depression. Another explanation for the higher suicide rate after an abortion could be low social class, low social support, and previous life events or that abortion is chosen by women who are at higher risk for suicide because of other reasons. Increased risk for a suicide after an induced abortion can, besides indicating common risk factors for both, result from a negative effect of induced abortion on mental wellbeing. With our data, however, it was not possible to study the causality more carefully. Our data clearly show, however, that women who have experienced an abortion have an increased risk of suicide, which should be taken into account in the prevention of such deaths.

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Association of cardiovascular disease risk factors with socioeconomic position during childhood and during adulthood

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Abstract

***Objective*—To investigate strength of associations between risk factors for cardiovascular disease and socioeconomic position during childhood and adulthood.**

***Design*—Cross sectional analysis of status of cardiovascular risk factors and past and present social circumstances.**

***Subjects*—5645 male participants in the west of Scotland collaborative study, a workplace screening study.**

***Main outcome measures*—Strength of association between each risk factor for cardiovascular disease (diastolic blood pressure, serum cholesterol concentration, level of recreational physical exercise, cigarette smoking, body mass index, and FEV_1 score (forced expiratory volume in one second as percentage of expected value) and social class during childhood (based on father's main occupation) and adulthood (based on own occupation at time of screening).**

***Results*—All the measured risk factors were significantly associated with both father's and own social class ($P<0.05$), apart from exercise and smoking (not significantly associated with father's social class) and body mass index (not significantly associated with own social class). For all risk factors except body mass index, the regression coefficient of own social class was larger than the regression coefficient of father's social class. The difference between the coefficients was significant for serum cholesterol concentration, cigarette smoking, body mass index, and FEV_1 score (all $P<0.001$).**

***Conclusions*—Subjects' status for behavioural risk factors (exercise and smoking) was associated primarily with current socioeconomic circumstances, while status for physiological risk factors (serum cholesterol, blood pressure, body mass index, and FEV_1) was associated to varying extents with both past and present socioeconomic circumstances.**

Introduction

The current debate about the origins of cardiovascular disease in early life has important implications for health promotion and preventing cardiovascular disease. If risk of disease in adulthood is substantially influenced by either biological programming in utero[1 2] or circumstances in early life[3-5] then what remains for attempts to encourage healthy lifestyles in adults? Should such attempts be abandoned or amended in line with more recent information?

Previous studies of the relation between childhood social circumstances and adult cardiovascular disease provide uncertain guidance because each study, from this point of view, is limited in some respect: the number of risk factors for cardiovascular disease included in the analyses is restricted,[6-9] social circumstances during adulthood are excluded,[10 11] or social circumstances during childhood are so different from those in most industrialised countries that generalisation is difficult.[12 13]

We addressed these issues in an industrial population and compared the influence of childhood and adult social circumstances on six widely accepted risk factors for cardiovascular disease. Our intention was to estimate the strength of the associations between these risk factors and adult socioeconomic circumstances, after childhood circumstances had been taken into account (and vice versa), in order to determine where

and when health promotion might be directed most effectively.

Methods

SUBJECTS

Our subjects were part of a cohort of employed people recruited between 1970 and 1973 from 27 workplaces in the west of Scotland.[14-16] The factories and offices were selected with the intention of adequately representing all types and levels of employment. Employees were invited to attend, and the great majority were under the then usual retirement ages of 64 years for men and 60 years for women. Response rates were available only for the workplaces from which 87% of the sample was recruited; for these sites, 70% of those invited completed a questionnaire and attended a physical examination. The achieved sample size was 6022 men and 1006 women.

Our study is based on the 5645 men who were aged 35-64 at the time of examination and who supplied information about both their father's main occupation and their own current occupation. We excluded men below the age of 35 in order to avoid the frequent job changes that characterise the early years of many employees.[17] Those aged 65 or over were also excluded because they constituted such a small proportion of this cohort. We confined our analyses to men because of the relatively small number of women and because intergenerational social mobility among women differs from that among men.[18]

CARDIOVASCULAR RISK FACTORS

For our analysis, we selected six cardiovascular risk factors that were of greatest concern to doctors: diastolic blood pressure, serum cholesterol concentration, recreational physical exercise, cigarette smoking, body mass index, and forced expiratory volume in one second (FEV_1).[19] Diet is the most serious omission, but, unfortunately, adequate dietary data were not collected. The physical examination included measurement of blood pressure (seated diastolic pressure recorded at disappearance of Korotkoff phase V), height, weight and FEV_1 (Garthur Vitalograph) and blood samples were taken for measurement of serum cholesterol concentration. The questionnaire collected information about cigarette smoking and physical exercise outside work; replies were checked with respondents by the clerical team. Recreational exercise was not limited to strenuous exercise and included activities such as walking, gardening, and golf.

