployment was reported at NCDS4 but not NCDS5 for the same period, the NCDS4 data was included to provide a fuller record of unemployment. Prior to the process of joining the NCDS4 and NCDS5 data, bouts of unemployment with a duration of less than three consecutive months were excluded from the data sets. The removal of these short spells of unemployment was designed to reduce bias (short spells being far more likely to be reported if experienced at a time that was close to data collection) and also to reduce the inclusion of 'unemployment during full-time education' that was reported at NCDS5 and not NCDS4.

8. TIMING AND DURATION OF UNEMPLOYMENT FROM 1974 TO 1991

The characteristics of unemployment experienced by NCDS men were investigated.

Results

Amount of Accumulated Unemployment

Overall, 2043 men (40.9%) had experienced at least one bout of unemployment with a minimum duration of three consecutive months between ages 16 and 33 years. The distribution of accumulated unemployment is shown in table 5 and this illustrates the skewed nature of the distribution. The men with the greatest amounts of accumulated unemployment are observed in the long tail of the distribution, beginning with an accumulation of over 36 months of unemployment. Figure 1 is a graphical representation of unemployment, broken down into six month accumulations. There was significant variation between the age of leaving education groups for the *amount* of unemployment accumulated between ages 16 and 33 years (table 6). However, there was little variation between these groups in terms of an any/none breakdown of unemployment experience: the group with least unemployment were those who left full-time education at age 17-18 years (38.8% experienced some unemployment). The group with the highest proportion who had been unemployed had remained in education longest, leaving at age 19 years or older (42.0% had been unemployed).

Amount of accumulated unemployment was categorised into four ordinal groups: no unemployment; up to 12 months; 13-36 months; and 37 months or longer (table 6). A continuous variable was not used as precursors and outcomes of unemployment are unlikely to display a linear relationship with increasing amount of accumulated unemployment.

The majority of those who experienced any unemployment, were unemployed for a total of 12 months or less, comprising 22.9% of all men. These men include a relatively high proportion who had entered higher or further education: 28.9% of those who left full-time education at age 19 years or over, compared with 20.7% of men who left school at age 16 years.

A higher proportion (8.4%) of men who left education at the earliest age experienced the greatest accumulation of unemployment, 37 months or more, compared with 3.1% of those who remained longest in education. The intermediate group, men who left full time education at ages 17-18 years, were the least likely to experience over 36 months of unemployment (2.8%). Amongst men who experienced unemployment, the mean number of months of accumulated unemployment for those who left full-time education at ages 16, 17-18 and 19 years or older were 26.1, 13.6 and 13.6 respectively.

Months of unemployment (maximum)	n	%
No unemployment	2956	59.1
12	1147	22.9
24	395	7.9
36	178	3.6
48	85	1.7
60	62	1.2
72	36	0.7
84	32	0.6
96	24	0.5
108	16	0.3
120	15	0.3
132	14	0.3
144	9	0.2
156	8	0.2
168	6	0.1
180	7	0.1
190	3	0.1
204	3	0.1
216	3	0.1
Total n	4999	100.0

Table 5. Amount of accumulated unemployment between ages 16 and 33 years

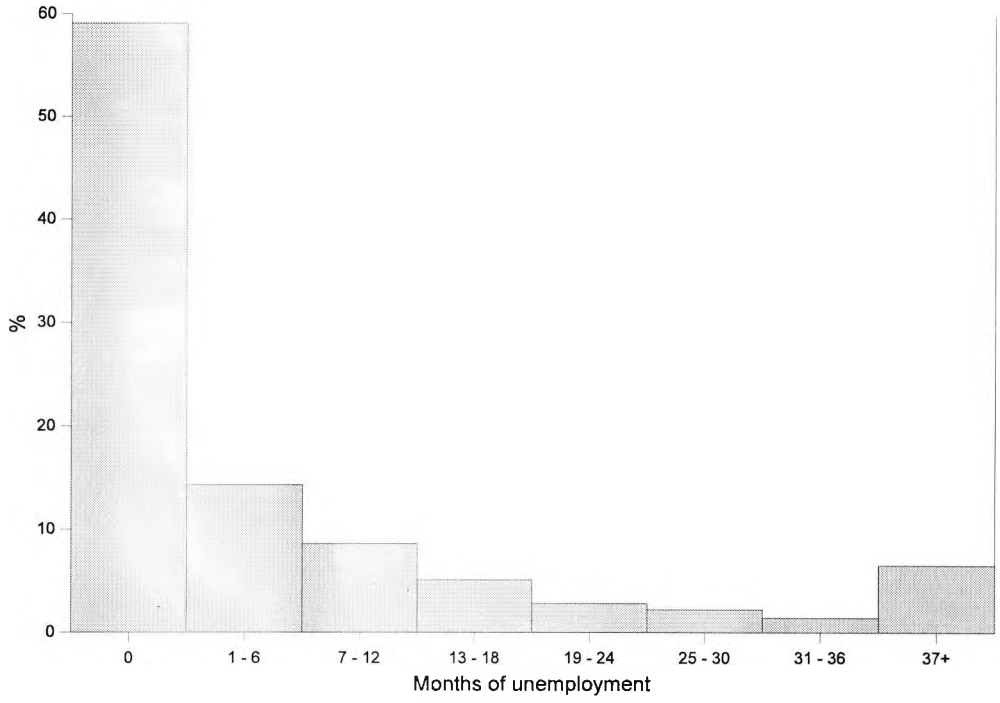

Figure 1. Months of accumulated unemployment between ages 16 and 33 years

months of un-employment	All %	Age 16 years %	Age 17-18 years %	Age 19 years or over %
0	59.1	59.0	61.2	58.0
1 - 12	22.9	20.7	25.1	28.9
13 - 36	11.5	12.0	10.9	10.1
37 +	6.5	8.4	2.8	3.1
Total n	4999	3253	797	949

Table 6. Number of months of accumulated unemployment between ages 16 and 33 years by age of leaving full-time education

timing of un-employment	All %	Age 16 years %	Age 17-18 years %	Age 19 years or over %
74 - 76	12.5	13.3	18.7	*
77- 79	15.9	15.8	13.2	18.5
80 - 82	20.2	20.8	14.3	23.2
83 - 85	12.1	13.9	7.7	9.8
86 - 88	9.1	11.0	4.9	5.8
89 - 91	9.1	10.8	6.1	5.5
Total n	4999	3253	797	949

Table 7. Timing of unemployment between ages 16 and 33 years by age of leaving full-time education. * Few of this group would have been at risk of unemployment between 1974 and 1976.

Timing of Unemployment

Table 7 shows the changing experience of unemployment between ages 16 and 33 years for NCDS men. For all men, the initial period, 1974-1976, saw a relatively low unemployment rate (12.5%). The rate then rose with time to peak at 20.2% in 1980-1982, this was the period of economic recession at the beginning of the 1980s. During the following period, unemployment dropped to 12.1% for the 1983 to 1985 period, then dropping again and remaining at its lowest level, 9.1%, up to 1991. The effect of the economic recession at the end of the 1980s on unemployment rates was not evident in this analysis. Whilst this recession was less severe than the one in the early eighties, some effect on employment rates would be expected. This may not have been observed because the three year grouping masked an initial drop and then a rise in the

unemployment rate during the 1990 - 1991 period.

Significantly different patterns of unemployment rate over time were observed for the three 'age of leaving full-time education' groups. During the period 1974 - 1976 a higher unemployment rate was observed amongst the men who stayed in education until ages 17-18 years, 18.7% compared with 13.3% of the 16 year old school leavers. The third group had not yet entered the labour market as they were still engaged in full-time education. Between 1977 and 1982 those who left education at age 19 years or older experienced the highest rate of unemployment, followed by those who left at age 16 years with the second highest rate. The period following the recession, 1983-1985, saw the unemployment rate of men who left education latest, fall below the rate for the 16 year old school leavers for the first time. Those who left full-time education between ages 17 and 18 years were still the most protected from unemployment. Unemployment continued to drop to lower rates in 1986-1988 and then remained relatively stable to 1991. In the final period, 1990-1991, the unemployment rate for men who stayed in education longest (and as a group were the most highly educated) was the lowest relative rate for the first time: 5.5%. Those who left full-time education between ages 17 and 18 years had an unemployment rate of 6.1%, while those who left at age 16 years had a rate of 10.8%.

Discussion

Timing of labour market entry may have been of particular significance in determining early unemployment risk for NCDS men. Those who were in full-time education until they were 19 years or older experienced the highest relative unemployment rate on labour market entry, even though they were the most highly qualified group, and this may have been because they entered the labour market during or immediately prior to the economic recession of the early 1980s. Entry into a labour market with diminishing numbers of vacancies would make it more difficult for the vast majority of job seekers to secure employment, even those with higher qualifications may experience difficulty due to their lack of work experience. During a recession employers are less likely to recruit new staff, and if they are recruiting they may be able to choose from a wider range of suitably qualified applicants.

The unemployment rate of men who left full-time education between ages 17 and 18 years was also slightly raised on labour market entry when compared to those who left school at age 16 years, even though this was not during a period of extreme recession. Several explanations are possible for this phenomenon, in addition to the possibility of a worsening economic climate. It may be that the more highly qualified men, who left education later, were more inclined to spend more time searching for a job, rather than taking the first possible job. A higher unemployment rate amongst men who left full-time education at a later age has been observed in another group of men, not during a period of recession (Montgomery, 1993). The 'discouraged worker' effect (Raffe &

Willms, 1989) offers another possible explanation: they observed that young men were more likely to remain in post-compulsory education in areas with high unemployment rates because leaving education may not appear to be a viable option due to the lack of local jobs. These young men tended to have below average levels of educational attainment, and so on leaving full-time education they still experienced a relatively high degree of labour market disadvantage and risk of unemployment. Labour market entry at a later age may usually be associated with a higher risk of initial unemployment, but in this cohort the risk of initial unemployment was increased by the recession of the early 1980s, particularly for those who had completed higher education.

The recession resulted in an increase in unemployment for men who had been in employment since they left school at age 16 years. These men were likely to be vulnerable to job loss due to their relative lack of skills and qualifications. Men who had left education between 17-18 years did not experience the same risk of job loss, as they were more highly skilled and qualified, and therefore more likely to be retained by employers. The job loss experienced by the men who left full-time education at age 19 years or older may be due their lack of a firm foothold in the labour market, due to their relatively recent point of entry. In a time of recession, employers may tend to retain, not only the most highly skilled men, but also those with greater experience, who have been working for their employer (or in the industry) for longer.

When the early 1980s recession ended, the men who left education at the latest age, the most highly qualified group, were best able to recover from a high rate of unemployment.

But possibly due to their early experience of unemployment during the recession, the unemployment rate of the most highly educated group only dropped below that of those who left full-time education at ages 17-18 years in the early 1990s. Whilst their unemployment rate did drop significantly after the recession, men who had left school at age 16 had almost double the unemployment rate in the 1989-1991 period, compared to those who left full-time education at the latest age. Many of these 16 year school leavers may have found it impossible to obtain a new foothold in the labour market after the recession, due to their relative lack of qualifications and because of the damage to their employment prospects by the experience of unemployment itself (Gershuny and Marsh, 1994).

Whilst men who left full-time education at the earliest age were slightly less likely to experience any unemployment when compared with men who remained in education longer, those who left education at the earliest age and who did experience unemployment, tended to have been unemployed for significantly longer periods. This, again, may be due to lower levels of skill and qualifications, as well as the damage done to their prospects by previous unemployment. Furlong (1992) has discussed the possibility that some young people *decide* to give up trying to find a job after prolonged unemployment, because this is the only way that they can have an element of 'control' over their own lives. This is consistent with a suggested role of 'agency theory' in explaining negative psychological consequences of unemployment, as discussed by Burchell (1994). Agency theory argues that it is the interruption of an individual's plans caused by unemployment that has negative psychological consequences, rather than the

experience of unemployment itself. Young men who cannot escape from unemployment cannot plan their future if this depends on securing a 'good job', as they do not consider this to be a realistic possibility. By planning a future that does not depend on obtaining a 'good job' and actively deciding to stop looking for one, some alleviation of the frustration of being unemployed may be possible. This decision may also result in an even more protracted experience of unemployment.

9. SOCIAL PRECURSORS OF UNEMPLOYMENT

The relationships of family background characteristics with unemployment were investigated.

Results

Overall, 269 men (11.9%) experienced more than a total of 12 months of unemployment accumulated between ages 22 and 32 years. This is a conservative estimate of amount of unemployment experienced by these men as unemployment experienced prior to age 22 years is not included in the definition of unemployment here. All of the social precursors of unemployment considered here were highly significantly associated with the measure of adult unemployment ($P<0.001$) in univariate analysis.

Social class at birth was powerfully predictive of unemployment (table 8). 26.3% of those born into social class V had over 12 months of unemployment, while only 6.6% of those in class I and II had experienced a similar amount. A gradient of association with unemployment in early adult life can be observed through the classes. There is a clear increase in risk of unemployment between classes I/II and III non manual, a slight increase to III manual (the largest class), with a large increase to IV and again to class V.

Table 8.			UNADJUSTED			ADJUSTED		
VARIABLE	**n**	**%**	**Relative Odds**	**95% CI**	**sig**	**Relative Odds**	**95% CI**	**sig**
Class at Birth					0.000			0.000
I/II	441	6.6	1.00			1.00		
IInm	258	10.1	1.59	0.92 - 2.77		1.37	0.77 - 2.43	
IIIm	1149	11.0	1.75	1.15 - 2.66		1.24	0.79 - 1.95	
IV	256	18.8	3.28	2.01 - 5.35		2.16	1.27 - 3.67	
V	152	26.3	5.07	3.01 - 8.55		2.80	1.58 - 4.95	
Crowding					0.000			0.064
Up to 1 persons/room	1382	9.0	1.00			1.00		
over 1 to 1.5 persons/room	508	14.6	1.73	1.27 - 2.35		1.27	0.91 - 1.77	
over 1.5 persons/room	366	19.4	2.44	1.78 - 3.36		1.53	1.06 - 2.22	
Age left Education					0.000			0.119
16	1407	14.2	1.00			1.00		
17 - 18	376	6.9	0.45	0.29 - 0.69		0.75	0.48 - 1.19	
19 or over	743	9.1	0.60	0.43 - 0.85		1.41	0.86 - 2.31	
Qualifications					0.000			0.000
None	227	26.4	3.16	2.13 - 4.68		2.23	1.47 - 3.39	
Less than O Level	253	16.6	1.75	1.15 - 2.67		1.55	1.00 - 2.43	
O Level	617	10.2	1.00			1.00		
A Level	698	10.3	1.01	0.71 - 1.45		1.00	0.68 - 1.46	
Further	221	6.8	0.64	0.36 - 1.15		0.63	0.34 - 1.16	
Degree	240	7.1	0.67	0.38 - 1.17		0.57	0.28 - 1.18	
Region					0.000			0.000
N. Western	218	17.9	3.41	1.93 - 6.02		2.84	1.58 - 5.11	
Scotland	278	17.6	3.35	1.94 - 5.78		2.39	1.34 - 4.24	
Northern	199	17.6	3.34	1.87 - 5.97		2.67	1.47 - 4.85	
Wales	126	15.1	2.78	1.43 - 5.40		2.37	1.20 - 4.67	
Midlands	215	14.4	2.64	1.46 - 4.76		2.32	1.26 - 4.25	
E. & W. Riding	198	13.1	2.36	1.28 - 4.36		2.12	1.14 - 3.97	
N. Midlands	169	9.5	1.64	0.82 - 3.25		1.46	0.73 - 2.95	
S. Western	171	8.2	1.39	0.69 - 2.84		1.21	0.59 - 2.50	
London & S.E.	333	6.0	1.00			1.00		
Eastern	190	5.8	0.96	0.45 - 2.05		0.89	0.41 - 1.93	
Southern	159	5.7	0.94	0.42 - 2.11		0.89	0.39 - 2.02	
Total n	2256							

Table 8. (previous page) **Social precursors of the experience of unemployment for over one year between ages 22 and 32 years: % and relative odds**. The relative odds are adjusted for all other variables.

