

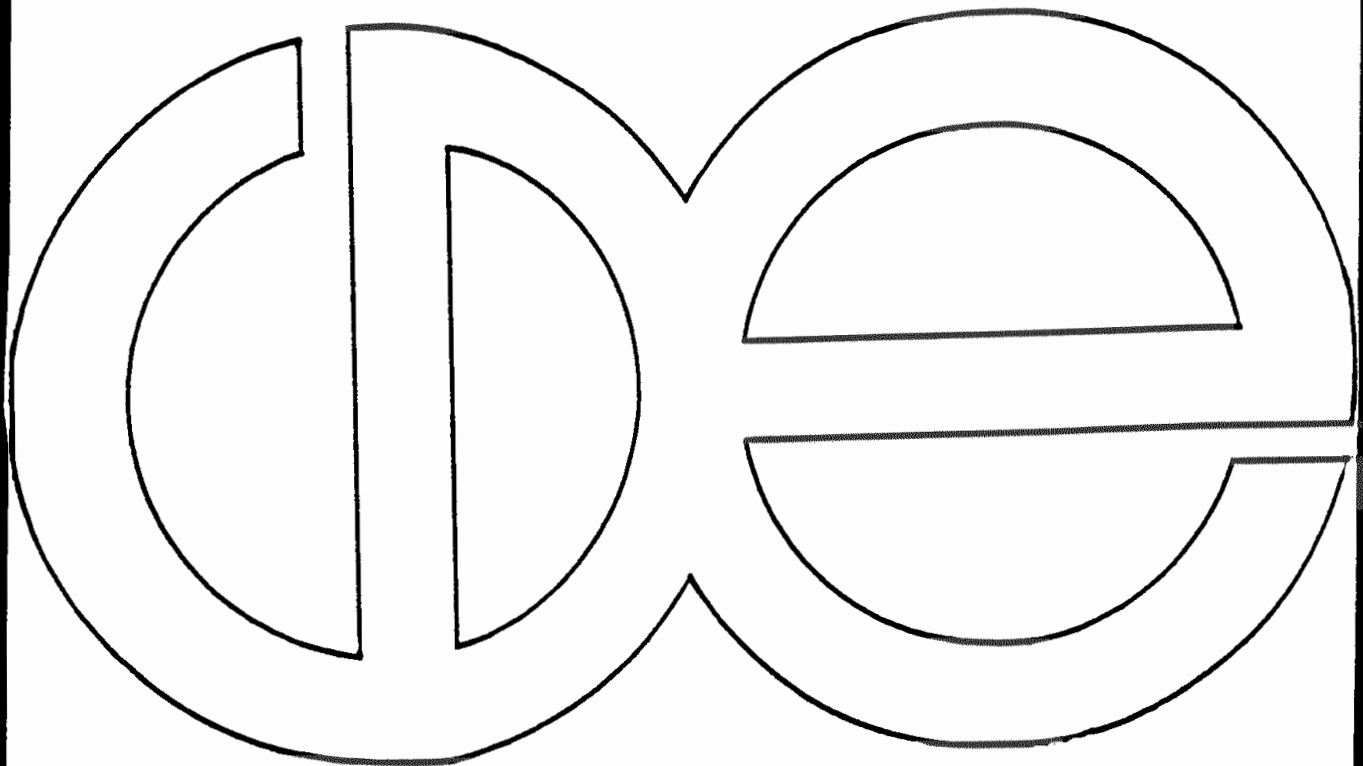
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**SOCIAL INEQUALITIES IN HEALTH: NEXT QUESTIONS AND
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Short title: Social Inequalities in Health

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ABSTRACT

Mortality studies show that social inequalities in health include, but are not confined to, worse health among the poor. There is a social gradient: mortality rises with decreasing socio-economic status. Three large sample studies, one British and two American, brought together for their complementarity in samples, measures, and design, all show similar social gradients for adult men and women in physical and mental morbidity and in psychological well-being. These gradients are observed both with educational and occupational status, and are not explained by parents' social status or lack of an intact family during childhood. They are also not accounted for by intelligence measured in school. This suggests that indirect selection cannot account for inequalities in health. Possible mediators that link social position to physical and mental health include smoking and features of the psycho-social environment at work and outside.

Key words: health inequalities, socioeconomic status, social causation, health selection

SOCIAL INEQUALITIES IN HEALTH: NEXT QUESTIONS AND CONVERGING EVIDENCE

In Britain, mortality statistics have been produced by social class since 1911, and have consistently shown an inverse relation between social position and mortality [1,2]. Social class has been a less popular topic in the USA at least since George III, but mortality statistics show a similar inverse relation between measures of socio-economic status and mortality [3,4]. Both in the USA and Britain, despite overall decline in death rates, socio-economic disparities in mortality rates have been increasing [5,6]. As international evidence continues to accumulate documenting the relationship between socioeconomic status and health [7-11], a good case can be made that this is the major unsolved public health problem of the industrialised world [12, 13].

In the USA, this issue has been brought more to the fore recently in public discussion about health care reform. Serving under-served people, reducing overtreatment, and controlling costs are ample reasons for health care reforms. Were they to happen, these much needed reforms would bring the USA more in line with other advanced industrial countries. However, if the experience in Britain is a guide, even the achievement of universal access to medical care would not substantially reduce socio-economic differences in health and disease. Thirty years after the National Health Service was set up in Britain, the Black Committee concluded that inequalities in health had widened, despite universal access to medical care, because the determinants of inequalities in health lay elsewhere [14].

This is seen clearly in the Whitehall studies of British Civil Servants which show a social gradient in mortality [15] and morbidity [16]: each grade of employment has higher levels of morbidity and mortality than the one above it. There is a social gradient for a wide range of causes of death, both those that may be influenced by medical care and those that may not. The Whitehall findings suggest that the debate should be not whether those in poverty are at greater risk of ill-health. Clearly they are. The larger issue, involving not just the poor, but the entire social spectrum, is whether relative position in society is an important determinant of morbidity and mortality. If so, how does this relation between inequality and health work, and what are the implications for policy?