The results of spirometry are presented as the FEV_1 score: the ratio of the measured FEV_1 to the expected FEV_1 multiplied by 100. The expected FEV_1 was obtained from linear regressions of age and height:

$$\text{Expected } FEV_1 = (-2.7806 + 0.0433 \times \text{height}) - (0.0306 \times \text{age})$$

where FEV_1 is in litres, height in centimetres, and age in years. The coefficients were derived from a healthy subset of the study population who had never smoked and answered no to questions on the presence of phlegm, breathlessness, wheezy or whistling chest, and weather affecting breathing. The FEV_1 score represents the percentage of this standard.

SOCIOECONOMIC CIRCUMSTANCES

We used occupational social class to indicate socioeconomic circumstances during childhood and adulthood. The questionnaire collected information on the subjects' present occupation and their father's main occupation. These occupations were coded to the registrar general's classification by means of the *Classification of Occupations 1966*,[20] the version contemporaneous with the study. As social class contains several distinct dimensions (such as material conditions, education, and lifestyles), it was not possible to identify which dimensions were particularly associated with cardiovascular risk factors.

We analysed social mobility conventionally[17 18 21 22] in terms of movement between father's social class and own social class. Use of all six of the registrar general's classes produced very small numbers in some of the categories: nobody moved from father's social class I to own social class V, and only one subject moved from father's social class I to own social class IV; at the other extreme only four subjects moved from father's social class V to own social class I. In consequence we aggregated social classes I with II and classes IV with V. These aggregations have some theoretical justification: a social class I professional making a career move to a social class II managerial position is likely to see the move as promotion rather than downward social mobility, and some moves between unskilled and semi-skilled manual occupations can have similarly ambiguous meanings. The separate identification of social class III non-manual is sometimes questionable in studies of male subjects, because of the class's comparatively small size and atypical nature.[23] It is justified in the present analyses, however, because this workplace study contained many male office staff—18% of the male subjects were assigned to social class III non-manual.

STATISTICAL ANALYSIS

We present the variation in cardiovascular risk factors in terms of subjects' adult social class. We further analysed these distributions by social mobility, based on father's social class (origin) and own social class (destination). We also present the results of regression analyses used to test the relative strength of the associations between father's and own social classes and the cardiovascular risk factors. We constructed a separate regression model, including terms for age, father's social class, and own social class, for each risk factor. Logistic regression was used for cigarette smoking because of the categorical nature of this variable. We compared regression coefficients with a standardised normal deviate test.[24]

Results

SOCIAL CLASS

Table 1 shows the variation in risk factors according to own social class and father's social class. All the risk factors except body mass index showed a graded relation with own social class: mean diastolic blood pressure and the percentage of current smokers increased from social classes I and II to classes IV and V; mean cholesterol concentration, mean hours of recreational exercise per week, and mean FEV_1 scores were graded in the opposite direction. All risk factors, including body mass index, showed a graded relation with father's social class: body mass index increased from social classes I and II to classes IV and V, while the other five risk factors varied in the same direction as they did with own social class.

SOCIAL MOBILITY

Table 2 shows the social mobility between father's social class and own social class. Net upward mobility is indicated by comparing the row and column totals. The aggregation of social classes ensured adequate numbers in all the cells, but the comparative rarity of some forms of social mobility is still apparent; for example, only 4% of the subjects in social classes IV and V and 3% of those in social class III manual had fathers who were in social classes I and II.