Crowding, here measured at age 7 years, provides additional information about childhood circumstances. More crowded households tend to be more disadvantaged. 9.0% of those in the least crowded households experienced over 12 months of accumulated unemployment, while 19.4% of those in the most crowded households went on to experience over 12 months of adult unemployment.

Men who left full-time education at the earliest age, 16 years, were at the greatest risk of over 12 months of unemployment between ages 22 and 32 years. 14.2% of men who left school at age 16 years went on to experience this accumulation of unemployment. Despite containing the most highly educated cohort members, those who left full-time education at age 19 years or older, were not the most protected from unemployment, as 9.1% experienced over 12 months of unemployment, while 6.9% of the vocational group who left full-time education between ages 17 and 18 years went on to have more than 12 months of unemployment.

Having no qualifications was found to be a significant risk factor for subsequent unemployment: 26.4% of those without qualifications had experienced more than 12 months of accumulated unemployment. Those who were at the lowest risk of unemployment had remained in full-time 'further education' but had not gone on to 'higher education'. 6.8% of the 'further education' group had experienced over 12 months

of unemployment. A similar proportion (7.1%) of those who had obtained a university or polytechnic degree were subject to this accumulation of unemployment. The protective value of higher education may have been diminished in this cohort by the economic recession of the early 1980s, which made it more difficult for graduates to obtain employment when they first entered the labour market.

Significant variation in unemployment risk by geographical region was observed: 17.9% of those in the North Western region at age 7 years had experienced over 12 months of unemployment, the highest regional rate, and at the opposite extreme, 5.7% of those living in the Southern region. This reflects geographic variation in the economy and may also be due to differences in the regional socioeconomic characteristics of cohort members.

Multivariate Analysis

In order to identify independence amongst the associations of background variables with unemployment, multiple logistic regression was used to consider all of the social and educational background precursors of unemployment in one statistical model, where the dependent variable was coded as 0 or 1 representing experience of more than 12 months of unemployment. Unadjusted relative odds (and their significance levels) were calculated for the univariate relationships between unemployment and each of the independent variables. Adjusted relative odds were the results of the multivariate analysis that included all of the potential confounding variables. Significance is reported at the

level of the overall association between the dependent and independent variables. The results are reported in table 8.

Social class at birth remained powerfully predictive of future experience of unemployment, although the adjusted relative odds were reduced for all classes when compared to the unadjusted relative odds, and this was particularly true for the lower social classes. The relative odds for social class V, when compared to classes I/II, dropped from 5.07 (95% CI 3.01 - 8.55) to 2.80 (95% CI 1.58 - 5.95). Whilst a clear gradient for increased risk of future unemployment with decreasing social class remained, only classes IV and V had a statistically significant increased risk when compared with classes I/II.

The power of the measure of crowding at age 7 years to predict future unemployment remained statistically significant in the adjusted model ($P < 0.1$), but its significance was diminished by adjustment for the other variables, when compared with the unadjusted relationship. The material disadvantage and their consequences, that are measured by crowding are also estimated by other variables in the adjusted model. The disadvantage experienced by those living in the most crowded conditions does still significantly predict future unemployment with adjusted relative odds of 1.53 (95% CI 1.06 - 2.22), when compared with those who were living in the least crowded conditions at age 7 years. The crowding measure contributes to our measurement of the effect of poor childhood conditions on the risk of adult unemployment, in addition to the information on childhood conditions offered by social class of family of origin.

Age of leaving full-time education was not significantly predictive of future unemployment in the adjusted model (P> 0.1). However, it may be valuable to include it in the model to adjust for the effects of entering the labour market at a particular time. Age of leaving full-time education is an approximate measure of time when cohort members began to seek work, as the vast majority were seeking work immediately when they left the education system. Date of initial entry to the labour market may have had significant implications for risk of unemployment in this cohort, as those who tried to find a first job during the recession period may have been at a particular disadvantage.

Qualifications attained prior to labour market entry remained the single most powerfully predictive measure of unemployment, after adjustment for the other variables. Relative to those with O levels, men with no qualifications had adjusted relative odds of 2.23 (95% CI 1.47 - 3.39) for experiencing over one year of accumulated unemployment between ages 22 and 32 years. Relative to O levels, higher level qualifications offered greater protection against unemployment, but not to a level that was statistically significant. After adjustment, each successive level of qualification was more protective against unemployment than those at lower levels.

Regional variation in unemployment risk was highly significant after adjustment for the other potentially confounding variables. This would tend to support the hypothesis that regional variation the local economy, and thus variation in local unemployment rates, account for this rather than differences in demographic characteristics of the population, such as social class. Compared with London and the South Eastern region, the relative

odds for over one year of unemployment in the North Western region were 2.84 (95% CI 1.58 - 5.11), this was the area of highest unemployment risk. The most protected regions, relative to London and the South East, were the Eastern and Southern regions, with non-significant adjusted relative odds of 0.89 (95% CI 0.41 - 1.93) and 0.89 (95% CI 0.39 - 2.02) respectively.

Discussion

By defining unemployment in terms of over 12 months of accumulated unemployment between the ages 22 and 32 years, this reduced the influence of age of labour market entry on possible experience of unemployment, as by age 22 years most men had left full-time education. As the measure of unemployment was over 12 months of accumulated unemployment, the shorter spells of unemployment experienced by the more highly educated men on initial entry to the labour market would not constitute unemployment by this definition. This removed some of the heterogeneity in type of unemployment experienced that could cloud analysis.

The relationship between qualifications attained and unemployment illustrates the powerful independent role that qualifications have in determining unemployment risk. Level of attained qualifications indicates not only innate ability, but is also strongly influenced by family background factors (Wadsworth, 1991), such as social class and crowding. Because the measure of qualification used is relatively crude (highest level attained), the social background factors are likely to be associated with performance

within level of education: those with A levels may have a greater number with higher grades if they came from a less disadvantaged family with high commitment to education.

Because social class at birth has such a strong relationship with adult unemployment, independently of qualifications and the additional measure of disadvantage, crowding, it seems likely that qualifications alone can not explain the relationship between poorer socioeconomic circumstances and a raised risk of unemployment. A relatively advantaged background provides an individual with more labour market advantage than that offered by their improved opportunity to obtain qualifications This supports the role of family during childhood proposed by Becker (1981), as a provider of many aspects of human capital that can be used to an individual's advantage in the labour market, ranging from personality characteristics to financial resources. The measure of crowding adds additional information about relative family disadvantage, and so also is independently related to the risk of adult unemployment.

Geographical region's independent association with risk of experiencing over one year of accumulated unemployment confirms the importance of the local economy for an individual's risk of unemployment. If an individual enters a local labour market with relatively few jobs and high levels of unemployment, his chances of finding a job are lower than if he entered a labour market with a more buoyant economy. The men at highest risk of unemployment because of their relatively low levels of qualification and skills, were also less likely to migrate to a region with a more favourable economic

climate in order to find work (Hughes and McCormick, 1994).

Socioeconomic background, qualifications and region were all significantly associated with risk of unemployment in early adult life. The importance of accumulation of human capital during childhood through both education and through less formal learning and conditioning at home, is clear. A more disadvantaged childhood is likely to result in reduced human capital and a higher risk of labour market disadvantage. The state of the economy can influence an individual's chances of finding a job, and as economies vary regionally, there is independent regional variation in the risk of unemployment.

10. CHILDHOOD HEALTH AND DEVELOPMENT

Poor childhood health as risk for adult unemployment was investigated in terms of the direct health selection and indirect health selection hypotheses.

Results

Direct Health Selection

Men who were moderately or severely disabled at age 16 years experienced a significantly increased risk of over 12 months of accumulated unemployment between ages 22 and 32 years (see table 9). 27.0% of these men had experienced this accumulation of unemployment, compared to 11.9% of men with a slight disability and 12.2% of men who had a chronic condition, but no disability, at age 16 years. 10.7% of men who did not have a chronic condition or disability at age 16 years subsequently experienced over 12 months of unemployment between ages 22 and 32 years.

Only those men with a moderate or severe condition were statistically significantly more likely to experience a greater accumulation of unemployment compared with men without a condition at age 16 years. The unadjusted relative odds for those with a moderate to severe condition, compared to men without a condition are 3.08 (95% CI 1.87-5.07). Those with a moderate/severe condition only account for 8.7% (n=24) of the men who had experienced over 12 months of accumulated unemployment. The men with

a chronic illness or disability at age 16 years only make up a small proportion of those who experienced the measure of unemployment used here.

severity	n	%	unadjusted relative odds	adjusted relative odds
no condition	1,384	10.7	1.00	1.00
condition - no disability	598	12.2	1.16 (0.86-1.56)	1.23 (0.90-1.68)
slight disability	261	11.9	1.12 (0.74-1.70)	1.17 (0.76-1.80)
moderate to severe disability	89	27.0	3.08 (1.87-5.07)	2.62 (1.53-4.48)
total	2,332			

Table 9. Experience of unemployment for over one year between ages 22 and 32 years by severity of chronic illness and disability at age 16 years: % and relative odds. The relative odds (with 95% confidence intervals) are adjusted for geographical region, qualifications, crowding and social class at birth.

Controlling for Confounding Variables

After adjusting for the socioeconomic characteristics of the family of origin, qualifications and geographical region, the moderate to severely disabled men were still at greater risk of unemployment, with slightly reduced relative odds of 2.62 (95% CI 1.53-4.48). In the adjusted model, less severe conditions at age 16 years were not statistically significantly associated with an accumulation of over 12 months of unemployment between ages 22 and 32 years.

VARIABLE	n	%	UNAD-JUSTED Relative Odds	95% CI	sig	AD-JUSTED Relative Odds	95% CI	sig
Height at Age 7					0.000			0.001
1 shortest	392	20.2	2.90	1.84 - 4.56		2.41	1.43 - 4.04	
2	293	15.0	2.03	1.23 - 3.33		1.81	1.05 - 3.12	
3	444	10.2	1.30	0.80 - 2.12		1.23	0.73 - 2.06	
4	766	9.4	1.19	0.76 - 1.87		1.20	0.75 - 1.92	
5 tallest	362	8.0	1.00			1.00		
BSAG Score					0.000			0.005
1 least maladjustment	509	6.7	1.00			1.00		
2	393	9.4	1.45	0.89 - 2.36		1.43	0.87 - 2.36	
3	549	11.7	1.84	1.19 - 2.85		1.78	1.13 - 2.79	
4	379	14.0	2.27	1.44 - 3.57		1.96	1.22 - 3.15	
5 most maladjustment	426	19.0	3.28	2.15 - 5.01		2.36	1.49 - 3.73	
Total	2256							

Table 10. Experience of unemployment for over one year between ages 22 and 32 years. Height at age 7 years and BSAG score at age 11 years are presented as group ordinal group variables. The relative odds are adjusted for class at birth, crowding, qualifications, region, height, BSAG score and parental height.

Indirect Health Selection

Table 10 provides a descriptive analysis in which height and BSAG were modelled as group variables corresponding to fifths of their distributions. Height at age 7 years was inversely associated with experience of unemployment. 20.2% of those who were in the lowest height group (lowest fifth of the height distribution) at age 7 subsequently experienced over 12 months of unemployment between 1980 and 1990, compared to 8.0% of those in the tallest group, the top fifth of the height distribution (Table 10). There was an uneven distribution between the height 'fifths' that were created using

quintiles. This was because the height at age 7 years was collected to the nearest inch, and then converted to centimetres. This has resulted in a distribution that cannot be divided into exact fifths. When height was modelled as a group variable, the adjusted relative odds for experiencing over 12 months of unemployment between ages 22 and 32 years for men who were in the bottom fifth of the distribution of height at age 7 years, when compared to those in the top fifth, were 2.41 (95% CI 1.43 - 4.04). Figure 2 shows the relative odds of experiencing over 12 months of unemployment between ages 22 and 32 years by mean value for each of the height groups.

BSAG score at age 11 years was also highly predictive of subsequent unemployment. 6.7% of the least deviant group, compared with 19% of the most deviant had reported over 12 months of unemployment (table 10). The relationship is not entirely linear, as the bottom fifth of the BSAG distribution is clearly distinct, with relatively large difference between it and the next fifth of the distribution. When BSAG score was modelled as a group variable, the adjusted relative odds for experiencing over 12 months of unemployment between ages 22 and 32 years for men who were in the top fifth of the BSAG distribution (most maladjusted), when compared to those in the bottom fifth, were 2.36 (95% CI 1.49 - 3.73). Figure 3 plots for each BSAG score group, the relative odds of experiencing over 12 months of unemployment between ages 22 and 32 years by the mean value for each BSAG score group.

The effects of fitting height and BSAG as linear terms in a multiple logistic regression model can be seen in table 11. The dependent variable was coded as 0 or 1 representing

experience of more than 12 months of unemployment. The effect of adjustment can be seen by comparing the unadjusted coefficients for height and BSAG score with the adjusted coefficients. These were moved towards one by adjustment, but both remained highly statistically significant.

Controlling for the socioeconomic background variables, qualifications, region, BSAG score and parental height resulted in the estimated relative odds for height increasing slightly to 0.95 (95% CI 0.92 - 0.97) from 0.93 (95% CI 0.91 - 0.96), where height was modelled as a continuous variable.

		UNAD-JUSTED			AD-JUSTED		
VARIABLE	**n**	**Relative Odds**	**95% CI**	**sig**	**Relative Odds**	**95% CI**	**sig**
Height age 7(cm)	2256	0.93	0.91 - 0.96	0.000	0.95	0.92 - 0.97	0.000
BSAG Score	2256	1.04	1.03 - 1.05	0.000	1.03	1.01 - 1.04	0.001
Paternal ht.(cm)	2256	0.98	0.96 - 1.00	0.024	1.00	0.99 - 1.03	0.338
Maternal ht.(cm)	2256	0.98	0.96 - 1.00	0.130	1.02	0.99 - 1.04	0.165

Table 11. Relative odds of unemployment for over one year between ages 22 and 32 years. Height and BSAG score were entered as continuous variables and the relative odds are those for a 1cm or 1 point increase respectively.

Neither maternal nor paternal height was significantly associated with risk of unemployment for the cohort member either before or after adjustment for the potential confounding variables.

When modelled as a continuous variable, the relative odds for BSAG score were slightly reduced from 1.04 (95% CI 1.03 - 1.05) to 1.03 (95% CI 1.01 - 1.04) by controlling for the social capital variables, region and height at age 7.