The present investigation brings together three major studies to advance the class and health agenda. Selected for their complementarity, the studies provide new evidence regarding the generalisability (across diverse samples and different measures of socioeconomic standing) of the social gradient in health. They also afford tests of rival interpretations (e.g., indirect selection) and extend the evidence to new health indicators (e.g., psychological well-being). We organize analyses of the three major data sets around the following questions.

Six unanswered questions on the relation between socio-economic status and health

As a way of addressing these issues, this paper focuses on a number of questions raised by the Whitehall findings. The first three are descriptive and allow us to approach the second set of questions that relate to understanding of the causes of health inequalities. 1) How generalisable are the findings from British civil servants to other populations? 2) Most data on inequalities in health relate to mortality. Do similar social gradients exist for more subjective measures of health and psychological well-being? 3) Is the relation between socio-economic

position and health status dependent on the measure of socio-economic position? 4) Are the relations between socio-economic position and health similar for the two genders? 5) To what extent might the alternate hypothesis of indirect selection [17] account for the social gradient in health i.e might factors that influence the socio-economic position in which people find themselves also influence health status? 6) Can we start to fill in the links between social position and ill-health? What are the mechanisms by which inequalities in health status are generated?

The studies: Whitehall II, Wisconsin Longitudinal Study, National Survey of Families and Households

Our approach to these questions is a comparison of data from three different studies of midlife adults: 1) the Whitehall II study of British Civil Servants; 2) the Wisconsin Longitudinal Study (WLS) of men and women who graduated from Wisconsin high schools in 1957; and 3) the National Survey of Families and Households (NSFH), a national sample of US adults. These three studies have different sampling frames: i) a sample of men and women, predominantly white, age 35-55 between 1985-88, who were employed in stable white collar jobs in the British Civil service in and around London; ii) a sample of Wisconsin high school graduates aged 53-54 in 1992-93, almost exclusively non-Hispanic white, which excludes the approximately 25% of birth cohort peers who did not graduate from high school during that period (presumably the most disadvantaged quarter); and iii) a US national sample of adults aged 19 and older in 1987-88 (only data for persons age 40-64 are used in the analyses shown here) that does not

exclude the poorer sections as Whitehall II and WLS do. (Additional details of these studies and statistical methods are given in Appendix 1 and the numbers of subjects in Appendix 2).

Each of the studies brings particular strengths to addressing different aspects of the six questions listed above. Whitehall II uses civil service employment grade as a socio-economic measure particularly suited to one white collar organisation. WLS, covering a range of occupations, uses the Duncan socio-economic index. Educational attainment is the socio-economic measure used in the NSFH. Whitehall II was also designed to include a rich array of measures of potentially mediating processes between socio-economic status and health. WLS can address indirect selection as it has data about personal characteristics (e.g., mental ability) of people going back to their adolescent years; and it can address health selection directly since it includes an occupational status measure from early mid-life (around age 36) which can be evaluated in relation to health about 18 years later (ages 53-54). Whitehall II and WLS allow a cross-national comparison of relatively advantaged white population samples. NSFH has the advantage of national representativeness as a test of the gradients observed in the other studies of more advantaged samples. All three studies include: i) contrasts of both men and women; ii) self-assessments of physical health, psychological distress (depression), and psychological well-being; and iii) measurement of parents' socio-economic status that can be used to address issues of indirect selection via social class of origin.

If three studies with quite different samples and methods yielded disparate results, little could be concluded. Similar findings on inequalities in health suggest a real phenomenon that demands attention from both research and policy.

1. Inequalities in health in different populations in the USA and UK

Figures 1 to 4 summarise analyses on four measures: self-perceived health; depression; a measure of psychological well being; and smoking (the multiple lines in each graph represent odds ratios adjusted using three different models). For each of these measures, there is a clear inverse relation with socio-economic status. In Whitehall II, a continuous relation had been observed between employment grade and a number of measures of ill-health [16]. A similar gradient is seen in the other two studies. This answers the first question concerning generalisability of findings. The social gradient in health is not confined to British civil servants but is observed in a national US sample, as well as in relatively privileged Americans from Wisconsin.

2. Inequalities in measures of morbidity and psychological well being

Self-perceived health (based on responses to the global question, "How would you rate your health?") shows a clear social gradient in men, somewhat less monotonic in women (Figure 1). In other studies self-evaluated health has been found to be a strong predictor of mortality [18]. The findings on self-reported health displayed here are also supported by "harder" evidence. In Whitehall II, for example there were social gradients in angina pectoris, in electrocardiographic evidence of ischaemia [16] and in sickness absence rates [19]. There were similar gradients in limitations due to a health condition in WLS, and in limitations in activities of daily living in NSFH (results not shown).

Depression was assessed in Whitehall II using a subset of items from the General Health Questionnaire [20] and in WLS and NSFH using a modified version of the Centre for Epidemiological Studies Depression Scale (CES-D) [21]. Subjects whose depression score was

in the highest quarter of the distribution were defined as cases. Once again, the gradient with socio-economic status was marked (Figure 2).

As measures of psychological well-being, we took answers from a question about finding "little meaning in life" in Whitehall II; a 7-item version of Ryff's purpose in life scale [22] in WLS; and a 3-item version of Rosenberg's self-esteem scale [23] in NSFH. These show clear gradients for men in each study and also for women in the WLS and NSFH studies (Figure 3). In Whitehall II a strong gradient was also seen for affect balance [24] in both men and women; and in WLS for Ryff's self-acceptance scale [22] (results not shown).

3. The relation between different measures of socio-economic position and health status

The figures shown use different measures of occupational status in Whitehall II and WLS; and education is used in NSFH. All three measures show a relation with ill-health and psychological well being. There are two relevant issues here. Which measure is the best predictor? What meaning do the different measures have?