Table 3 shows the mean values of the risk factors for each category of social mobility. For each risk factor, the socially stable subjects (found on the table's diagonal)

Table 1—*Mean (SE) values of risk factors for cardiovascular disease among 5645 working men aged 35-64 by own social class and by father's social class (values adjusted for age)*

	Diastolic blood pressure (mm Hg) (n = 5641)	Serum cholesterol concentration (mmol/l) (n = 5605)	Recreational exercise (hours/week) (n = 5630)	Current cigarette smokers (%) (n = 5643)	Mean body mass index (kg/m²)	Mean FEV_1 score (%) (n = 5641)
Own social class						
I and II	82.9 (0.24)	6.18 (0.02)	6.3 (0.13)	43.6 (1.2)	25.1 (0.07)	99 (0.46)
III non-manual	83.3 (0.33)	6.0 (0.03)	6.7 (0.18)	54.8 (1.6)	25.0 (0.10)	96 (0.62)
III manual	84.9 (0.26)	5.69 (0.03)	5.9 (0.14)	61.8 (1.2)	25.3 (0.08)	91 (0.49)
IV and V	84.4 (0.30)	5.59 (0.03)	5.5 (0.16)	65.4 (1.4)	25.1 (0.09)	90 (0.58)
Father's social class						
I and II	82.5 (0.37)	6.18 (0.04)	6.5 (0.20)	48.4 (1.8)	25.0 (0.11)	99 (0.71)
III non-manual	83.1 (0.43)	6.05 (0.04)	6.5 (0.23)	47.8 (2.1)	24.7 (0.13)	97 (0.83)
III manual	84.1 (0.21)	5.85 (0.02)	6.0 (0.11)	56.5 (1.0)	25.2 (0.06)	94 (0.40)
IV and V	84.3 (0.24)	5.75 (0.02)	5.8 (0.13)	58.9 (1.2)	25.4 (0.07)	92 (0.47)

showed stepwise or nearly stepwise gradients that were similar to those in table 1. There was a general tendency for the risk factor values to show gradients by both father's social class (rows) and own social class (columns). This tendency seemed stronger for some risk factors (such as diastolic blood pressure and serum cholesterol concentration) than for others (such as percentage of current smokers and recreational exercise).

Table 2—*Social mobility among 5645 working men: father's social class by own social class. Values are numbers (percentages for rows) (percentages for columns)*

	Own social class				
Father's social class	**I and II**	**III non-manual**	**III manual**	**IV and V**	**Total**
I and II	573 (72.8) (32.1)	114 (14.5) (11.2)	52 (6.6) (3.2)	48 (6.1) (4.1)	797 (13.9)
III non-manual	320 (55.0) (17.4)	150 (25.8) (14.8)	72 (12.4) (4.4)	40 (6.9) (3.4)	582 (10.3)
III manual	673 (27.4) (36.6)	474 (19.3) (46.7)	816 (33.2) (50.3)	494 (20.1) (42.2)	2457 (43.5)
IV and V	271 (14.9) (14.8)	276 (15.2) (27.2)	682 (37.5) (42.0)	590 (32.4) (50.3)	1819 (32.2)
Total	1837 (32.5)	1014 (18.0)	1622 (28.7)	1172 (20.8)	5645

Table 3—*Mean values of risk factors for cardiovascular disease among 5645 working men by own social class and father's social class (values adjusted for age)*

	Own social class			
Father's social class	**I and II**	**III non-manual**	**III manual**	**IV and V**
Diastolic blood pressure (mm Hg)				
I and II	82.2	82.3	85.7	83.5
III non-manual	83.1	82.1	85.9	82.0
III manual	83.3	83.4	84.7	85.0
IV and V	83.3	84.3	84.9	84.2
Serum cholesterol concentration (mmol/l)				
I and II	6.30	6.09	5.72	5.50
III non-manual	6.20	6.05	5.74	5.49
III manual	6.13	6.04	5.68	5.54
IV and V	6.05	5.88	5.69	5.64
Recreational exercise (hours/week)				
I and II	6.5	7.0	6.5	5.2
III non-manual	6.4	7.0	7.1	5.2
III manual	6.3	6.6	5.9	5.4
IV and V	5.5	6.7	5.7	5.5
Current cigarette smokers (%)				
I and II	45.5	53.2	58.1	53.6
III non-manual	38.5	52.6	58.6	68.5
III manual	42.3	58.6	61.3	66.4
IV and V	47.3	48.9	62.9	64.4
Body mass index (kg/m²)				
I and II	24.9	24.9	25.4	25.5
III non-manual	24.8	24.3	25.2	24.4
III manual	25.3	25.1	25.3	24.9
IV and V	25.6	25.4	25.4	25.3
FEV_1 score (%)				
I and II	100	98	95	92
III non-manual	100	96	91	90
III manual	98	95	91	91
IV and V	98	95	90	89