Disability and Chronic Illness

Multiple logistic regression for risk of unemployment was also performed where cohort members who had a moderate to severe chronic illness or disability at age 16 (85 cases) were excluded. The regression coefficients for height at age 7 and BSAG score at age 11 were almost identical in the models including and excluding the cases who suffered moderate to severe chronic illness or disability at age 16. Adjustment for chronic illness and disability at age 16 years in the model, instead of exclusion of cases, was also modelled and this did not result in a reduction in the adjusted relative odds for risk of unemployment associated with height at age 7 years and BSAG score. The relationship between height at age 7 years, BSAG score and subsequent unemployment did not appear to be due to chronic illness or disability in childhood, as measured at age 16 years.

Adult Height and Childhood Growth

Table 12 shows the relationships of height at age 7 with unemployment and height at age 23 with unemployment, both modelled as continuous variables and unadjusted for the potential confounding variables. Adult height (at age 23) was weakly predictive in the unadjusted model ($p < 0.1$) but in the adjusted model the p value was increased to 0.4293 and the adjusted relative odds were 1.10 (95% CI 0.98 - 1.04). In the adjusted model which also included adult height, height at age 7 had relative odds for unemployment of 0.94 (95% CI 0.91 - 0.98), and $p< 0.01$, indicating the statistically significant protective effect associated with increasing height. Height at age 7 was thus a significantly better

predictor of risk of future unemployment than adult height. As short stature in childhood significantly predicts future unemployment, but adult short stature does not, it can be concluded that many of those who are short at age 7 years do not make up a significant proportion of the short adults. What appears to predict future unemployment is relatively *slow growth* to age 7 years.

	UNADJUSTED			ADJUSTED		
VARIABLE	**Relative Odds**	**95% CI**	**sig**	**Relative Odds**	**95% CI**	**sig**
Height age 7(cm)	0.94	0.92 - 0.96	0.000	0.94	0.91 - 0.98	0.001
Height age 23 (cm)	0.97	0.96 - 0.99	0.010	1.01	0.98 - 1.04	0.429

Table 12. The relative odds of experiencing over one year of unemployment between age 22 and 32 years for height at ages 7 and 23 years. Adjusted for social class at birth, crowding, qualifications, region of residence, BSAG score and parental height (n=2075).

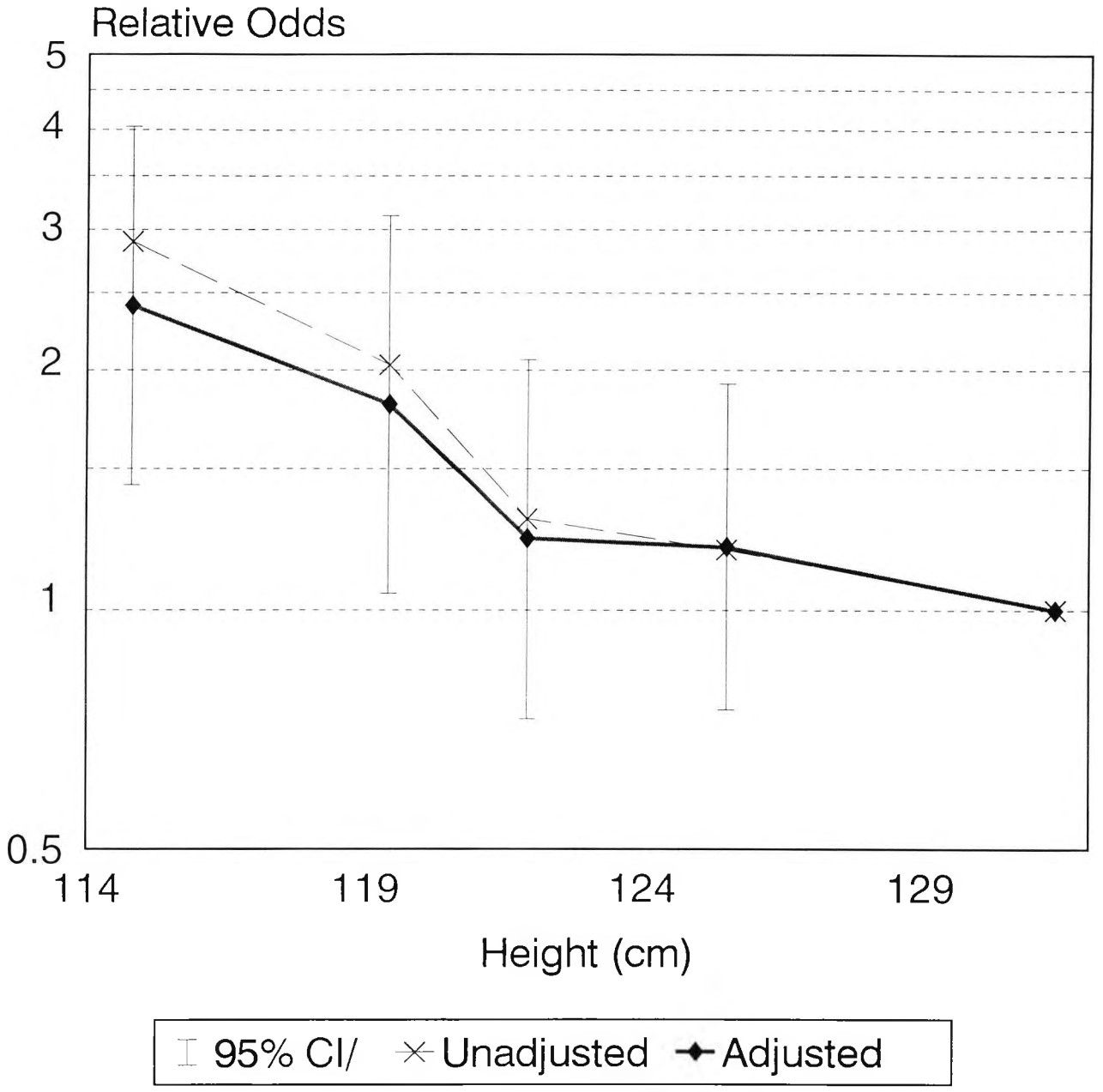

Figure 2. Relative odds of experiencing more than 1 year of unemployment between ages 22 and 32 by height goups at age 7 years. Adjusted for class at birth, crowding, qualifications, region, BSAG score and parental height.

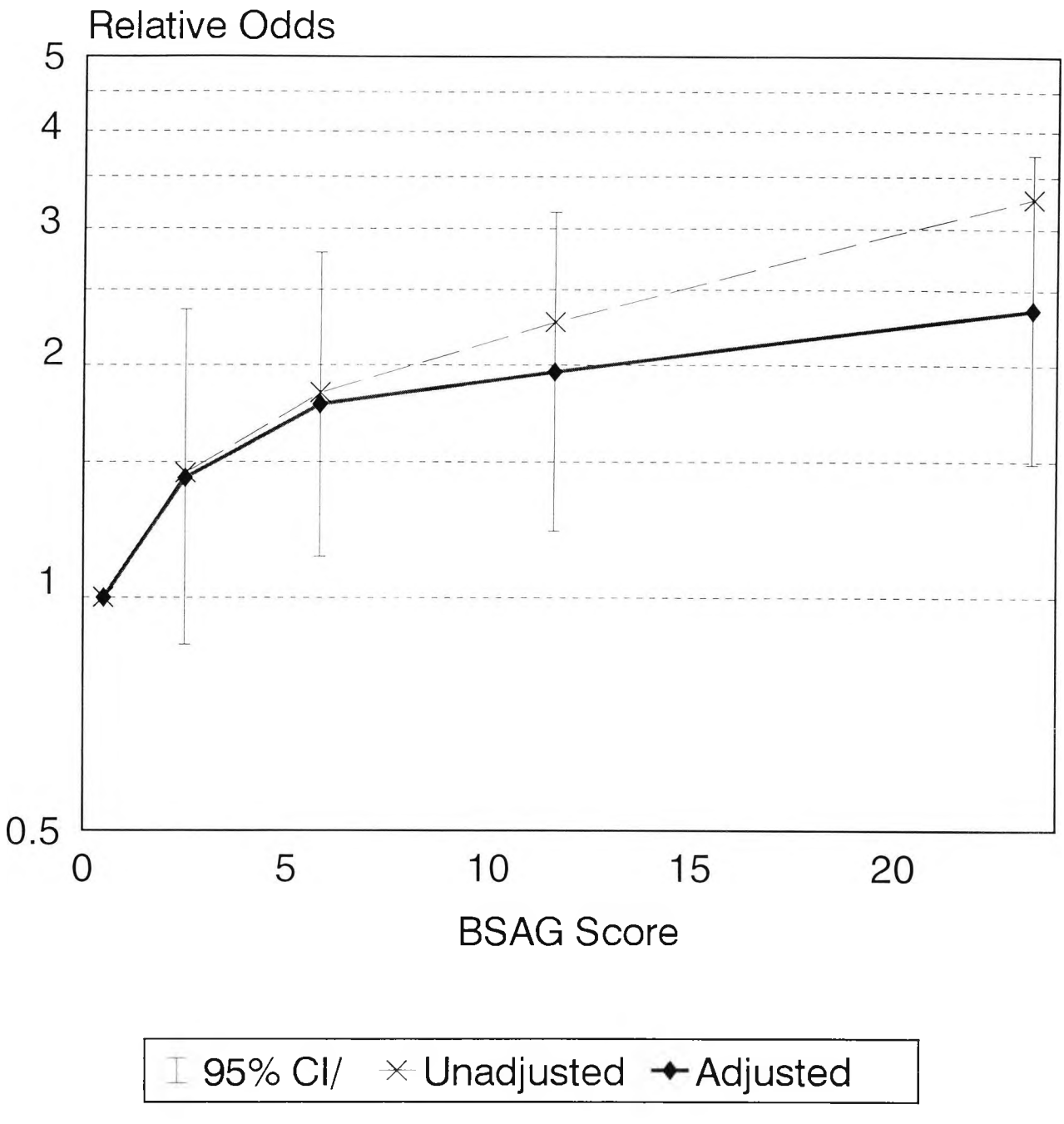

Figure 3. Relative odds of experiencing more than 1 year of unemployment between ages 22 and 32 by BSAG score groups at age 11 years. Adjusted for class at birth, crowding, qualifications, region and height.

Discussion

In order to examine the role of direct health selection in explaining the relationship between poor health, in terms of chronic illness and disability, with subsequent unemployment experience, health status was defined at age 16 years and unemployment was defined as over 12 months of accumulated unemployment between ages 22 and 32 years. Health status at age 16 years represents chronic conditions and disabilities that developed throughout the entire childhood period that could not be due to unemployment or any other aspect of labour market participation as they pre-date labour market entry. Accumulated unemployment between ages 22 years to 32 years represents a period when the majority of the cohort were at risk of being or becoming unemployed and therefore comparison between cohort members can be made legitimately, even though it ignores the possible consequences for unemployment between age 16 and 22 years, and so this is likely produce a conservative estimate of unemployment as an outcome of chronic illness and disability. The multiple logistic regression analysis adjusted for the effects of social class at birth and crowding at age seven years: indicators of childhood socio-economic disadvantage. Region is adjusted for, as variations in regional economies may alter the consequences of pre-existing chronic illness or disability for labour market disadvantage. In areas of relatively high unemployment, those with a chronic condition may be at a greater disadvantage as the labour force could be more highly selected by employers. Qualifications attained are also included in the multiple logistic regression analysis as potential confounders: they may be related both to a chronic condition, as it might affect school performance, and to unemployment, as low qualifications can lead

to labour market disadvantage.

A moderate to severe disability present prior to labour market entry, was a significant risk factor for an accumulation of over 12 months of unemployment between ages 22 and 32 years, but less severe conditions were not significantly related to this measure of unemployment. The relationship of disability and chronic illness with unemployment remained when the confounding variables were included in the multiple logistic regression. Direct health selection does appear to occur where the condition is sufficiently severe, but only a relatively small proportion of men who had experienced over 12 months of unemployment were moderately to severely disabled. This influence of chronic illness or disability is independent of the social circumstances of the family of origin. From this evidence, direct health selection into unemployment is a risk where individuals were suffering from a moderately or severely disabling condition, but it seems unlikely that this could be a full explanation of the association between unemployment and ill-health, due to the relatively small numbers who were sufficiently disabled by their condition prior to labour market entry. Direct health selection may operate through men finding difficulty in keeping a job or doing a job because their condition is handicapping and prevents than functioning in a way that is required by most employers. This may take the form of limitations of physical functioning or simply through absence from work necessitated by the condition. In many cases the biggest problem experienced by men with a chronic condition seeking work may be discrimination by potential employers (Bell *et al*, 1988).

The second form of health selection being examined, 'indirect health selection', was found to predict subsequent unemployment for a higher proportion of men than direct health selection. In investigating indirect health selection it was important to adjust for social class at birth and crowding at age 7 years in the multiple logistic regression model, as poor conditions might account for both labour market disadvantage and greater health vulnerability. A variable for qualifications attained was included in the models due to their relationship with both family background and unemployment risk, and region is included to adjust for the variation in local economies. Vulnerability to ill-health was indicated by a higher BSAG score at age 11 years and shorter stature at age 7 years: more symptoms of behavioural maladjustment as indicated by the BSAG score and slower growth, indicated by short stature, in early life are risk factors for future excess morbidity and mortality. As the relationship between health vulnerability and unemployment remained beyond adjustment for the potential confounding variables, it indicated that those who become unemployed were more vulnerable to illness than would be predicted by their socio-economic background.

The high relative risk of unemployment associated with shorter stature at age 7 years and a higher BSAG score at age 11 years, is largely independent of measures of socioeconomic background, region and qualifications. Short stature at age 7 years and a higher BSAG score are both risk factors for subsequent unemployment, independently of each other. However, the relationship between the measures of health vulnerability and employment does not appear to be due to selection into unemployment because of pre-existing illness or disability: when cohort members with clinically diagnosed chronic

illnesses and disabilities were excluded from the analysis the relationship of unemployment to height at age 7 years and social adjustment at age 11 years remained.

Whilst those of shorter stature at age 7 years were at greater risk of unemployment, their height itself was not the direct cause of the unemployment. If employers were selecting for height, this would be on the basis of adult height, which was not significantly related to unemployment. The majority of men who were of shorter stature at age 7 years became adults who were not at the shortest extreme of the adult height distribution, due to later growth spurts (Greco *et al*, 1995). As many of those who were short at age 7 years and who experienced over 12 months of adult unemployment were not short adults, it was slow growth to age 7 years that indicated risk of future unemployment.

The relationship between slow growth to age 7 years and unemployment may be because growth is a good indicator of childhood circumstances. Stature has been shown to be associated with family circumstances in childhood (Terrell & Mascie-Taylor, 1991) and childhood growth may add another dimension to the measurement of social and economic circumstances. The importance of the influence of early life environmental factors for both childhood height and later socio-economic outcomes is further supported by experiments using twins reared apart and together (Lichtenstein *et al*, 1992). The mechanisms that lead to short stature are likely to include poor nutrition and other factors such as disrupted sleep patterns. Growth hormone is released during periods of deep sleep and its secretion rate would fall if sleep were disrupted (Preece, 1985). The

secretion of other hormones required for normal physical development is also stimulated by growth hormone (Preece & Holder, 1982). Sleeping conditions that are more likely to result in disturbed sleep, such as shared rooms, or even a shared bed, could cause children to spend less time in a state of undisturbed deep sleep. This would reduce the amount of growth hormone secreted and result in patterns of slower growth.