Two common ways of determining which is the best of two potential predictors is to compare the strength of association of different measures or to put them both in a multivariate model and see which survives. In NSFH, both years of education and occupational status (not shown) are related to self-rated health and the other endpoints. In a multivariate model including both occupation and education, education proves to be the better predictor. This may mean that education is more intimately involved in the causal pathways leading to ill-health. Alternatively, both education and occupational status may be indicators of some underlying social reality but education may be measured with greater precision, hence its closer association with health. In Whitehall II, employment grade was more strongly related to health than years of education.

This may illustrate differences in measurement precision. Given the hierarchical nature of the British civil service, employment grade is an exquisitely precise measure of status. It may be a better measure of social standing than years of education in this study, or than occupational status in studies that include a range of occupations such as WLS or NSFH. In WLS, in multivariate models including both education and occupation, education was a better predictor of self-rated health, occupational status a better predictor of psychological well-being. These latter findings suggest yet another interpretation: different aspects of health may be differentially influenced by separate components of social position [25].

This issue of the meaning of these predictions will be taken up below. One particular aspect is that of health selection. In a cross-sectional study showing a relation between occupational position and health, the causal direction could go either way: health could be a determinant of social position or social position could influence health status. This health selection interpretation is possible in Whitehall II. It is possible but less likely in WLS which assessed socio-economic status in 1975 and health 18 years later. It is also less likely in NSFH which used years of education (usually completed in early adulthood) as a measure of socio-economic status and health measured at ages 40-64.

4. Gender differences in the relation between socio-economic status and health

In WLS and NSFH, for each of the health measures, the gradient is similar for men and women whether occupational status (18 years previously) is used as in WLS or education as in NSFH. Both of these studies include virtually all of the women in the sampling frame; the NSFH because there is a measure of education for everyone, and the WLS because it used a measure of occupational status from the respondent's 1975 or most recent job, resulting in the inclusion

of 98% of the women and all of the men in the analyses. By contrast, Whitehall II, by nature of the sample, includes only women currently employed outside the home. Excluding non-employed women from the sample, when current occupational status was used as the measure of socio-economic status in NSFH, showed that the social gradients in health, although present, were less steep than when education was used. This suggests that for women there may be more health selection into employment than there is for men, making measures of current occupational status measures less adequate for describing the socio-economic status gradient in health for women. Furthermore, health selection may depend on the material circumstances of the woman and may also differ depending on whether social position is defined by the woman's or her partner's occupational status.

5. Indirect selection as an explanation of the gradient

Indirect selection implies not that health determines social position (health selection) but that factors predictive of ill-health also predict future social position. Using education as a marker of social position reduces this problem but does not solve it completely, as the common factor(s) could also determine educational achievement. Figures 1 to 4 examine this possibility in a number of ways. Whitehall II shows that taking into account the social background of parents does not change the relationship between grade of employment and health (Model 2). WLS shows that taking into account parents' education and whether the respondent lived in an intact family during childhood (Model 2), and, additionally, IQ measured in high school (Model 3) reduces the relation between occupational status and health only to a small extent. In NSFH, adding to age and race (Model 2), parents' education, and whether the family was intact when

the respondent was 15 (Model 3), did not eliminate the relation between social position and health.

These analyses from the three studies provide little support for the view that family background or intelligence determine class position and health status. They suggest that health is related to social position rather than to the individual characteristics of individuals who end up in different strata of society. The question is how.

6. Potential mediators that link social position to physical and mental health

One category of explanation is health behaviour. That is, poorer health practices are more prevalent in lower social positions. Figure 4 shows that in both Whitehall II and WLS, there was a clear social gradient in smoking.

The data from Whitehall II take the exploration of pathways a step further. Three classes of potential intermediaries between social position and health have been examined: individual behaviours - alcohol consumption; psychosocial characteristics of work - control, variety and use of skills, social support at work, work pace and job satisfaction; social circumstances outside work - negative aspects of social support and difficulty paying bills (Model 3). The "fully adjusted" lines in Figures 1 to 4 show a varied picture. These variables "account for" none of the social variation in smoking, for about half of the social variation in self-rated health and for all of the social variation in depression and psychological well being.

Explanations for social inequalities in health

These three studies show that there is worse health among those at the bottom of the socio-economic distribution than among those at the top. This is consistent with a link between poverty and ill-health. Perhaps more important, all three studies show a social gradient that runs

right across the whole population: the lower the social status the greater the physical and mental ill-health and the worse the psychological well-being. This is seen both in the studies likely to exclude the lowest socio-economic groups, WLS and Whitehall II, and in a sample more representative of the whole population, NSFH.

The fact that these measures of health are self-reports and subjective does not detract from their importance. We know there is a similar social gradient in mortality [5,6], and that self-perceived health predicts mortality [18]. The data presented here suggest that mortality is the tip of the iceberg; underneath the mortality statistics are substantial social inequalities in morbidity and psychological well being. Given the usual focus on negative health outcomes, the findings for positive mental health (self-esteem, meaning and purpose in life) are particularly informative. They show that lower social position not only increases the likelihood of ill-health, it decreases one's chances for well-being. To be well is more than to be free of sickness and disease; it is to possess positive features of human functioning [26]. These well-being factors not only constitute quality of life; their presence provides important protective mechanisms in the face of life stresses, and their absence creates vulnerability for depression [27,28].

There are three types of explanation for these social inequalities in health: health determines social position ("health selection"), social position determines health ("social causation"), and factors operating early in life determine both achieved social status and health status ("indirect selection"). Whether this last category should be referred to as selection or causation is a matter of perspective. The distinction is important, however, as indirect selection suggests that there is not a causal connection between social circumstances in adult life and health status; it is posited that the observed relationship is due to the operation of some common

factors from earlier in life. The clear implication is that improvement in features of adult social conditions would have little impact on the worse health of the current generation of adults at relative social disadvantage. Potentially, by improving conditions for children it could improve the health of future generations of adults. The distinction between these three classes of explanation therefore has clear policy implications.