REGRESSION ANALYSES

Table 4 shows the results of the regression analyses. Diastolic blood pressure, serum cholesterol concentration, and FEV_1 score were all associated with both father's social class and own social class at conventional levels of statistical significance. For these three risk factors, the regression coefficient of own social class was larger than that of father's class; the difference between the coefficients of own and father's class was significant for serum cholesterol concentration ($P<0.001$) and FEV_1 score ($P<0.001$) but not for diastolic blood pressure ($P = 0.5$).

Body mass index was significantly related to father's social class but not to own social class. Conversely, recreational exercise and cigarette smoking were significantly associated with own social class but not father's class. The difference between the regression coefficients of each of these three risk factors was significant for cigarette smoking ($P<0.001$) and body mass index ($P<0.001$), but not for recreational exercise ($P = 0.5$).

Finally, we examined the possibility of interaction among the risk factors. Possible interaction between smoking and FEV_1 score was considered most plausible, so we investigated the relation between social class and FEV_1 among the subjects who had never smoked. Table 4 shows that the FEV_1 score of those who had never smoked was associated with own social class ($P = 0.001$) but not with father's social class ($P = 0.2$).

Discussion

INTERPRETATION OF RESULTS

We have described the distribution of six risk factors for cardiovascular disease among male participants in the west of Scotland collaborative study. The cross sectional distributions, based on the men's own social class during adulthood, were broadly consistent with those found by comparable studies in Scotland,[25 26] Britain,[27] and southeast England.[28 29] Mean values of diastolic blood pressure, hours of recreational physical exercise, percentage of current cigarette smokers, and FEV_1 score were graded by social class in the same direction as risk of coronary heart disease. Mean cholesterol concentrations, in contrast, were highest in social classes I and II and lowest in social classes IV and V and so were graded in the opposite direction to coronary heart disease risk (these data were collected in the early 1970s, and there is some suggestion in the data of the Whitehall II study,[29] collected in 1985-88, that this "counter gradient" for serum cholesterol may be disappearing).

Table 4—*Regression analysis (including age) of risk factors for cardiovascular disease on father's social class and own social class included simultaneously*

Risk factor	Father's social class		Own social class		
	Coefficient (95% confidence interval)*	P value	Coefficient (95% confidence interval)*	P value	Test for difference
Diastolic blood pressure (mm Hg)	0.37 (0.06 to 0.67)	0.018	0.50 (0.24 to 0.77)	0.0002	P = 0.5
Serum cholesterol concentration (mmol/l)	−0.05 (−0.08 to −0.02)	0.001	−0.19 (−0.22 to −0.17)	<0.0001	P<0.0001
Recreational exercise (hours/week)	−0.16 (−0.32 to 0.01)	0.06	−0.23 (−0.37 to −0.08)	0.002	P = 0.5
Current smokers (%)†	1.01 (0.95 to 1.07)	0.68	1.36 (1.29 to 1.43)	<0.0001	P<0.0001
Body mass index (kg/m^2)	0.20 (0.11 to 0.29)	<0.0001	−0.05 (−0.12 to 0.03)	0.23	P<0.0001
FEV_1 score (%):	−1.06 (−1.64 to −0.48)	0.0003	−2.29 (−3.43 to −2.42)	<0.0001	P<0.0001
Among subjects who never smoked	−0.92 (−2.28 to 0.45)	0.19	−2.35 (−3.55 to −1.16)	0.0001	P = 0.12

*Change associated with a unit change in the risk factor.
†Logistic regression for smoking: odds ratio reported.

The west of Scotland collaborative study also held information on the subjects' father's social class, which allowed a longitudinal dimension to be added to our cross sectional analyses. The resulting social mobility between father's and own social class were broadly consistent with contemporaneous studies of social mobility in Scotland[30] and in England and Wales.[18] Our results on the distribution of risk factors in relation to social mobility can therefore probably be generalised to the wider British population.