A second mechanism for slower growth during childhood may be through psychosocial processes. Children with psychosocial illnesses have been found to be significantly shorter at age 7 years (Power & Manor, 1995). This may be related to stressful events at home, such as problematic relationships between the child and other members of the family (Sweeting and West, 1994).

The childhood conditions that result in short stature could also produce other personal characteristics that are risk factors for unemployment, which are not accurately measured by conventional indicators such as social class and crowding, resulting in future labour market disadvantage. Slowed childhood growth may be considered as a fine-grain indicator of social and economic conditions during childhood. This could add a useful dimension to the measurement of socioeconomic conditions, when used in conjunction with conventional measures such as social class and crowding. Poorer social and economic conditions can limit an individual's accumulation of human capital, the accumulation of material, educational, psychological, and cultural assets throughout life (Wadsworth, 1991). This can result in subsequent labour market disadvantage, such as unemployment.

Adverse conditions during childhood are also likely to influence psychological health (Cohen *et al,* 1990; Dunn, 1988), as reflected by BSAG score at age 11 years. As with height, lower levels of psychological health may be a sensitive measure of poor childhood conditions and stressful life events. Sweeting and West (1994) have shown that those children who go on to experience educational and employment trajectories that are associated with a higher risk of unemployment have, on average, experienced a greater number of undesirable life events. The argument for direct selection into unemployment due to poor psychological health is plausible, as employers might be less likely to employ, or continue to employ those who are behaviourally maladjusted. However, whilst this may be true for a minority of cases with a high degree of maladjustment, it is unlikely that 'direct selection' can fully explain the raised risk of unemployment associated with increasingly poor social adjustment at age 11 years. There is a statistically significantly increased risk of unemployment, relative to the lowest fifth of the BSAG score distribution, for each of the other four fifths of the BSAG score. As this risk factor affects the risk of unemployment for 80% of this male population, it is unlikely that such a high proportion could be categorised as 'behaviorally maladjusted'. It is more likely that those men with higher BSAG scores at age 11 years tended to have generally lower levels of other elements of human capital that provide advantages in the labour market.

Psychological health vulnerability in childhood has been demonstrated to be a risk for adult ill-health by research showing that childhood behaviour and personality is associated with adult psychiatric disorder or tendency to psychiatric disorder (Rodgers,

1990). This is further supported by work linking childhood behaviour and temperament with adult neurosis (Warren, 1965; Pritchard & Graham, 1966; Robins, 1966; Mellsop, 1972; Kandel & Davies 1986). Similarly, short stature and slow growth has been shown to be an indicator for the risk of future morbidity, as can be demonstrated by the association of short stature with a higher mortality from stroke, ischaemic heart disease, rheumatic heart disease and chronic bronchitis (Barker *et al,* 1990) and also with increased risk of psychiatric disorder (Barker *et al*, 1995). Slow growth may indicate processes that resulted in some degree of compromise for organ development, and thus increased vulnerability to future illness. In mammals, growth hormone and related factors are implicated in the control of organ development during the periods of rapid growth, both in utero and in infancy (Krzysztof *et al*, in press). Environmental factors that modulate growth hormone activity in childhood could also influence, and possibly compromise, organ development.

The conditions leading to slow growth may also have implications for cognitive development, as well as other forms of psychological development and thereby for labour market performance and coping strategies in later life. Childhood socioeconomic disadvantage has been linked with poorer cognitive development and functioning (Kramer *et al*, 1995). Growth is an additional indicator of disadvantage and may also be a highly sensitive marker for achievement and the accumulation of human capital. Slow growing children were likely to attain lower level educational qualifications when compared with their peers from the same social class and the slow growers would have had greater difficulty in finding or keeping employment in the labour market of the

1980s, particularly during the periods of significant economic recession. A higher BSAG score may also reflect childhood disadvantage, leading to lower levels of accumulated human capital, including educational qualifications, in addition to the behavioural factors which may themselves increase the risk of unemployment.

Even though the indicators of childhood health vulnerability were independently associated with unemployment risk, they are unlikely to account for all of the subsequent excess mortality and morbidity that is associated with unemployment. A study of Finnish men (Lynch *et al*, 1994) aged 42 - 60 years, found that adult socioeconomic conditions were far more important in determining risk of all-cause cardiovascular mortality than childhood socioeconomic conditions. This highlights the contribution of socioeconomic adversity throughout life as a risk factor for excess morbidity. Those children in the Finnish study who grew up in disadvantaged conditions would have been more likely to become disadvantaged adults, due to expected continuities in disadvantage (Johnson and Reed, 1996). Lower levels of health potential resulting from childhood circumstances may be carried forward into further socio-economic disadvantage in adulthood, including labour market disadvantage, resulting in an accumulation of risk to health. Thus 'indirect selection' is a misleading term, and it may be more appropriate to refer to this process as 'accumulation of risk'. Men who experience relative disadvantage in childhood accumulate some risks to health at that time. These men then go on, because of their background, to experience a higher risk of labour market, and therefore socioeconomic, disadvantage. Further risks to health may be associated with this continuing disadvantage.

The concept of accumulation of risk through 'indirect health selection' does not undermine the argument that the experience of unemployment, or the process of becoming unemployed, can damage physical and psychological health. The experience of unemployment may result in biological and psychological insults, but those who experience unemployment are more likely to be more vulnerable to illness, as they have experienced other insults in earlier life. This is consistent with recent work on accumulation of disadvantage throughout life, which has shown that individuals with measures of greater health vulnerability and disadvantage in earlier life are more likely to experience disadvantage throughout childhood and into early adulthood (Bartley *et al*, 1994). This accumulation of health risks throughout life may eventually result in excess mortality and morbidity. The physical and psychological characteristics of the men at the highest risk of experiencing unemployment may render them more vulnerable to illness precipitated or exacerbated by unemployment. Those with lower levels of psychological well-being in childhood may be more vulnerable to mental illness, particularly if subjected to any additional precipitating factor such as unemployment and further psychological deterioration has been observed in young people who experience continuing unemployment (Hammarström *et al*, 1988). Platt (1984) suggests that unemployment may exacerbate underlying psychiatric conditions, which in some cases, results in suicide or parasuicide. Chronic stress and the possibly lower ability to deal with it might also, eventually, result in physical illness (Kaplan, 1991). Unemployment may well play an important mediating role between disadvantage in early life and morbidity and mortality in later life through a process of accumulating socioeconomic disadvantage resulting in a higher accumulation of health risks throughout life.

11. HEALTH BEHAVIOUR AND BODY MASS INDEX

The relationship of employment experienced between ages 16 and 33 years, with smoking, alcohol consumption, diet, exercise and Body Mass Index was examined.

Results

To investigate the relationships of recent and accumulated unemployment with health behaviour and BMI. two measures of unemployment were used. Recent unemployment was defined as any unemployment experienced in the 12 months prior to interview at age 33 years. An ordered group variable was used for accumulated unemployment with the following categories: no unemployment; one to 12 months; 13 to 36 months; and over 36 months of accumulated unemployment between ages 16 and 33 years. As associations with both recent and accumulated unemployment are being investigated here, it was important to establish the relationship between these two measures of unemployment. Table 13 shows that amount of accumulated unemployment and recent unemployment at age 33 years are not independent. Those men who accumulated more unemployment between ages 16 and 33 years were more likely to have experienced unemployment in the 12 months prior to interview at age 33 years. 5.8% of all men had experienced recent unemployment, but 36.5% of those who had accumulated over 36 months of unemployment had also experienced recent unemployment.

	All	0	1-12	13-36	37+
Unemployment in last year	5.8	0	8.7	13.7	36.5
n	2906	1714	687	335	170

Table 13. Months of accumulated unemployment between ages 16 and 33 years by recent unemployment (column percentages)

Unemployment (months)	n	age 16 %	age 33 %	age 33 unadjusted relative odds	age 33 adjusted relative odds*	age 33 adjusted relative odds +
0	1689	31.6	25.8	1.00	1.00	1.00
1-12	679	32.4	30.6	1.27 (1.04-1.55)	1.30 (1.03-1.64)	1.24 (0.98-1.57)
13-36	330	42.1	40.3	1.95 (1.52-2.49)	1.67 (1.25-2.24)	1.57 (1.17-2.12)
37+	166	50.0	51.2	3.03 (2.19-4.18)	2.11 (1.42-3.12)	1.79 (1.18-2.73)
Unemployment in last year						
no	2699	32.8	28.6	1.00	1.00	1.00
yes	165	54.5	53.9	2.92 (2.13-4.01)	2.06 (1.41-3.03)	1.57 (1.04-2.38)
Total n	2864					

Table 14. Smoking by amount of unemployment between ages 16 and 33 years, and recent unemployment. Relative odds are shown with 95% confidence intervals. Adjusted for: social class, qualifications, age of leaving full-time education, region and number of cigarettes smoked at age 16 years. * Accumulated and recent unemployment modelled separately. + Accumulated and recent unemployment adjusted for each other.

Cigarette Smoking

At age 16 years, men who subsequently experienced more than 36 months of unemployment were already more likely to smoke (50.0%), than those who experienced no unemployment, of whom 31.6% were smokers (table 14). By age 33 years this difference had grown: 51.2% of those who had accumulated most unemployment were smoking at age 33 years, compared with 25.8% of those who had never been unemployed. This indicates the greater tendency for men who did not experience unemployment to stop smoking. The recently unemployed were also more likely to smoke at age 33 years than those who had not been recently unemployed: 53.9% were smokers, compared with 28.6% of men who had not experienced recent unemployment. After adjustment for confounding variables, including number of cigarettes smoked per week at age 16 years, the relative odds of smoking at age 33 years were 2.11 (95% CI 1.27 - 3.50) in the group with more than 36 months of unemployment, compared to those who were never unemployed. Smoking at age 33 years was also associated with recent unemployment (adjusted RO 2.06, 95% CI 1.41 - 3.03), in a comparison with those who had not been unemployed in the 12 months prior to interview at age 33 years. Including both accumulated and recent unemployment in the same model suggested that both were independently associated with smoking at age 33 years. Greater exposure to unemployment, whether recently, or in the past, was associated with a significantly increased risk of being a cigarette smoker.

Alcohol consumption

Drinking no alcohol in the week prior to interview at age 16 years was more common amongst those of who would go on to experience over 36 months of unemployment, compared with men who would not experience unemployment: 58.7% of men who would experience over 36 months of unemployment reported drinking no alcohol in the week prior to interview at age 16 years, while 47.4% of those who would not experience unemployment had not consumed alcohol in the week prior to interview at age 16 years (table 15). At age 33 years abstinence was also more common amongst those with over 36 months of unemployment (28.7%) than those who were never unemployed (17.9%). After adjustment for confounding variables including drinking at age 16 years, the relative odds of not drinking at age 33 years were 1.52 (95% CI 1.04-2.24) in men with over 36 months of unemployment, when compared with men who had not been unemployed. There was no suggestion that shorter accumulations of unemployment or recent unemployment were related to abstinence.

High alcohol consumption at age 33 years was represented by the top fifth of the alcohol consumption distribution. The characteristics of this section of the distribution was a minimum value of 31 units and a median of 44 units. High alcohol consumption at age 16 years was not related to subsequent experience of unemployment (table 16). Heavy drinking was more common amongst those with over 36 months of unemployment (adjusted relative odds 1.47, 95% CI 0.97-2.23) and significantly associated with recent unemployment (adjusted relative odds 1.73, 95% CI 1.18-2.54). Inclusion of both

accumulated and recent unemployment in the same model confirmed that recent unemployment was more clearly related to higher alcohol consumption than accumulated unemployment.

Unemployment (months)	n	age 16 %	age 33 %	age 33 unadjusted relative odds	age 33 adjusted relative odds *	age 33 adjusted relative odds +
0	1703	47.4	17.9	1.00	1.00	1.00
1 - 12	683	46.7	17.9	1.00 (0.79-1.26)	1.02 (0.81-1.30)	1.00 (0.78-1.27)
13 - 26	334	53.6	19.2	1.09 (0.81-1.47)	1.01 (0.74-1.38)	0.98 (0.71-1.34)
37 +	167	58.7	28.7	1.86 (1.30-2.65)	1.52 (1.04-2.24)	1.40 (1.93-2.11)
Unemployment in last year						
no	2721	48.7	18.2	1.00	1.00	1.00
yes	166	47.6	25.3	1.52 (1.06-2.18)	1.14 (0.97-2.05)	1.27 (0.84-1.92)
Total n	2887					

Table 15. No alcohol consumed in the previous week by amount of unemployment between ages 16 and 33 years, and recent unemployment. Relative odds are shown with 95% confidence intervals. Adjusted for : social class, qualifications, age of leaving full-time education, region and number of units of alcohol consumed in the week prior to interview at age 16 years. * Accumulated and recent unemployment modelled separately. + Accumulated and recent unemployment adjusted for each other.

Unemployment (months)	n	age 16 %	age 33 %	age 33 unadjusted relative odds	age 33 adjusted relative odds *	age 33 adjusted relative odds +
0	1703	5.7	14.6	1.00	1.00	1.00
1 - 12	683	7.3	16.7	1.17 (0.89-1.43)	1.13 (0.89-1.43)	1.07 (0.83-1.38)
13 - 26	334	5.7	16.5	1.15 (0.84-1.58)	1.08 (0.78-1.51)	1.00 (0.71-1.41)
37 +	167	4.8	21.6	1.60 (1.08-2.38)	1.47 (0.97-2.23)	1.22 (0.77-1.92)
Unemployment in last year						
no	2721	6.0	15.2	1.00	1.00	1.00
yes	166	6.0	24.7	1.83 (1.27-2.65)	1.73 (1.18-2.54)	1.62 (1.06-2.46)
Total n	2887					

Table 16. High alcohol consumption (top fifth of the distribution) in the previous week by amount of unemployment between ages 16 and 33 years, and recent unemployment. Relative odds are shown with 95% confidence intervals. Adjusted for : social class, qualifications, age of leaving full-time education, region and number of units of alcohol consumed in the week prior to interview at age 16 years. * Accumulated and recent unemployment modelled separately. + Accumulated and recent unemployment adjusted for each other.

Unemployment (months)	n	age 33 %	age 33 unadjusted relative odds	age 33 adjusted relative odds *	age 33 adjusted relative odds +
0	1703	10.5	1.00	1.00	1.00
1 - 12	683	16.0	1.62 (1.25-2.10)	1.63 (1.25-2.13)	1.50 (1.14-2.96)
13 - 26	334	17.4	1.79 (1.19-2.70)	1.86 (1.33-2.59)	1.62 (1.14-2.28)
37 +	167	19.8	2.10 (1.39-3.16)	2.15 (1.39-3.33)	1.57 (0.97-2.53)
Unemployment in last year					
no	2721	12.2	1.00	1.00	1.00
yes	166	27.7	2.75 (1.92-3.93)	2.90 (1.99-4.21)	2.26 (1.50-3.40)
Total n	2887				

Table 17. Problem drinking (defined by the CAGE questionnnaire) by amount of unemployment between ages 16 and 33 years, and recent unemployment. Relative odds are shown with 95% confidence intervals. Adjusted for : social class, qualifications, age of leaving full-time education, region and number of units of alcohol consumed in the week prior to interview at age 16 years. * Accumulated and recent unemployment modelled separately. + Accumulated and recent unemployment adjusted for each other.