The data here make health selection in adult life unlikely but do not bear directly on health selection in childhood. For health selection in adult life to operate, the sick would have to drift down the social hierarchy or fail to be as upwardly mobile as the non-sick. Other data suggest that although this may apply to specific problems like schizophrenia it is not a general or total explanation for inequalities in health [29,30]. The fact that social status, as defined by education, is related to ill-health of middle aged adults (NSFH) suggests that ill-health developing after completion of education cannot be the cause of low social status. If health selection is operating, it must be operating earlier in life than the time when education is completed.

We do not have information from any of the three studies here on the possible influence of health in childhood on educational performance or social mobility either up or down. There is evidence from a birth cohort study that ill-health in childhood is associated with downward social mobility [31], but the effect is of minor importance. Other studies which can relate health in childhood to health in early adulthood similarly suggest that this cannot account for class differences in health in adulthood [32,33].

"Indirect selection" [17] recognises that people bring with them into adulthood the results of influences from their earlier days: genetic factors, biological results of early experiences,

educational, cultural, psychological and social factors. Since it has been argued that the major influences on health in adulthood operate early in life [34], it is possible that both social position and health in adulthood are determined by common early life influences. The focus on the childhood origins of adult disease has been criticised precisely because influences from early life shape the lives people lead and the social environments in which they live and work [35]. It may be these conditions of adult life that are related to ill-health, and the importance of childhood conditions may therefore be indirect. It is clearly not easy to separate the direct effects on health of early and later life experiences.

The data presented here do not support an indirect selection argument. Social inequalities in health were still observed after taking account of parents' occupational social class (Whitehall II), parents' education (WLS, NSFH), non-intact family of origin (WLS, NSFH), and mental ability (IQ) measured in adolescence (WLS). If indirect selection is operating, it is not captured by these broad and specific measures.

This suggests that features of adult socio-economic status do, at least in part, have a causal connection with health in adult life. In NSFH, in multivariate models, education had a stronger relation to health measures than did occupational status. It is tempting to speculate that features of educational experience and achievement relate directly to ill-health possibly through an influence on health behaviours and coping strategies. Alternatively, education may be a good marker but not itself be directly implicated in the cause. The truth is likely to be a combination. In Whitehall II, grade of employment was a better predictor of ill-health than education. As with education in NSFH, this might be because in this population, grade is the best marker of status or because factors directly related to employment status are related to ill-health. Employment

grade within the British civil service, with its strong relation to income is a more precise classification of socio-economic position than other measures based on occupation. Homogeneity within grades is high, and differences between grades fairly distinct.

The analyses presented here suggest that, in Whitehall II, a combination of factors including features of the work environment (low control, low variety and skill use, high pace, low supports, and low satisfaction), social circumstances outside work (negative aspects of social supports and financial difficulties), and health behaviour (alcohol consumption) do account for a good deal of the social gradient in overall health status and all the gradient in depression and psychological well-being. Similar intervening mechanisms have been proposed in other class and health analyses [12].

As has been emphasised these likely candidates for explanation apply to a population who are not materially deprived to the same extent as seen in the worst cases of inner city deprivation. It may be that at the lower end of the scale, material deprivation plays an important role in generating inequalities in health. At a threshold above absolute deprivation, other factors may be more important in generating relative differences in health. If we are to appeal to a concept of relative deprivation, this implies the operation of psychosocial factors related to position in a hierarchy. The Whitehall II findings suggest that these psychosocial factors may be related both to work and to the wider social environment outside work. Taken together, these observations point to the possibility that there are different intervening mechanisms operating at different points in the social hierarchy - what explains the link between social position and health at the low end may not be the relevant explanatory factors at the high end.

The evidence on mortality suggests that inequalities in health are not of fixed magnitude. They vary between countries and over time [36]. This suggests that a health strategy that included reduction in inequalities in health is not a utopian fantasy. The converging evidence suggests that attention must be paid to the circumstances in which people live and work. The present analyses provide clues as to where such effort might be focused.

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APPENDIX 1

Description of each study

Whitehall II

The original Whitehall study, begun in 1967, followed 17,530 men and showed a three-fold difference in mortality between top and bottom grades: low grade, higher mortality. The gradient was seen for all the major causes of death and could be explained only to a small extent by the major cardiac risk factors. The Whitehall II study was set up in 1985 to investigate the degree and causes of the social gradient in morbidity and mortality and to study additional factors related to the gradient, including demographic factors, health status, health behaviours, psychological well-being, work characteristics, and social networks and supports. Whitehall II involves 10,308 men and women aged 35-55 at their initial examination in 1985-1988. There have been two further data collection phases: a postal survey in 1989-90 and a medical examination in 1992-93. Participants are all office-based workers, working in and around London. By its nature, the sample excludes blue collar workers, housewives, the unemployed, and people in Britain outside London and the South East. It does, nevertheless, include a wide social range. In 1987, salaries ranged from stg3,060 to stg62,100 (\$4,437 - \$90,045). Although the Whitehall II cohort are being followed, the analyses reported here are based on data from the initial cross-sectional survey conducted between 1985-88 [16].

Wisconsin Longitudinal Study

The Wisconsin Longitudinal Study (WLS) is a long-term study of a random sample of 10,317 men and women who graduated from Wisconsin high schools in 1957. Survey data were collected from the original respondents or their parents in 1957 (age 18), 1964 (age 25), and 1975 (age 36). These data provide a full record of social background, youthful aspirations,

schooling, military service, family formation, labour market experiences, and social participation of the original respondents. The survey data from earlier years have been supplemented by obtaining mental ability test scores (from high school records), measures of school performance, and characteristics of communities of residence, schools and colleges, employers, and industries. A recent follow-up survey of all living respondents was undertaken in 1992-93, when most respondents were 53 or 54 years old. About 98% of the original (1957) sample respondents were successfully traced. About 5% of the original sample (n=539) had died. Over 87% of those still alive were successfully interviewed by phone (for about one hour). Over 80% of those interviewed by phone returned a 20-page self-administered postal survey, which included the health and psychological well-being measures used in this analysis. Overall response is just over 70% of known survivors of the original 1957 sample [37].