Problem drinking, as identified by the CAGE questionnaire, was more prevalent amongst those who experienced unemployment, with a slight positive gradient with increasing amount of accumulated unemployment (table 17). Recent unemployment was particularly strongly associated with problem drinking, the relative odds after adjustment for confounding variables were 2.90 (95% CI 1.99 - 4.21). Interestingly, accumulated unemployment (except for the highest category of accumulation) remained significantly associated with problem drinking even after adjustment for recent unemployment. Recent unemployment was clearly more strongly associated with problem drinking, with adjusted relative odds of 2.26 (95% CI 1.50 - 3.40), after adjustment for accumulated unemployment and the other potential confounding variables.

Exercise

Lower levels of exercise during leisure time at age 16 years were more common amongst men who would subsequently experience unemployment. 32.1% of men who had over 36 months of unemployment were in the lowest exercise score group at age 16 years, compared with 25.2% of those who would not experience any unemployment between ages 16 and 33 years (table 18). (Note: due to the distribution of the exercise score at age 16 years, the top 'fifth' actually accounts for 26.2% of all cases). At age 33 years no significant relationship was observed between low levels of exercise and either accumulated or recent unemployment.

Unemployment (months)	n	age 16 %	age 33 %	age 33 unadjusted relative odds	age 33 adjusted relative odds *	age 33 adjusted relative odds +
0	1689	25.2	19.2	1.00	1.00	1.00
1 - 12	678	25.4	19.3	1.01 (0.80-1.26)	1.00 (0.79-1.26)	1.05 (0.83-1.33)
13 - 26	327	30.6	22.9	1.25 (0.94-1.66)	1.10 (0.82-1.49)	1.18 (0.88-1.59)
37 +	162	32.1	22.2	1.20 (0.81-1.77)	0.86 (0.57-1.30)	1.05 (0.68-1.63)
Unemployment in last year						
no	2694	26.1	20.2	1.00	1.00	1.00
yes	162	28.4	14.8	0.69 (0.44-1.07)	0.57 (0.36-0.90)	0.55 (0.34-0.89)
Total n	2856					

Table 18. Exercise in leisure time less than twice a month by amount of unemployment between ages 16 and 33 years, and recent unemployment. Relative odds are shown with 95% confidence intervals. Adjusted for : social class, qualifications, age of leaving full-time education, region and frequency of active sports at age 16 years. * Accumulated and recent unemployment modelled separately. + Accumulated and recent unemployment adjusted for each other.

Unemployment (months)	n	age 16 %	age 33 %	age 33 unadjusted relative odds	age 33 adjusted relative odds *	age 33 adjusted relative odds +
0	1689	23.0	14.5	1.00	1.00	1.00
1 - 12	678	21.4	16.7	1.18 (0.92-1.50)	1.17 (0.91-1.50)	1.13 (0.88-1.45)
13 - 26	327	19.0	17.1	1.22 (0.89-1.67)	1.21 (0.87-1.67)	1.14 (0.82-1.59)
37 +	162	19.1	30.2	2.56 (1.78-3.67)	2.59 (1.77-3.80)	2.24 (1.48-3.40)
Unemployment in last year						
no	2694	22.0	15.6	1.00	1.00	1.00
yes	162	21.6	27.2	2.03 (1.41-2.91)	1.96 (1.36-2.83)	1.46 (0.97-2.20)
Total n	2856					

Table 19. Exercise in leisure time every day or most days by amount of unemployment between ages 16 and 33 years, and recent unemployment. Relative odds are shown with 95% confidence intervals. Adjusted for : social class, qualifications, age of leaving full-time education, region and frequency of active sports at age 16 years. * Accumulated and recent unemployment modelled separately. + Accumulated and recent unemployment adjusted for each other.

High levels of physical exercise were slightly less common at age 16 years amongst men who would subsequently experience over 36 months of unemployment (19.1%), compared with 23.0% of men who would not experience unemployment (table 19). At age 33 years this relationship is reversed: 30.2% of those with the largest accumulation of unemployment were in the high exercise group, compared with only 14.5% of those who were never unemployed. The adjusted relative odds for high exercise amongst men who were unemployed for over 36 months were 2.59 (95% CI 1.77-3.80). Whilst a higher level of exercise was also associated with recent unemployment, it was accumulated unemployment that was significantly associated with a high level of physical exercise. After adjustment for the potential confounding variables and both accumulated and recent unemployment, the adjusted relative odds for a high level of exercise in men who had experienced over 36 months of accumulated unemployment, compared with those who had never been unemployed were 2.24 (95% CI 1.48-3.40).

Diet

Details of dietary habits were not collected at age 16 years, but at age 33 years men who had experienced over 36 months of unemployment were far more likely to report bad dietary habits, based on types of food usually consumed, than those who were unemployed for less time or never unemployed (table 20). 37.1% of men who had over 36 months of unemployment had poor diets, compared with 20.5% of men who had never been unemployed.

Unemployment (months)	n	age 33 %	age 33 unadjusted relative odds	age 33 adjusted relative odds *	age 33 adjusted relative odds +
0	1710	20.5	1.00	1.00	1.00
1 - 12	684	20.5	0.93 (0.79-1.08)	0.92 (0.78-1.08)	0.90 (0.77-1.06)
13 - 26	334	22.2	1.13 (0.91-1.39)	0.99 (0.30-1.22)	0.96 (0.77-1.19)
37 +	170	37.1	2.26 (1.69-3.01)	1.45 (1.08-1.94)	1.35 (0.99-1.84)
Unemployment in last year					
no	2730	21.1	1.00	1.00	1.00
yes	168	29.8	1.70 (1.29-2.25)	1.31 (0.99-1.74)	1.23 (0.92-1.67)
Total n	2898				

Table 20. Diet at age 33 years by amount of unemployment between ages 16 and 33 years, and recent unemployment. Relative odds are shown with 95% confidence intervals. Higher odds represent the risk of having a less healthy diet. Adjusted for : social class, qualifications, age of leaving full-time education and region. * Accumulated and recent unemployment modelled separately. + Accumulated and recent unemployment adjusted for each other.

Because the dietary models used ordered polytomous logistic regression, the relative odds represent the odds of moving one unit of measurement (one less 'healthy' dietary practice) towards a worse diet. In the adjusted models, it was accumulated rather than recent unemployment that was statistically significantly associated with a poorer diet. The adjusted relative odds for a poorer diet amongst men who had been unemployed for over 36 months, when compared to men who had never been unemployed were 1.45 (95% CI 1.08-1.94).

Body Mass Index

Table 21 shows that the relationship of unemployment with men being in the bottom fifth of the BMI distribution. This part of the distribution had a maximum BMI value of 22.62 and a median value of 21.44; 18.7% (n=90) had a BMI value under 20. At age 16 years, men who would experience over 36 months of unemployment were more likely to be in the lowest relative weight fifth at age 16 years: 25.0% were in the bottom fifth, while 19.2% of men who would not be unemployed were in the bottom fifth. At age 33 years, this association between low body mass and unemployment was stronger, as 29.9% of men who had been unemployed for over 36 months were in the bottom fifth, while only 18.3% of those who had not been unemployed were in the lowest BMI group. At age 33 years the adjusted relative odds for being in the bottom BMI fifth for men with over 36 months of unemployment were 1.84 (95% CI 1.14-2.96). There was no clear evidence that unemployment for less than 36 months was associated with low BMI at age 33 years, nor was there any clear evidence that low BMI was associated with

recent unemployment.

Unemployment (months)	n	age 16 %	age 33 %	age 33 unadjusted relative odds	age 33 adjusted relative odds *	age 33 adjusted relative odds +
0	1463	19.2	18.3	1.00	1.00	1.00
1 - 12	565	18.2	20.7	1.16 (0.91-1.48)	1.21 (0.92-1.59)	1.21 (0.92-1.60)
13 - 26	295	24.1	19.0	1.04 (0.76-1.44)	0.99 (0.68-1.44)	0.99 (0.68-1.44)
37 +	134	25.0	29.9	1.90 (1.28-2.81)	1.84 (1.14-2.96)	1.84 (1.11-3.05)
Unemployment in last year						
no	2320	19.8	19.3	1.00	1.00	1.00
yes	137	21.1	24.8	1.38 (0.93-2.07)	1.23 (0.77-1.96)	1.00 (0.60-1.66)
Total n	2457					

Table 21. Low BMI (bottom fifth of the distribution) by amount of unemployment between ages 16 and 33 years, and recent unemployment. Relative odds are shown with 95% confidence intervals. Adjusted for : social class, qualifications, age of leaving full-time education, region, number of cigarettes smoked at ages 16 and 33 years, dietary score at age 33 years, frequency of liesure time excercise at age 33 years and BMI at age 16 years. *Accumulated and recent unemployment modelled separately. + Accumulated and recent unemployment adjusted for each other.

Unemployment (months)	n	age 16 %	age 33 %	age 33 unadjusted relative odds	age 33 adjusted relative odds *	age 33 adjusted relative odds +
0	1463	20.2	19.7	1.00	1.00	1.00
1 - 12	565	20.5	17.5	0.87 (0.67-1.12)	0.80 (0.60-1.08)	0.79 (0.46-1.37)
13 - 26	295	21.1	19.7	1.00 (0.73-1.37)	0.90 (0.62-1.31)	0.89 (0.61-1.30)
37 +	134	20.3	24.6	1.33 (0.88-2.02)	1.25 (0.76-2.06)	1.21 (0.72-2.05)
Unemployment in last year						
no	2320	20.1	19.3	1.00	1.00	1.00
yes	137	20.8	21.9	1.17 (0.77-1.78)	1.09 (0.66-1.82)	1.10 (0.64-1.90)
Total n	2457					

Table 22. High BMI (top fifth of the distribution) by amount of unemployment between ages 16 and 33 years, and recent unemployment. Relative odds are shown with 95% confidence intervals. Adjusted for : social class, qualifications, age of leaving full-time education, region, number of cigarettes smoked at ages 16 and 33 years, dietary score at age 33 years, frequency of liesure time excercise at age 33 years and BMI at age 16 years. *Accumulated and recent unemployment modelled separately. + Accumulated and recent unemployment adjusted for each other.

There was no discernable relationship between high BMI at age 16 years and subsequent unemployment (table 22). At age 33 years a slight trend indicating an increased risk of high BMI with increasing unemployment was observed, but this was not statistically significant. Men in the high BMI group (top fifth of the distribution) had a minimum BMI value of 28.14 and a median value of 30.07.

Discussion

Previous research has not provided a consistent picture of the relationship between unemployment and health related behaviour. This may be because different studies have examined different age groups, differing population sub-groups and they may not have been able to adjust for previous experience of unemployment and other socioeconomic background characteristics that might affect both health behaviour and risk of unemployment. Here, adjustment has been made for the potential confounding effects of region of residence, social class and education prior to labour market entry. It was also possible to adjust for measures of health behaviours and BMI prior to labour market entry. This study was able to examine the effect of all unemployment experienced in the lives of these young men up to age 33 years: unlike some other studies, there is no difficulty over considering the effect of unemployment that took place prior to the period of investigation.

Even though they exhibited a higher prevalence of cigarette smoking prior to labour market entry, the men in this study who had accumulated more unemployment, were less likely to give up smoking and slightly more likely to have taken it up by age 33 years. Both accumulated unemployment and recent unemployment were associated with a higher rate of smoking independently of each other. The deterioration of smoking behaviour is consistent with other research (Hammarström, 1994) that has demonstrated the association between youth unemployment and a deterioration in health behaviour. As Graham (1987) has suggested for women, cigarette smoking may represent an

affordable luxury for these unemployed men and could also represent a symbol of adulthood for men who have been unable to fully enter the adult world of work.

Lower levels of alcohol consumption are likely to represent financial hardship and social isolation that may be associated with unemployment (Hammarström *et al,* 1988). At age 16 years men who would go on experience most unemployment were more likely to have drunk no alcohol in the week prior to interview. Accumulated unemployment, but not recent unemployment, was associated with abstinence at age 33 years after adjustment for potential confounding variables. The lower levels of drinking observed prior to labour market entry might indicate that a significant proportion of men, who went on to experience significant amounts of unemployment, may have come from relatively disadvantaged families. This could have several detrimental consequences for these men: financial hardship would have made it less possible for these men to consume alcohol at age 16 and this may have produced some social isolation as, for men, the socialisation around alcohol consumption can be an important part of growing up (Winefield *et al*, 1993). Poorer circumstances in childhood may have consequences in terms of the accumulation of human capital (see earlier chapters), which increases the risk of unemployment. Some of the social skills acquired during the socialising that arises from adolescent alcohol consumption, may contribute to the accumulation of human capital and men who have been denied this form of interaction may suffer from reduced levels of human capital, and thus have an increased risk of future unemployment.

Both high alcohol consumption and a positive CAGE score were significantly associated

with accumulated and recent unemployment at age 33 years. Here, unemployment may be producing this relationship. The risk of having a positive CAGE score increased with accumulated unemployment. High alcohol consumption was more significantly associated with recent, rather than accumulated unemployment, but a positive CAGE score was independently associated with both recent and accumulated unemployment but, paradoxically, not with the greatest accumulation of unemployment. This may be because higher alcohol consumption is a response to recent unemployment or because unemployment may be a consequence of having a drinking problem. Men with a positive CAGE score who had accumulated significant amounts of unemployment may have been more likely to have been recently unemployed (in addition to having been unemployed for over three years) because their drinking problem was detrimental in their attempts to secure employment. But another explanation is that recent unemployment resulted in men developing (or exacerbating) drinking problems in response to the experience or threat of unemployment. The relatively reduced risk amongst men who had accumulated over 36 months of unemployment may have been due to financial difficulties reducing the opportunity to consume alcohol, or longer term unemployment amongst these men may have resulted in a habituation to being unemployed, resulting in a reduction the proportion of men with drinking problems.

Men who would subsequently experience unemployment, were less likely to do regular physical exercise at age 16 years, but at age 33 years accumulated unemployment was associated with more regular exercise. This is an unexpected finding as many leisure time exercise activities require some financial outlay which might be viewed as luxury

expenditure during a period of unemployment. However, relatively high levels of exercise activity during a period of unemployment may represent an attempt to reduce the potentially harmful psychological consequences of unemployment. Other studies have shown that time use during a period of unemployment can influence psychological well-being (Feather and Bond, 1983): positive use of time for activities other than searching for a job may restore feelings of control and greater life satisfaction. A regular exercise habit, developed during a period of unemployment may persist beyond the spell of unemployment. Unemployment is more likely to result in men starting to exercise more if the unemployment occurs when they are relatively young, as older men (over 40 years of age) are far less prone to participate in physical exercise than young men (Blaxter, 1990).

A less healthy diet was more prevalent amongst men who had the greatest accumulation of unemployment by age 33 years. The difficulty of eating healthily and feeding a family with healthy food whilst experiencing the relative financial hardship associated with unemployment (Ross and Mirowsky, 1995) is likely to be a major reason for this association. Relative financial hardship is likely to be experienced by more of the men with greater amounts of accumulated unemployment as a greater risk of unemployment is associated with manual work that is likely to have worse pay. Cox *et al* (1987) reported that men doing manual work were more likely to have a bad diet, independently of other factors.

Neither recent unemployment nor amount of unemployment were significantly associated

with high BMI. This is not too surprising, as no social class gradient for obesity in men between ages 16 and 44 years was observed in the 1993 Health Survey for England (Bennet *et al*, 1995). The association between higher BMI and unemployment has previously been reported amongst long-term unemployed men in middle age, as observed in the Regional Heart Study (Morris *et al*, 1992). The relatively high prevalence of low BMI amongst men who had been unemployed was unexpected and the circumstances surrounding this phenomenon deserves further investigation. Smoking, high levels of exercise and dietary factors are known to be associated with low BMI, but adjustment was made for these. Stress and depression have been shown to result in significant weight loss amongst women independently of other behavioural factors (French *et al*, 1995). The stress imposed upon NCDS men by unemployment may have resulted in weight loss or low weight gain during the experience of unemployment. Metabolic changes in response to stress, that may be associated with weight loss, have been observed in men who suffered the threat of unemployment or who were made unemployed (Arnetz *et al*, 1991). The stress responses reported by Arnetz *et al* (1991) tend to decrease with increasing duration of unemployment, and it may be hypothesised that any trend towards weight loss might also end, resulting in a cyclical pattern of weight loss and weight gain. Weight cycling is a risk factor for developing the visceral pattern of body fat distribution in future life and this pattern of adipose tissue is a significant risk factor for cardiovascular disease (Bosello *et al*, 1993).

These data show that the experience of accumulated unemployment is independently associated with a deterioration in smoking behaviour, developing a drinking problem

and having an unhealthy diet. All of these factors are risks for excess mortality and morbidity and may add to the explanation of the link between unemployment and ill-health. However, there was evidence that unemployment may also produce protective behaviour, in the form of regular physical exercise, in some young men. However, this high exercise is likely to be combined with other less healthy behaviours, as Blaxter (1990) found a relatively high proportion of young unemployed men who combined an otherwise unhealthy lifestyle (in terms of alcohol consumption, cigarette smoking and diet) with a high level of leisure exercise.

The association of low body weight with accumulated unemployment appears to be independent of behavioural factors related to weight control. The experience of unemployment may result in stress induced changes in the neuro-endocrine system which affects body weight and this may also indicate risk for future illness. As this is a study of young men, for whom patterns of health and health behaviour were still being established: unemployment may play a significant part in establishing life-long patterns of hazardous behaviour and may also possibly result in the establishment of metabolic vulnerability to future ill-health through stress mediated mechanisms.

12. MENTAL HEALTH

The association between symptoms of depression and anxiety and unemployment was examined. Recent unemployment and accumulated unemployment were modelled as time dependent covariates.

Results

Table 23 shows the univariate relationships of accumulated unemployment and recent unemployment with symptoms of anxiety and depression. The results are decomposed by age of onset for the symptoms of anxiety and depression. Accumulated unemployment from age 16 years is calculated up to the end of the year prior to onset. Recent unemployment is defined as any unemployment in the year prior to onset. Cases were removed from the risk set after symptoms had been reported: for example, the men who reported onset of symptoms at age 24 years, were excluded from the sample for age 25 years and onwards. When compared with men who did not have symptoms of depression and anxiety, those who did were more likely to have accumulated some unemployment in the majority of age groups. Men with symptoms were also more likely to have had some unemployment in the year prior to onset. To reliably interpret these results, statistical modelling using Cox regression was performed. Cox regression has the advantages of being able to model unemployment as a time dependent covariate and also calculating a hazard rate function for the changing pattern (over time) of onset of symptoms of depression and anxiety that lead to medical consultation.

Age	Symptoms	n	Accumulated unemployment 0	1 -12	13-36	37+	Recent unemployment Yes
24	yes	23	65.2	26.1	4.3	4.3	4.3
	no	3218	68.5	21.0	8.7	1.9	13.7
25	yes	26	57.7	19.2	11.5	11.5	19.2
	no	3192	67.1	21.1	9.5	2.3	7.6
26	yes	22	54.5	31.8	9.1	4.5	13.6
	no	3170	66.2	21.1	9.5	3.2	6.8
27	yes	20	60.0	20.0	5.0	15.0	10.0
	no	3150	65.3	20.9	10.2	3.7	6.8
28	yes	29	62.1	20.7	13.8	3.4	6.9
	no	3121	64.3	21.3	10.2	4.3	6.5
29	yes	22	68.2	18.2	9.1	4.5	4.5
	no	3099	63.7	21.2	10.5	4.6	5.3
30	yes	41	65.9	14.6	12.2	7.3	4.9
	no	3058	62.9	21.9	10.2	5.0	4.8
31	yes	41	58.5	26.8	9.8	4.9	4.9
	no	3017	62.3	22.1	10.4	5.2	4.3
32	yes	55	50.9	20.0	18.2	10.9	1.8
	no	2962	61.9	22.5	10.4	5.2	4.3
33	yes	16	50.0	31.3	12.5	6.3	6.3
	no	2946	61.0	23.0	10.5	5.5	5.3

Table 23. Age of onset of symptoms of depression and anxiety by accumulated unemployment and recent unemployment. Each age of onset is split into two rows, one for men with symptoms at that age and the other for men without. Within each row, the (row) percentages indicate the proportions experiencing recent unemployment and amounts of accumulated unemployment.

VARIABLE	n	%	Relative Risk	95% CI
Class at Birth				
I/II	638	6.9	1.00	
IIInm	365	9.6	1.42	0.91 - 2.21
IIIm	1611	8.6	1.26	0.90 - 1.77
IV	381	8.9	1.31	0.84 - 2.05
V	246	8.9	1.31	0.79 - 2.19
BSAG score				
1 least maladjusted	723	6.5	1.00	
2	550	11.1	1.74	1.19 - 2.55
3	651	7.2	1.11	0.74 - 1.66
4	645	8.5	1.31	0.89 - 1.94
5 most maladjusted	672	9.4	1.46	1.00 - 2.13
Malaise score				
1 least depressed	1180	5.4	1.00	
2	710	7.9	1.47	1.03 - 2.11
3	475	8.2	1.54	1.03 - 2.29
4	310	10.6	2.02	1.33 - 3.08
5 most depressed	566	14.3	2.79	2.01 - 3.87
Qualifications				
None	363	8.8	1.52	0.86 - 2.68
Less than O Level	381	13.1	2.32	1.37 - 3.93
O Level	880	7.8	1.33	0.80 - 2.21
A Level	989	8.1	1.39	0.84 - 2.29
Further	306	7.5	1.29	0.70 - 2.37
Degree	322	5.9	1.00	
Region				
N. Western	289	8.3	0.87	0.55 - 1.38
Scotland	299	4.7	0.48	0.27 - 0.85
Northern	172	8.1	0.85	0.48 - 1.50
Wales	184	12.0	1.29	0.80 - 2.08
West Midlands	305	8.5	0.90	0.58 - 1.41
East Midlands	280	9.3	0.99	0.64 - 1.55
Yorks & Humberside	311	5.8	0.60	0.36 - 1.00
S. Western	283	8.1	0.85	0.41 - 1.76
S. East	812	9.5	1.00	
London	193	10.9	1.15	0.71 - 1.87
East Anglia	113	7.1	0.75	0.36 - 1.55
Total	3241	8.4		

Table 24. Symptoms of depression and anxiety between ages 24 and 33 years by background characteristics. Relative risks are from Cox regression models

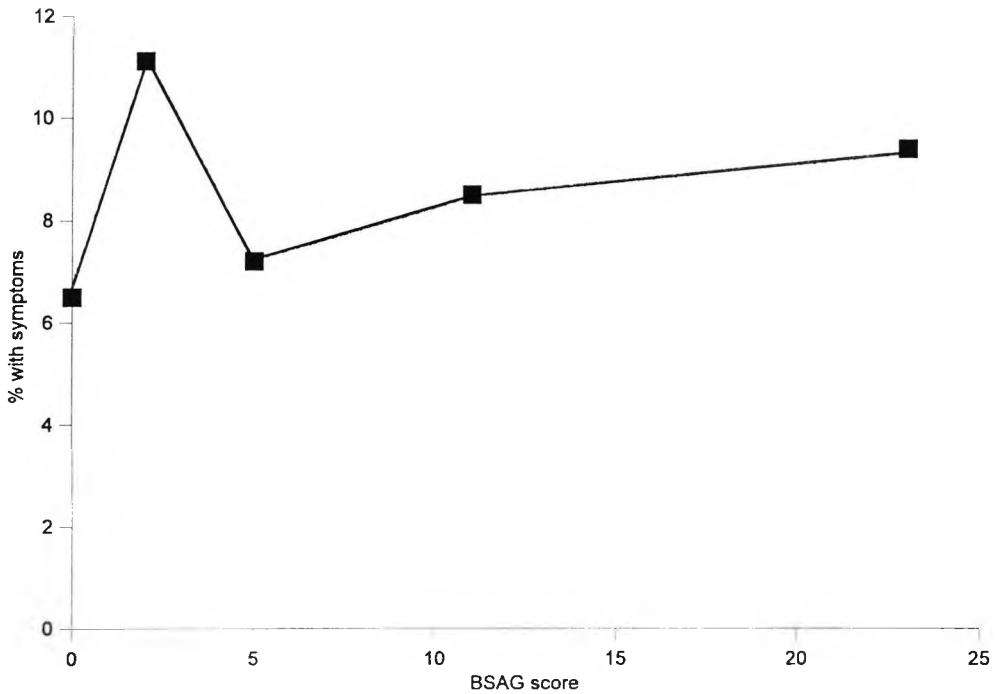

Figure 4. Symptoms of depression and anxiety between ages 24 to 33 years by mean values of BSAG score groups at age 11 years.

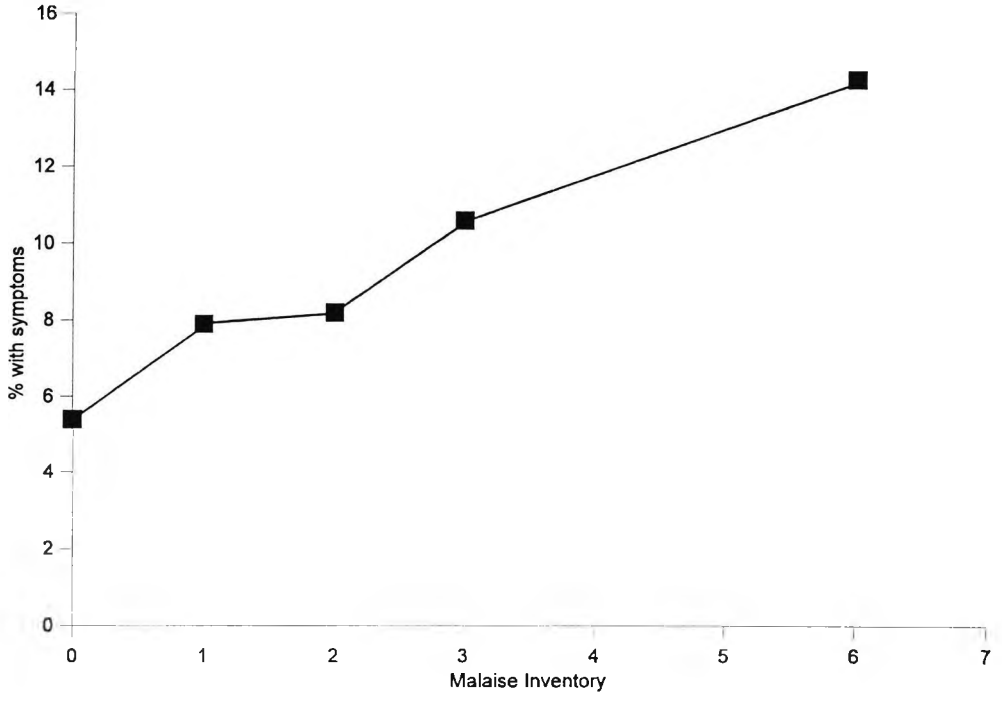

Figure 5. Sypmtoms of depression and anxiety between ages 24 to 33 years by mean values of Malaise Inventory score groups at age 23 years.

The univariate relationships of the potential confounding variables with onset of symptoms of depression and anxiety are shown in table 24. The percentages represent the proportion in each group who reported symptoms. The relative risks (unadjusted) are from Cox regression analysis, where all of the potential confounding variables were modelled as fixed (non time dependent) covariates. Overall, 8.4% of men reported experiencing symptoms of depression and anxiety that began between ages 24 years and 33 years, that were sufficiently severe to result in medical consultation. Social class at birth displayed a weak association with onset of symptoms of depression and anxiety. When compared with social classes I/II, of whom 6.9% had reported symptoms of depression and anxiety, all other classes were at greater risk of having reported onset of symptoms. The highest relative risk was amongst men in class IIInm (1.42, 95% CI 0.91-2.21), where 9.6% reported having symptoms, however, this difference was not statistically significant. It should be noted that social class at other ages prior to labour market entry was investigated and found to have the same weak relationship with symptoms of depression and anxiety that resulted in a medical consultation. Social class at birth was used as this variable had fewest missing values.

An interesting relationship between BSAG score at age 11 years and subsequent onset of symptoms of depression and anxiety was found. The least maladjusted children were least likely to have developed symptoms of depression and anxiety between ages 24 and 33 years that resulted in medical consultation (6.5%). The second group were the most likely to develop such symptoms (11.1%), with a relative risk of 1.74 (95% CI 1.19-2.55) when compared with the least maladjusted group. The third group were almost as likely

to develop symptoms as the least maladjusted group and a positive shallow gradient between the third and the fifth group was observed. The relationship between symptoms of adult depression and anxiety and childhood maladjustment is shown in figure 4. The mean BSAG score in each group is plotted against the proportion who developed symptoms of depression and anxiety.

The relationship between Malaise Inventory score at age 23 years and subsequent onset of symptoms of depression and anxiety, resulting in medical consultation, was such that a higher Malaise Inventory score was associated with a higher proportion of men who reported symptoms of depression and anxiety. Compared with the lowest Malaise Inventory group, of whom 5.4% reported symptoms of depression and anxiety, the highest score group (14.3% reported symptoms) had a relative risk for adult depression and anxiety leading to medical consultation of 2.79 (95% CI 2.01-3.87). The linearity of the relationship is demonstrated by figure 5, which plots the mean Malaise Inventory score for each group against the proportion who had symptoms of depression and anxiety between ages 24 and 33 years.

Overall, higher qualifications were protective: 5.9% of men who had obtained a university degree or higher level qualification reported symptoms of depression and anxiety. The group with the highest proportion with symptoms of depression and anxiety was not those with no qualifications, but men who had attained some qualifications at the lowest level, below O level. 13.1% of this group reported symptoms and, when compared with men with degrees or higher qualifications, they had a relative risk of 2.32

(95% CI 1.37-3.97).

When compared with the South Eastern region (9.5%), men resident in other regions were less likely to report symptoms of depression and anxiety between ages 24 and 33 years, that resulted in medical consultation. The only regions with higher relative risks were London (10.9%) with a relative risk of 1.15 (95% CI 0.71-1.87) and Wales (12.0%) with a relative risk of 1.29 (95% CI 0.80-2.08). Relative to the South Eastern region, the only statistically significant difference was with Scotland, where only 4.7% of men reported symptoms, with a relative risk of 0.48 (95% CI 0.27-0.85).