National Survey of Families and Households

The National Survey of Families and Households (NSFH), conducted during 1987-88, is a national sample survey covering a wide variety of issues on American family life. Interviews were conducted with 13,017 respondents, including a main cross-section sample of 9,643 persons aged 19 years and older, plus an oversample of minorities and households containing single-parent families, step-families, recently married couples, and cohabiting couples. (Results are weighted for both sample design and non-response to properly represent the U.S. population with categories of gender, race/ethnicity, age and region.) In each household, a randomly selected adult was interviewed. In addition, a shorter, self-administered questionnaire was administered to the spouse or cohabiting partner of the primary respondent. Interviews averaged about 100 minutes, although interview length varied considerably with the complexity of the respondent's family history. Topics covered included detailed household composition, family

background, adult family transitions, couple interactions, parent-child interactions, education and work, economic and psychological well-being, and family attitudes [38].

Statistical methods

Each outcome has been dichotomised and the relationship with the measures of socio-economic status expressed in terms of odds ratios. Logistic regression has been used to calculate the odds ratios, separately for men and women, for each outcome having adjusted for possible confounding factors according to three different models within each study. The factors included in the three models for each study are as follows:

Whitehall II study

Model 1: age

Model 2: age, father's social class

Model 3: age, father's social class, features of the work environment (control over work, variety and use of skills, support at work, work pace, and job satisfaction), social circumstances outside work (negative aspects of social support and difficulty paying bills), health behaviour (frequency of alcohol consumption) and ethnic group.

Wisconsin Longitudinal study

Model 1: no other factors

Model 2: parent's combined years of education, whether respondent lived in an intact family during childhood

Model 3: parent's combined years of education, whether respondent lived in an intact family during childhood, and mental ability (measured in high school)

National Survey of Families and Households

Model 1: no other factors

Model 2: age, race/ethnic group

Model 3: age, race/ethnic group, mother's education, father's education, and whether respondent lived in an intact family during childhood

APPENDIX 2

Number* of subjects used in the analyses

Whitehall II Study**

	Grade of employment						TOTAL
	High 1	2	3	4	5	Low 6	
MEN	644	1049	886	975	594	407	4555
WOMEN	61	37	126	303	425	987	2039

Wisconsin Longitudinal Study

	Most recent occupational status				
	High 1	2	3	Low 4	TOTAL
MEN	773	539	663	1036	3011
WOMEN	842	1083	952	564	3441

National Survey of Families and Households***

	Years of education				TOTAL
	≥16	13-15	12	≤11	
MEN	1092	1131	1810	1172	5205
WOMEN	1104	1605	3130	1917	7756

* The number of subjects in some analyses may vary slightly due to some missing values in the outcome factors.

** The number of subjects contributing to these analyses is reduced since some of the questions were introduced at a later stage during the study.

*** Unweighted sample sizes. Unusual distributions by gender reflect the oversampling of single mothers and minorities.

LEGEND FOR FIGURES

FIGURE 1

Odds ratios* for self-reported health (average or worse) by measures of socio-economic status in: A) Whitehall II study; B) Wisconsin Longitudinal Study; and C) National Survey of Families and Households.

* Odds ratios are adjusted according to three models (see Appendix 1):

_____ Model 1 ; _ _ _ _ Model 2 ; - - - - Model 3.

FIGURE 2

Odds ratios* for depression by measures of socio-economic status in: A) Whitehall II study; B) Wisconsin Longitudinal study; and C) National Survey of Families and Households.

* Odds ratios are adjusted according to three models (see Appendix 1):

_____ Model 1 ; _ _ _ _ Model 2 ; - - - - Model 3.

FIGURE 3

Odds ratios* for psychological well-being by measures of socio-economic status in: A) Whitehall II study; B) Wisconsin Longitudinal study; and C) National Survey of Families and Households.

* Odds ratios are adjusted according to three models (see Appendix 1):

_____ Model 1 ; _ _ _ _ Model 2 ; - - - - Model 3.

FIGURE 4

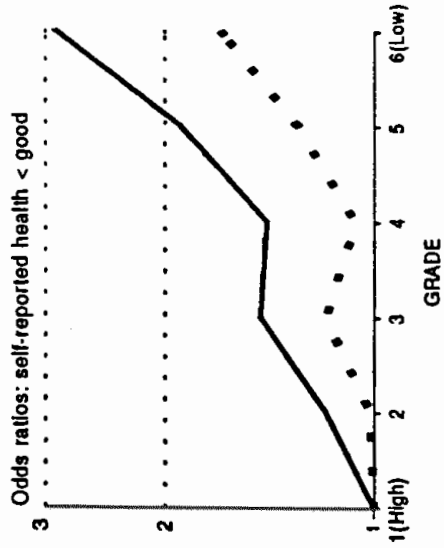
Odds ratios* for current smoking by measures of socio-economic status in: A) Whitehall II study; and B) Wisconsin Longitudinal study.

* Odds ratios are adjusted according to three models (see Appendix 1):

_____ Model 1 ; _ _ _ _ Model 2 ; - - - - Model 3.

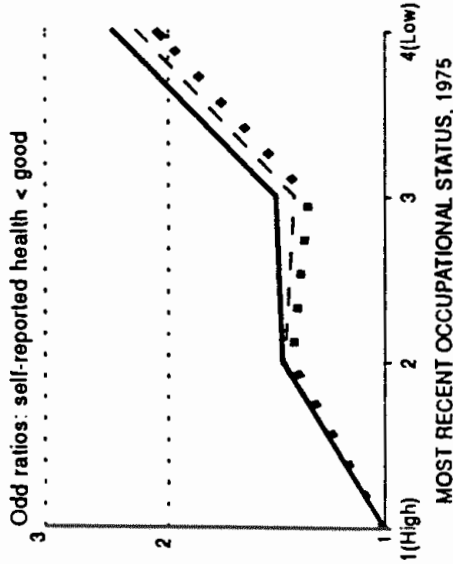
A Whitehall II

Men



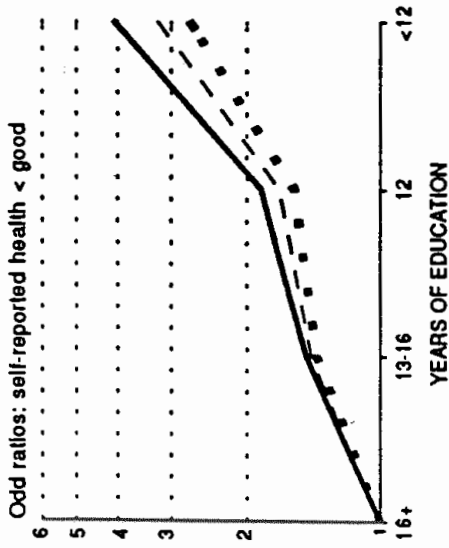
B WLS

Men



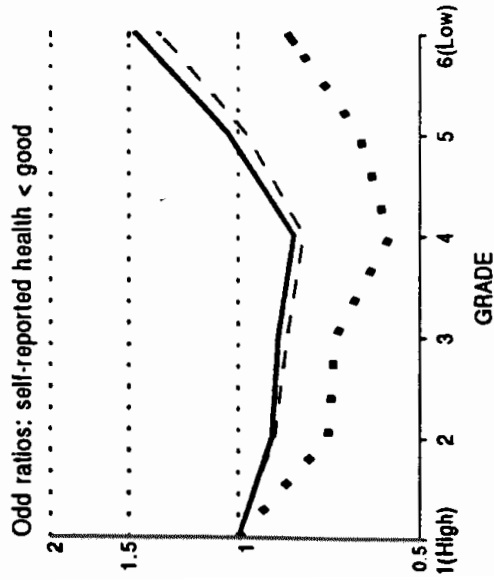
C NSFH

Men



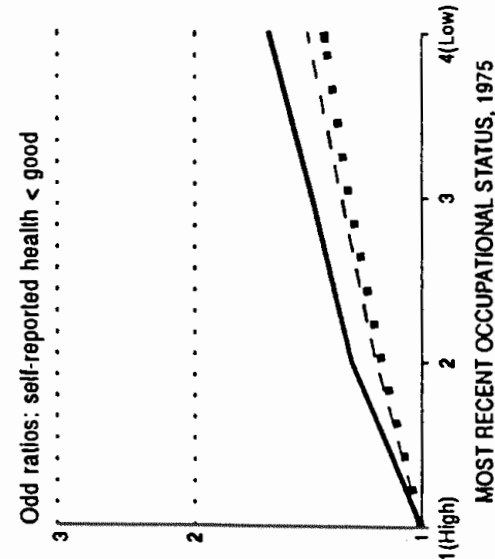
A Whitehall II

Women



B WLS

Women



C NSFH

Women

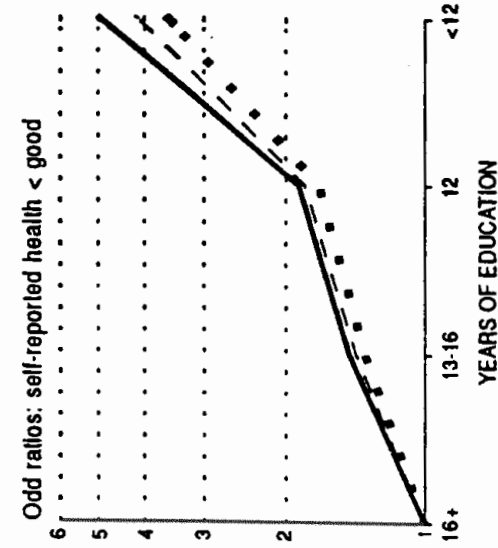
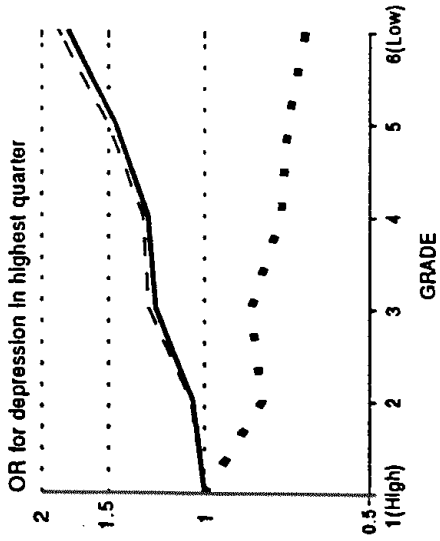