Adjustment for Confounding Variables

Cox regression, with age of onset of symptoms of depression and anxiety leading to medical consultation as the dependent variable, was used to examine the independent effect of unemployment. Social class, qualifications and region were modelled as binary dummy variables and the full (24 item) Malaise Inventory score was modelled as a linear term. Because of the non-linear relationship between BSAG score and the dependent variable, BSAG score was modelled as five binary dummy variables. Separate models were used to investigate the effect of accumulated and recent unemployment, represented as time dependent covariates, being adjusted for the potential confounding variables.

VARIABLE		UNADJUSTED Relative Risk	95% CI	ADJUSTED Relative Risk	95% CI
Accumulated unemployment (months)					
0		1.00		1.00	
1 - 12		1.11	0.79 - 1.57	1.08	0.76 - 1.52
13 - 36		1.08	0.68 - 1.72	1.00	0.62 - 1.61
37+		1.87	1.12 - 3.11	1.63	0.95 - 2.79
Recent unemployment					
No		1.00		1.00	
Yes		2.27	1.47 - 3.50	2.10	1.34 - 3.28
Total n	3241				

Table 25. Cox regression analysis for risk of symptoms of depression and anxiety by recent and accumulated unemployment (modelled separately). The relative risks were adjusted for all of the background characteristics.

VARIABLE		Relative Risk	95% CI
Accumulated unemployment (months)			
0		1.00	
1 - 12		1.00	0.71 - 1.42
13 - 36		0.87	0.53 - 1.42
37+		1.05	0.55 - 2.02
Recent unemployment			
No		1.00	
Yes		2.10	1.21 - 3.63
Total n	3241		

Table 26. Cox regression analysis for risk of symptoms of depression and anxiety by recent and accumulated unemployment (in the same model). The relative risks were adjusted for all of the background characteristics.

Accumulated unemployment was significantly associated with a raised risk of symptoms of depression and anxiety in the unadjusted model. The unadjusted relative risk was 1.87 (95% CI 1.12-3.11) after an accumulation of over 36 months of unemployment, when compared with men who had not experienced any unemployment (table 25). However, after adjustment for the potential confounding variables, the relationship between symptoms of depression and anxiety and accumulated unemployment was no longer statistically significant.

Table 25 also shows the results of the Cox regression models used to investigate the effect of recent unemployment modelled as a time dependent covariate. In the unadjusted model, when compared with those who had not been recently unemployed, those who were had a relative risk of symptoms of depression and anxiety of 2.27 (95% CI 1.47-3.50). This difference remained statistically significant after adjustment for the potential confounding variables: the adjusted relative risk was reduced to 2.10 (95% CI 1.34-3.28).

Both recent and accumulated unemployment, as time dependent covariates, were included in the same model to ascertain their independence from each other (Table 26); the potential confounding variables were also included in the model. The relationship between accumulated unemployment and symptoms of depression and anxiety was not statistically significant. Men who were recently unemployed were still statistically significantly more likely to report symptoms of depression and anxiety, with an adjusted relative risk of 2.10 (95% CI 1.21-3.63), when compared with men who were not recently

unemployed.

Two further models (shown in table 27) were used to assess the effect of excluding men who had a Malaise Inventory score of 8 or more at age 23 years, as this indicates a significant tendency to depression (Power *et al*, 1991). The first model was adjusted for the potential confounding variables and included accumulated unemployment as a time dependent covariate. The effect of excluding the more depressed men was to increase the significance of the relationship between accumulated unemployment and symptoms of depression and anxiety. When compared with men who had not been unemployed, those who had over 36 months of accumulated unemployment had an adjusted relative risk for reporting symptoms of depression and anxiety of 2.04 (95% CI 1.17-3.54).

The second model that excluded the more depressed men included recent unemployment as a time dependent covariate and also the potential confounding variables. The significance of the relationship between recent unemployment and onset of symptoms of depression and anxiety was also strengthened by the exclusion of the more depressed men. When compared with men who had not been unemployed during the previous 12 months, those who had experienced recent unemployment had an adjusted relative risk for reporting symptoms of depression and anxiety of 2.30 (95% CI 1.44-3.65).

VARIABLE		Relative Risk	95% CI
Accumulated unemployment (months)			
0		1.00	
1 - 12		1.09	0.75 - 1.56
13 - 36		1.16	0.72 - 1.87
37+		2.04	1.17 - 3.54
Recent unemployment			
No		1.00	
Yes		2.30	1.44 - 3.65
Total n	3150		

Table 27. Cox regression analysis for risk of symptoms of depression and anxiety by recent and accumulated unemployment (modelled separately): men with pre-existing depression were excluded. The relative risks were adjusted for all of the background characteristics.

Discussion

The use of longitudinal data, from birth to age 33 years, made it possible to perform a rigorous examination of recent and accumulated unemployment as causal factors in the onset of symptoms of depression and anxiety that resulted in medical consultation. By using Cox regression and modelling the unemployment variables as time dependent covariates, it was possible to analyse the effect of unemployment in an appropriate temporal context. This technique also has the advantage of calculating a hazard rate function and including its influence in the model, thus adjustment is made for the changing pattern of onset of symptoms of depression and anxiety with increasing age.

By ensuring that the measures of unemployment used here pre-dated onset of symptoms, it makes it unlikely that poor mental health could be the cause of the unemployment. Indeed, the approach taken would tend to underestimate exposure to unemployment prior to onset of symptoms of depression and anxiety, so the results produced here may be conservative estimates of the affects of unemployment.

All of the potential confounding measures were estimated prior to onset of symptoms of depression and anxiety, and therefore are unlikely to be consequences of poor psychological health. Adjustment was not only made for socioeconomic risk factors, known to be powerful predictors of unemployment, which may also be associated with poor mental health, but also for measures of pre-existing mental health. The powerful linear relationship between the measurement of depression used at age 23 years (the Malaise Inventory) and the risk of reporting subsequent symptoms of depression and anxiety, indicates that this is an appropriate baseline measurement of pre-existing mental health.

The relationship of behavioural maladjustment at age 11 years (BSAG score) with adult onset of depression and anxiety provided additional information about pre-existing mental health and the subsequent risk of both reporting depression and anxiety, as well as having a higher risk of unemployment. Previous analysis has shown that an increasing BSAG score at age 11 years is associated with an increasing risk of unemployment between ages 22 and 32 years (Montgomery *et al*, 1995). A similarly straight-forward relationship between BSAG score and adult symptoms of depression and anxiety was not

found. An initial significant increase in risk associated with a higher BSAG score was observed, which then fell as BSAG score increased further; and with further increase in BSAG score the risk of depression and anxiety showed a shallow increase. The decrease in risk of depression and anxiety, leading to medical consultation, with increase in BSAG score is somewhat surprising. West (1996) reported a similar finding from the Scottish Twenty-07 cohort study of young people: higher self-esteem was associated with participation in 'street-oriented' leisure time activities. These activities were also associated with an anti-school orientation, therefore it is likely that these young people would also have a higher BSAG score, as BSAG score is closely related to attitudes and performance at school (Stott, 1969). Young men with higher BSAG scores may have developed an adult identity and social support network, not based on education and employment, but based on other lifestyle elements, and so are better able to cope with the experience of unemployment. The apparently paradoxical relationship may be due to a protective influence of rebelliousness that is associated with a higher BSAG score. Illness behaviour may also account for some of this affect: men with greater maladjustment may be more likely avoid contact with the 'establishment', including use of health services. The higher risk of reporting symptoms of depression and anxiety observed in men with lowest level qualifications, when compared to men without any qualifications, may reflect a similar phenomenon. Those with low-level qualifications may be especially vulnerable as they did not 'opt-out' of the system which may have provided a satisfactory self-identity, instead they remained within the system and were unsuccessful when compared with others who obtained higher level qualifications.

Even though unemployment was a risk factor for poorer mental health, the geographical regions with higher unemployment rates (Montgomery *et al*, 1996) did not consistently have higher proportions of men who reported symptoms of depression and anxiety. While high regional unemployment rates, such as in Wales, may result in more men seeking help from health services, in some areas this does not appear to be the case. This may be due to poorer provision of appropriate facilities, or it could be due to social and cultural differences in attitudes to health service use.

The adjustment that was made for the potential confounding variables was probably an over-adjustment when looking at accumulated unemployment, thus producing even more conservative estimates of the effect of unemployment. Adjustment using a measure influenced itself by unemployment may partly account for the statistically non-significant relationship between accumulated unemployment and subsequent symptoms of depression and anxiety in the analysis of all men. The measurement of depression at age 23 years is likely to have been significantly affected by unemployment prior to age 23 years (Kessler *et al*, 1987). The damaging effects of previous unemployment that was not recent may have been reversed by the potentially positive experience of employment (Ross and Mirowsky, 1995; Banks and Jackson, 1982; Tiggeman and Winefield, 1984; and Corti, 1994). Re-employment may mend some, or all, of the psychological damage done by unemployment.

Recent experience of unemployment was significantly associated with subsequent onset of symptoms of depression and anxiety, that led to medical consultation, even after

adjustment for measures of pre-existing mental health and the other potential confounding variables. The damaging effects of recent unemployment will have had less time to be reversed by the potentially positive effects of any re-employment. The stress of job loss (Fagin, 1984) may still have an impact and financial hardship associated with job loss may still be increasing, which can result in increased risk of depression (Ross and Huber, 1985). Men who were recently unemployed have had less opportunity to habituate to being unemployed, as deterioration in psychological well-being does not continue indefinitely (Banks and Ullah, 1987; Hamilton *et al*, 1993; Warr and Jackson, 1985).

Unemployment may directly result in deterioration of psychological well being or it may work through increasing levels of financial hardship, or other agents. A previous spell of unemployment is likely to result in men having to accept more poorly paid and insecure jobs (Gregg and Wadsworth, 1995). Less desirable and insecure jobs themselves can result in reduced levels of psychological well-being (Graetz, 1993; Ferrie *et al*, 1995). Even where unsatisfactory or insecure work following unemployment is the cause of deteriorating psychological well-being, unemployment is the catalyst that begins the processes leading to this deterioration. Unemployment appears to cause the deterioration of psychological well-being, resulting in a significant proportion of men using health services for symptoms of depression and anxiety. The non-significant relationship of accumulated, rather than recent, unemployment with depression and anxiety leading to medical consultation, may indicate that unemployment itself, rather than poor quality work, is the most damaging to psychological health.

It has been suggested that pre-existing vulnerability to poorer mental health in men who become unemployed is one of reasons for the association between unemployment and increased risk of psychological morbidity (Catalano *et al*, 1981, 1985; Platt, 1984). In order to test this, men with a high Malaise Inventory score at age 23 years, indicating depressive tendency, were excluded from analysis. If the relationship between unemployment and symptoms of depression and anxiety was less significant, it would have indicated that only those men who were already more depressed were affected by the experience of unemployment. In fact, the exclusion of depressed men strengthened the relationship between unemployment and symptoms of depression and anxiety that resulted in medical consultation. Recent unemployment remained significantly related to depression and anxiety and the relationship between accumulated unemployment and depression and anxiety also became statistically significant. It is not only men with pre-exiting poor mental health who are vulnerable to the psychologically damaging consequences of unemployment. Some of the depressed men who were excluded may have reached a psychological nadir due to the experience of unemployment prior to age 23 years. These men may have been habituated to the experience or risk of unemployment and any relevant medical consultations may have occurred prior to age 23 years, and would not have been reported. The exclusion of depressed men may have resulted in the relationship between symptoms of depression and anxiety and accumulated unemployment being strengthened, because greater accumulated unemployment is associated with a higher risk of that unemployment being recent: more of the men with greater amounts of unemployment may have also been recently unemployed.

The causal association between unemployment and higher rates of medical consultation due to depression and anxiety have significant implications for health service provision. The number of consultations can be expected to increase at times of higher unemployment. Any intervention to reduce the risk of long-term psychological damage or decrease the consultation rate should be soon after the experience of unemployment begins, as recent unemployment appeared to be the stronger risk factor for deterioration in psychological well being. It may also be appropriate to consider all unemployed men at risk of psychological morbidity and not just those who have a history of tendency to depression and anxiety. These data indicate that the most effective medicine for the symptoms of depression and anxiety associated with unemployment, is re-employment.

13. CONCLUSIONS

Using longitudinal data from the National child Development Study (NCDS), it was possible to examine the relationship of unemployment with health and health behaviour, and also consider the role of childhood circumstances in determining risks for unemployment, poor health and hazardous health behaviours in young British men. By identifying childhood characteristics or circumstances that are risk factors for unemployment or indicators of poor health and health behaviour, it has been possible to adjust for these factors in analysis. Thus, the relationship of unemployment with health and health behaviour reported here is independent of the important confounding factors associated with family background. Childhood circumstances as indicators of cultural and material influences are more useful than adult measures, such as the cohort members' own social class, as the adult measures are themselves likely to be affected by the experience of unemployment.

The NCDS men experienced a relatively high risk of unemployment, compared with other cohorts of young men, due to the economic recession of the early 1980s. For some of them, this early experience of unemployment may have profound consequences. Because unemployment erodes human capital, early unemployment is likely to be associated with a higher risk of unemployment at later ages (Gershuny and Marsh, 1994), as well as a greater likelihood of having to accept less desirable jobs (Gregg and Wadsworth, 1995). Many of the men who experienced unemployment associated with

the 1980s recession may experience relative labour market disadvantage for some, or all, of their working lives.

The economic recession of the early 1980s resulted in a pronounced cohort effect for members of NCDS: men who first entered the labour market at this time were at a particular disadvantage in terms of obtaining and staying in a job. In NCDS the majority of those who entered the labour market at this time had remained in full-time education well beyond the minimum age and the majority had completed their higher education. This has resulted in greater heterogeneity amongst unemployed NCDS men than might be observed in other cohorts of young men, as higher educational attainment is usually protective against unemployment (Glyn, 1995) and is associated with a more privileged family background. Men from more privileged backgrounds tend to be in better health (Power *et al*, 1991) and have fewer hazardous health behaviours (Blaxter, 1990). At a time of lower unemployment, when a higher proportion of the more highly qualified were in employment, more of the unemployed men would be from less privileged backgrounds, and would tend to have worse health and a greater tendency to hazardous health behaviours.

Socioeconomic Circumstances, Health and Development in Childhood

Social and cultural circumstances in childhood were clearly associated with future unemployment risk. The considerable effect of regional variation in the economy and therefore local demand for labour was demonstrated by the strength of association

between area of residence and unemployment, even after adjustment for the potentially confounding personal characteristics. Coming from a more disadvantaged family or being born to parents with a lower social class, significantly increased the risk of future unemployment. As socioeconomic disadvantage and being born into a family of lower social class have been shown to be risks for poor health (Power, 1991), it was important to adjust for these when testing the direct health selection hypothesis which assert that poor health is associated with a greater risk of unemployment, independently of other characteristics. The results from investigation of behavioural change and deterioration in mental health were also made more robust by taking childhood characteristics into account.

There was some evidence of direct health selection, as moderate to severe chronic illnesses and disabilities that pre-dated labour market were independently associated with a higher risk of unemployment. The relatively small number men with a pre-existing condition, who became unemployed, is unlikely to fully explain the relationship between unemployment and poorer health witnessed in later life (Cook *et al*, 1982): the vast majority of unemployed NCDS men had been healthy children. It may be argued that illnesses and disabilities with later ages of onset continue to result in direct health selection. The risk of developing a chronic illness or disability increases with increasing age (Martin *et al*, 1988), so direct health selection may become a more significant factor in determining the relationship between unemployment and poor health in later life. The cohort effect that resulted in a relatively high rate of graduate unemployment, due to time of labour market entry, may have masked the role direct health selection. At other times,

when demand for labour is higher (low unemployment), disabled and chronically sick men would make up a far greater proportion of all unemployed men. During those times of low unemployment, the relationship of pre-existing chronic ill health and disability with unemployment would probably be stronger than found amongst men in NCDS.