Figure 1

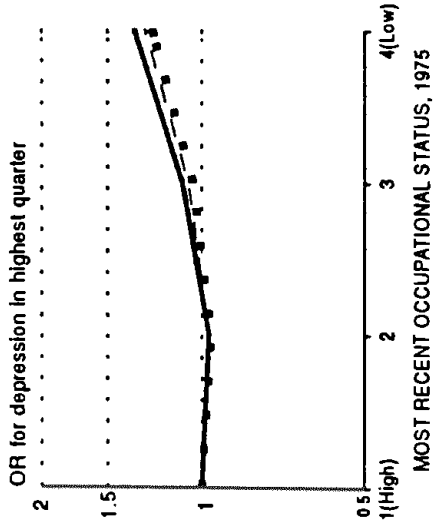
A Whitehall II

Men



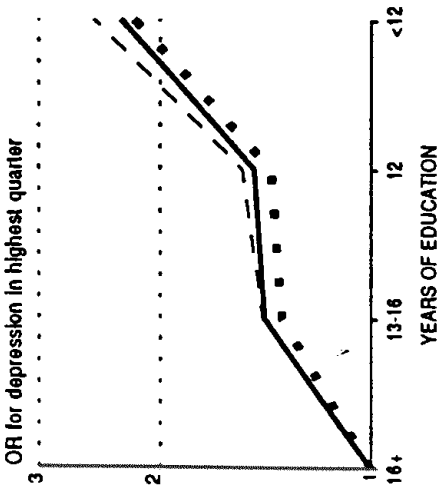
B WLS

Men



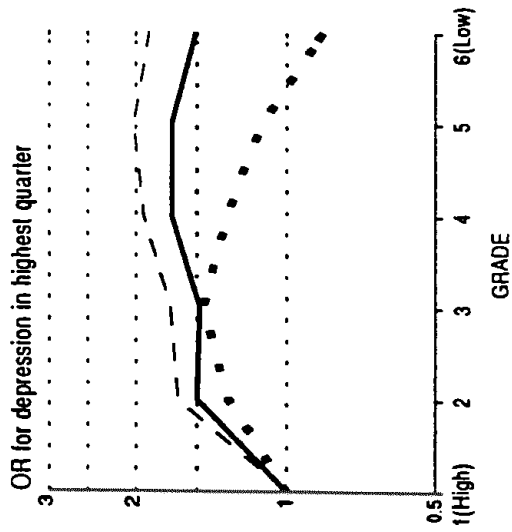
C NSFH

Men



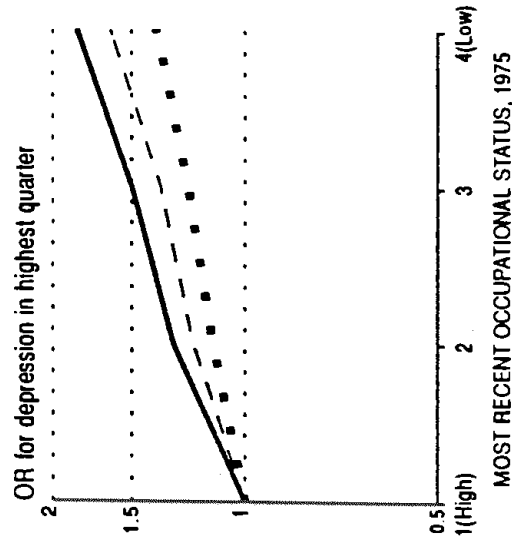
A Whitehall II

Women



B WLS

Women



C NSFH

Women

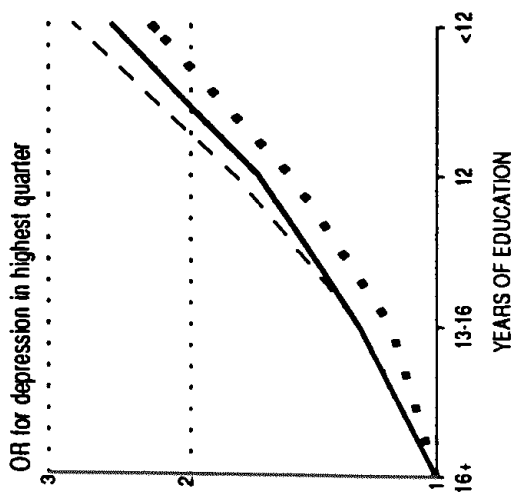
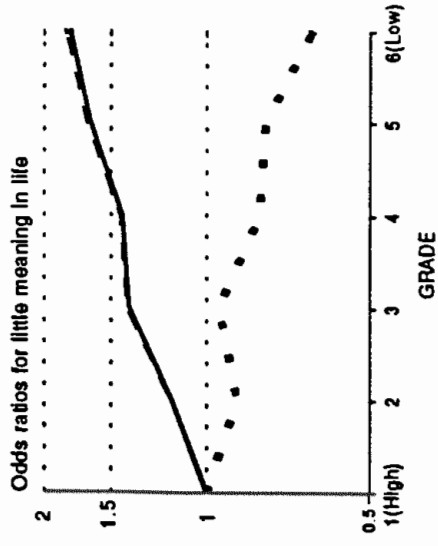