Indirect health selection was found to exist among NCDS men, as a significant proportion of men showed greater vulnerability to future illness, without actually being sick, prior to any experience of unemployment. Slow growth to age 7 years, an indicator of vulnerability to future physical illness, was associated with an increased risk of future adult unemployment. Poorer social adjustment at age 11 years, an indicator of risk for future psychological morbidity, was also associated with an increased risk of adult unemployment. Neither the association of physical or psychological vulnerability with future unemployment appeared to be due to chronic illnesses or disabilities that were present prior to labour market entry. These associations of health vulnerability with future unemployment were independent of family background and educational attainment. It is unlikely that these associations could be due to NCDS men anticipating future unemployment, as has been suggested for older children who are likely to experience unemployment in the near future (West, 1994), as the measures of health vulnerability were taken some years prior to the minimum school leaving age.

Greater height has been linked with upward social mobility: the heights of Civil Servants in the Whitehall Study were more closely related to achieved occupational grade than to social class of origin (Marmot, 1986). It was once widely assumed that findings

such as these indicated that height was a marker for some physiological advantage, and also that tall men were upwardly mobile perhaps because of a human tendency to be impressed by stature (Wilkinson, 1996). However, these interpretations are unlikely to represent a full explanation, as it has been demonstrated that unemployment, which is a good marker for social mobility, was more closely related to slow growth at age 7 years than to fully attained adult height. These findings demonstrate that the measure of physical health potential, slow growth in childhood, was not associated with unemployment through a direct selection mechanism. If men were more likely to become unemployed as a direct consequence of their height, adult height rather than height at age 7 years would be more significantly associated with unemployment.

It seems probable that the measure of psychological health potential, the BSAG, which is an indicator of behavioural maladjustment, may be related to unemployment through both the direct and indirect selection mechanisms. Direct selection may have taken place where employers were less likely to employ, or retain, men who displayed significant symptoms of behavioural maladjustment. However, the BSAG provides a continuous score and whilst a proportion of men in the highest scoring group, for example those in the top fifth of the distribution, might be described as showing significant symptoms of behavioural maladjustment, this is unlikely to be the case for men with lower scores. Men with lower BSAG scores, for example those in the second highest fifth of the distribution, were sill significantly more likely to experience unemployment, despite the fact that they were unlikely to be demonstrating a high level of maladjustment. This indicates the presence of indirect health selection as, in the majority of cases, the

indicators of health vulnerability would not themselves increase the risk of unemployment.

What seems likely is that the measurements of physical and psychological vulnerability used here provide more information about adverse circumstances in childhood than social class and the other traditional indicators of social and material circumstances. It is proposed that childhood adversity has the dual, but separate, effects of increasing vulnerability to poor health and also increasing the risk of future unemployment. The indicators of health vulnerability may be providing a measure of psychosocial factors, such as domestic conflict which has been previously associated with both slowed growth (Montgomery, Bartley & Wilkinson, 1996) and future labour market adversity (Sweeting and West, 1994).

Health behaviour and Body Mass Index

It seems probable that the psychological stress associated with the experience of unemployment results in deterioration of some health behaviours, as well as influencing mental and physical health more directly. The financial hardship that is often associated with unemployment may directly influence elements of behaviour such as diet by restricting choice, while the financial hardship itself may also be an important stress inducing factor. It was not possible to examine the possible mediating role of financial hardship here, but the effects of accumulated and recent unemployment on health behaviours and BMI were examined. The relationships between the measures of health

behaviour and unemployment were not conceptualised in terms of indirect health selection. This is because the measures of health potential were chosen to represent fixed risk factors for future ill-health, that pre-dated labour market entry and therefore any experience of unemployment. These measurements were made during childhood so that even the threat of future unemployment would be unlikely to influence them. Whilst the majority of the health behaviours were measured prior to the experience of unemployment at age 16 years, these could change over time, possibly as a function of unemployment experience. For example a man could begin smoking due to unemployment or he might give up because of favourable labour market experiences. Here, changes in behaviour that may be associated with unemployment are the focus, while the investigation of health potential was concerned with a fixed measurement of health potential that existed prior to any unemployment.

A higher prevalence of cigarette smoking was found at age 33 years amongst men who had accumulated significant amounts of unemployment. Even though those who would go on to be unemployed were more likely to be smokers at age 16 years, the experience of unemployment was associated with a reduced tendency to stop smoking and an increased tendency to take it up. Smoking is used to cope with external stressors (Parrott, 1995) and unemployment, or the threat of unemployment, may result in increased stress and greater nicotine dependence. The experience of unemployment in early adulthood may result in future excess morbidity and mortality for a proportion of these men, due to the health risks associated with prolonged exposure to cigarette smoke.

At age 33 years, relatively high alcohol consumption was associated with the experience of recent unemployment more strongly that with a greater amount of accumulated unemployment. Men who became unemployed may have increased their drinking as a response to the stress (Kushner *et al,* 1996) of being, or becoming unemployed. The relationship between unemployment and problem drinking could be due to unemployment increasing alcohol dependence or to pre-existing drinking problems increasing the risk of unemployment. In some men the stress of unemployment, or threat of unemployment, could have resulted in higher anxiety, as alcohol consumption has been shown to reduce state anxiety (Kushner *et al,* 1996). Chronic exposure to stress, due to labour market disadvantage, may have resulted in alcohol dependence and drinking problems in a proportion of these men. The financial hardship associated with unemployment (Sinfield, 1993) is likely to have been largely responsible for the relatively high proportion of men who experienced unemployment and had low levels of alcohol consumption at age 33 years. Also, recent unemployment, rather than accumulated unemployment, may have been more significantly associated with heavier alcohol consumption because men are eventually partially or fully habituated to unemployment after several months and therefore, their levels of stress decline. This declining level of stress may be accompanied by a reduction in alcohol consumption.

The experience of unemployment was associated with higher levels of physical exercise in leisure time. These higher levels of exercise were maintained by men, even after unemployment had ended, as amount of accumulated unemployment rather than recent unemployment was most strongly associated with high levels of exercise. Exercise may

have been used by these men as a coping strategy, to reduce the negative psychological impact of unemployment. This physical exercise may have protective consequences for both physical and mental health during a period of unemployment in these men.

Men who had been unemployed were more likely to have an unhealthy diet at age 33 years, however, it was not possible to measure change in diet as suitable measures were not available prior to age 33 years in NCDS. Having a poor diet was only weakly (but statistically significantly) associated with accumulated unemployment after adjustment for the potential confounding factors. Financial hardship associated with unemployment may be a factor in determining dietary behaviour, as financial hardship has previously been linked with less healthy dietary habits (Ross and Mirowsky, 1995). The stronger univariate association between accumulated unemployment and poor diet was significantly diminished by adjustment for characteristics prior to labour market entry, indicating the significant role of family background and personal characteristics that predispose an individual to both a higher risk of unemployment and having worse dietary habits.

The association of low BMI at age 33 years with greater amounts of accumulated unemployment remained statistically significant, even after adjustment for behavioural and background factors that are important determinants of body weight. Low weight gain or weight loss in these men may be due to stress induced metabolic changes (Arnetz *et al,* 1991) associated with unemployment. Alternating spells of employment and unemployment, which produced periods of higher stress followed by others of relatively

low stress could result in a significantly raised risk of cardiovascular disease. This is because the pattern of high and then lower stress may result in alternating weigh loss and weight gain. If stress from unemployment resulted in weight cycling, this would represent a significant risk factor for cardiovascular disease (Bosello *et al,* 1993). Future research in this area, using NCDS data, would benefit if waist/hip ratio data were available, as stress related influences on body fat distribution would be most easily identified by examination of the visceral pattern of body fat distribution (Bjorntorp, 1991).

Mental Health

The analysis performed to investigate the relationship between mental health and unemployment was designed to thoroughly test the hypothesis that the experience of unemployment pre-dated the onset of depression and that this relationship remained statistically significant even after previous psychological state and other relevant personal characteristics were taken into account. This thorough test of the hypothesis was likely to result in an underestimate of the strength of the relationship between unemployment and a deterioration in mental health. Despite this, a significant relationship was identified between symptoms of anxiety and depression, sufficiently severe to result in medical consultation, with recent experience of unemployment. As the onset of these symptoms took place after the experience of unemployment, this indicates that unemployment may have been the cause of depression and anxiety. Unemployment was associated with a deterioration in mental health amongst men who did not have show any previous

symptoms of vulnerability to anxiety and depression, as well as for men who did have symptoms of pre-existing vulnerability. Unemployment is not only a risk factor for psychological morbidity in those individuals who have a greater pre-existing tendency to depression. As recent unemployment, rather than accumulated unemployment, was most significantly related to onset of symptoms of depression and anxiety, it may indicate that employment provides some protection against psychological morbidity if unemployed men become successfully re-employed.

As symptoms of anxiety and depression were more significantly associated with recent unemployment, rather than amount of accumulated unemployment, it seems likely that the initial period after job loss witnesses the most rapid decline in psychological well-being. This could be accounted for by several of the theories used to explain why unemployment can lead to depression: Jahoda's deprivation theory (Jahoda, 1981, 1982) and Warr's vitamin model (Warr, 1987) would explain it in terms of loss of the psychological and material benefit supplied by work. Men may feel that their ability to pursue their personal goals has been removed, and this has been described as Agency Theory (Fryer and Payne, 1983) and also as learned helplessness (Seligman, 1975) where men feel their ability to control outcomes has been lost. All of these theories offer plausible explanations for reduction in psychological well-being after job loss, however Jahoda's deprivation theory (Jahoda, 1981, 1982) should perhaps be rejected as it implies that men's mental health would continue to deteriorate indefinitely after job loss. As recent unemployment was found to be the greatest risk for medical consultation for depression and anxiety, it would appear that the decline in mental well-being does not

continue indefinitely and it is more akin to the process of bereavement described by Fagin (1984). This may have significant policy implications as much of the State-sponsored assistance for unemployed people tends to be available to those who have already been unemployed for a considerable period of time, but perhaps it would be more beneficial for assistance to be offered sooner so that the psychological nadir that many men may experience in the first months of unemployment could be avoided.

As unemployment results in stress and stress-related psychological morbidity, this could also damage physical health through lowered immunity (Kaplan, 1991) or through other metabolic processes, including increasing the risk of cardiovascular disease by raising cholesterol levels (Bjorntorp, 1991, 1992). Stress is likely to be a major factor in explaining the relationship between unemployment and excess mortality and morbidity. As well as the acute stress associated with initial job loss (or its threat), the ongoing chronic stress that unemployment produces through mechanisms such as financial hardship is also likely to result in both psychological and physical morbidity (Pearlin *et al*, 1981).

Accumulation of Risk

It has been demonstrated that unemployment is associated with a deterioration in health and health behaviours, beyond what would be expected when family background and other personal characteristics are taken into account. Young men who were most likely to experience unemployment were also more likely to be vulnerable to future illness or,

in a minority of cases, chronically sick or disabled, prior to experiencing any unemployment. These men also tended to have worse health behaviours prior to any experience of unemployment. Whilst health and health behaviour was worse in men who would become unemployed, unemployment was also associated with a significant worsening of health and health behaviours, independent of previous health, health behaviours and family background characteristics. Clearly, the mechanisms that underlie the relationship of unemployment with excess morbidity and mortality are not straightforward. The terms direct and indirect health selection are useful tools to describe elements of the processes linking unemployment with poor health, but care must be taken to clearly define these terms (West, 1991) and consider the socioeconomic context within which health selection operates. Because unemployment is also likely to *cause* illness, a full understanding of the link between unemployment and ill-health requires investigation of the complex interaction of pre-existing health vulnerability, illness, socioeconomic risk factors, as well as the socioeconomic and biological risk factors which are direct and indirect consequences of unemployment itself.

The disadvantage that many men unemployed men experience may be amplified by the experience of unemployment itself, as past unemployment is a risk for future unemployment and other forms of socioeconomic disadvantage, this is also likely to be associated with a greater accumulation of risks to health. Unemployment may play an important mediating role in causing illness or converting vulnerability to illness into active disease, but unemployment itself is just one link in the chain linking socioeconomic disadvantage with excess mortality and morbidity (Fox and Shewry,

1988). As previous unemployment is associated with a greater risk of future unemployment, early unemployment could result in disease which makes later unemployment erroneously appear to be health selection, when in fact it is unemployment that was the cause of the illness.

To establish true patterns of causality, it will be necessary to study the life-long accumulation of health risks and their interactions, with each other as well as with other personal and environmental characteristics. An examination of the life-long continuity of disadvantage that unemployed men can experience is likely to provide the most complete explanation of the link between unemployment and ill-health. The statistical modelling techniques required to model the accumulation of disadvantage, or identify health 'trajectories' are still being developed, but it should be possible to begin using them to examine patterns of accumulation of risk.

The association of adverse socioeconomic circumstances with the accumulation of more biological risk factors can start in early life for many of the men who experience unemployment. Children from relatively socioeconomically disadvantaged backgrounds, and those who experience other forms of childhood adversity are more likely to experience unemployment. Their childhood circumstances may have made them more vulnerable to future illness and this childhood vulnerability has been shown to be associated with socioeconomic disadvantage that continues into early adulthood (Bartley *et al,* 1994). A relatively disadvantaged background is not only associated with a greater risk of unemployment, it is also associated with a greater tendency to have hazardous

health behaviours, such as cigarette smoking (OPCS, 1990). The experience of unemployment may also increase the risk of men becoming or remaining smokers. However, while this certainly adds to health risk, smoking itself cannot be a full explanation for the relationship of unemployment and ill health, as the class and mortality gradient for smoking was reversed earlier this century (Royal College of Physicians of London, 1977). Cigarette smoking and its association with disease, like other health risks, has to be considered in the context of life-time accumulation of other health risks.

The stress that unemployment brings may be a very significant factor in accelerating the accumulation of health risks. Coping strategies adopted by men to deal with the problems of stress, may themselves represent health risks: cigarette smoking and relatively high levels of alcohol consumption may be responses to stress that provide acute relief. Interestingly, if some men use physical exercise to combat stress, this will also be beneficial for physical health. Stress may institute metabolic changes that eventually cause chronic physical illness. The strain of financial hardship associated with unemployment will have an impact on health (Davey Smith *et al*, 1994), possibly because the financial hardship associated with unemployment also increases the risk of stressful events such as marriage breakdown and loss of mortgaged homes (Fox and Shewry, 1988).

The variability of the processes by which risks to health are accumulated throughout life amongst men who experience unemployment, indicates that there will be considerable variation in the timing of the onset and nature of any morbidity in these men. Mental

health may deteriorate rapidly during a spell of unemployment, but physical health may be slowly eroded over many years. The consequences of health risks accumulated during a bout of unemployment might only become visible much later in life. Further research that models the relationships between unemployment and ill health using causal pathways and the accumulation of risk from birth to old age and death, could provide more information on the risk to health that is directly attributable to the experience of unemployment.

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