Figure 2

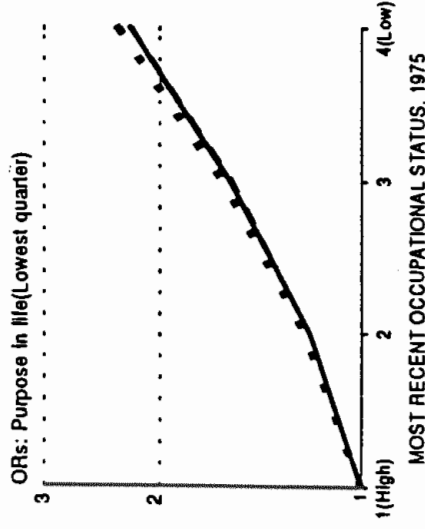
A Whitehall II

Men



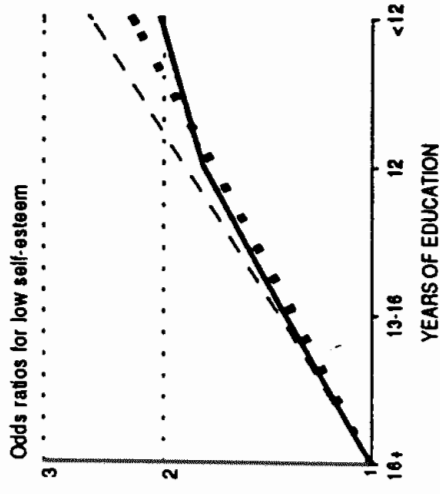
B WLS

Men



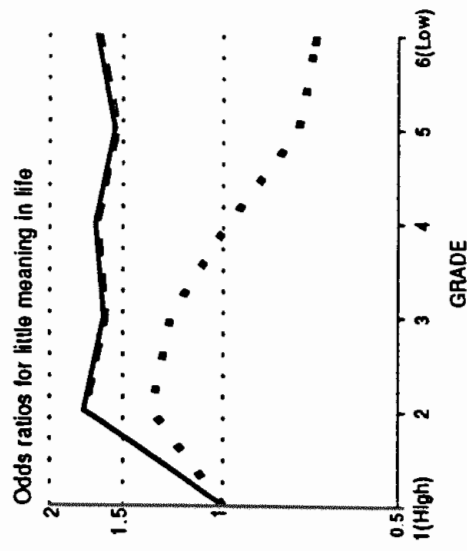
C NSFH

Men



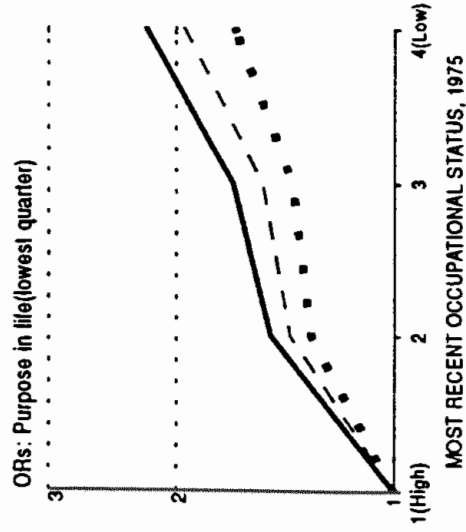
A Whitehall II

Women



B WLS

Women



C NSFH

Women

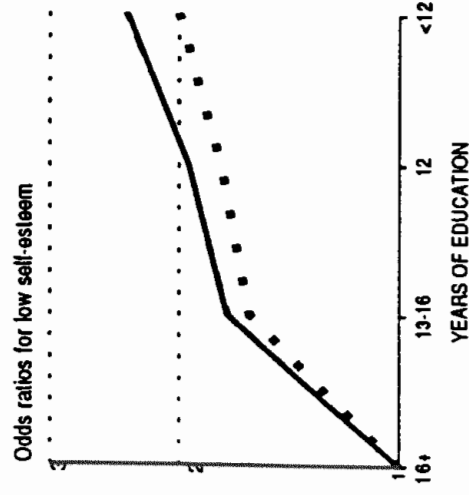
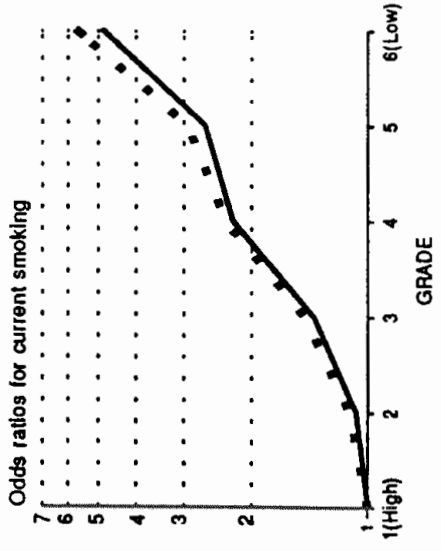


Figure 3

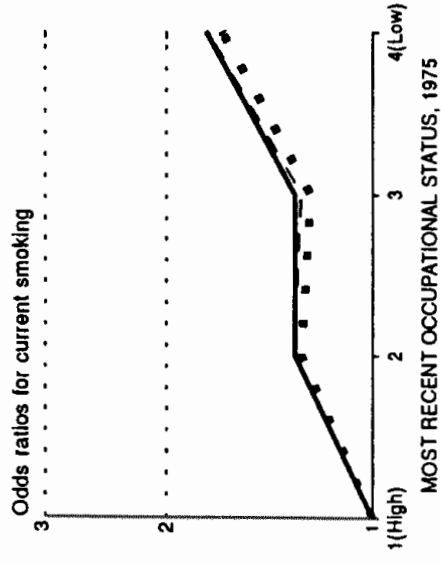
A Whitehall II

Men



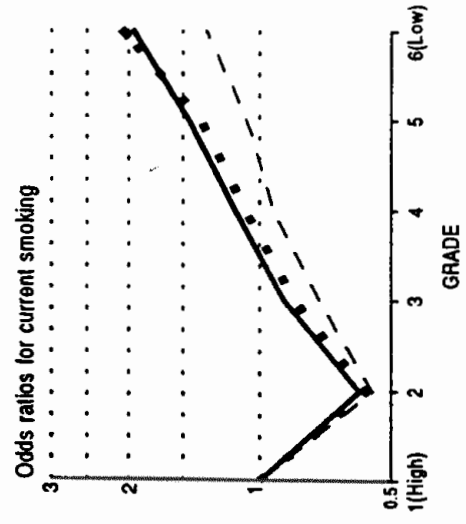
B WLS

Men



A Whitehall III

Women



B WLS

Women

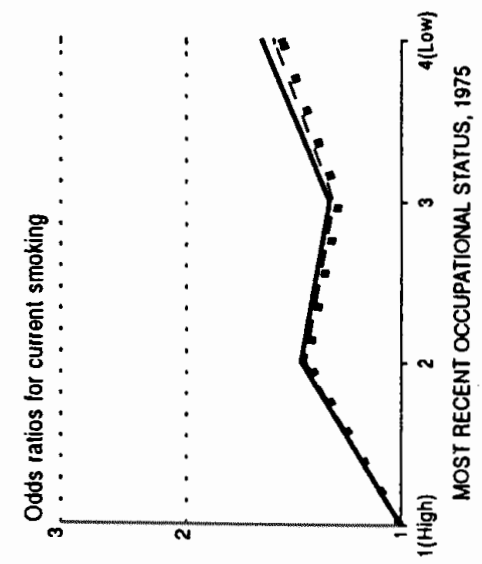


Figure 4

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