These results show that the risk factors for cardiovascular disease differed in their association with the subjects' own social class and with their father's social class. Cigarette smoking and level of recreational physical exercise, which are the more explicitly behavioural risk factors, were associated with own social class but not with father's social class, although in the latter case the difference between the regression coefficients was not significant. With the exception of body mass index, the essentially physiological risk factors were associated with both father's and own social class; the association with own social class was stronger than with father's class in the case of serum cholesterol concentration and FEV_1 score, but both father's and own social class were associated with similar strength with diastolic blood pressure. Body mass index was associated only with father's social class.

These findings are unlikely to have been artefacts of the study's methodology. Potential spuriousness—due to age being independently linked to both prospects for social mobility and status of risk factors—was eliminated by including a separate term for age in the regression models. The basis on which the study sample was drawn excluded unemployed men, but, while the resulting "healthy worker effect"[31] would have lowered the absolute levels of risk factors, any resultant bias is likely to have been conservative rather than having artefactually produced the results. Instead, the results are consistent with the idea that behaviour is associated primarily with current circumstances during adulthood (as indexed by own social class) while physiological status is also associated, decisively in the case of body mass index, with earlier circumstances during childhood (as indexed by father's social class).

OTHER STUDIES

The literature offers some support for our interpretation, although directly comparable studies are disappointingly few. Brunner *et al* found that adult plasma fibrinogen concentrations, a physiological risk factor for coronary heart disease that was not measured in our study, were independently related to both father's social class and own socioeconomic position during adulthood.[9] Arnesen and Forsdahl found that living conditions during childhood were related to adult serum cholesterol concentrations and smoking status but not to diastolic blood pressure or body mass index.[11] However, they did not investigate adult social circumstances and used a subjective measure of childhood living conditions ("What were the economic conditions in your family during childhood?"). Braddon *et al* found that adult obesity was associated with the socioeconomic circumstances and educational achievements of the family of origin and that socially mobile men did not tend to show the level of obesity of the class they joined[32]; these findings are consistent with those of Power and Moynihan.[33]

Notkola and colleagues examined serum cholesterol concentrations, systolic blood pressure, and smoking in adulthood and found that none was differentiated according to childhood socioeconomic position.[12,13] However, their study population had a childhood that was predominantly rural, which makes questionable any attempt to apply the study's results to Britain. Other studies of childhood circumstances and adult cardiovascular disease have either ignored risk factor status[7] or simply controlled for risk factor status in the regression analyses.[6,8]

CONCLUSIONS

Our findings and what evidence is available from the literature suggest that attempts to improve cardiovascular health by changing the current status of risk factors has not been made obsolete by new knowledge about the early origins of this disease, although it is possible that such attempts are least likely to be successful with regard to body mass index. These conclusions

Key messages

- Cardiovascular disease in adulthood can have its origins in early life, which raises questions about doctors' attempts to modify risk factors for cardiovascular disease in adults
- We examined associations between six such risk factors and working men's social conditions during childhood and adulthood; the risk factors varied in the strength of their associations with childhood and adult conditions
- Behavioural risk factors (cigarette smoking and recreational physical exercise) were more strongly associated with adult circumstances
- Physiological risk factors (diastolic blood pressure, serum cholesterol concentration, FEV_1 score, and body mass index) were associated to varying degrees with both childhood and adult circumstances except for body mass index, which seemed unrelated to the latter
- The authors conclude that, as most of the main risk factors varied with adult social conditions, it is likely that they can be modified at this time

need to be qualified strongly by recognising that our cross sectional data preclude any analysis of changes in risk factors. Our conclusions are suggestive and need to be tested with longitudinal data; however, we are not aware of any longitudinal data sets that contain measures of the relevant risk factors at different stages of life, including childhood.

The data of the west of Scotland collaborative study were collected in the early 1970s. It would be useful to establish whether risk factors for cardiovascular disease are still related in the same way to father's and own social class. Although coronary heart disease is less prevalent in women than in men, any study of the current situation should include women.

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A randomised controlled trial of psychological debriefing for victims of road traffic accidents

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Psychiatric problems are common after major or minor road accidents. [1-4] Mayou *et al* found that one fifth of victims developed an acute stress reaction and one quarter displayed psychiatric problems within the first year.[1] Long term psychiatric problems were mainly mood disorder (10%), phobic travel anxiety (20%), and post-traumatic stress disorder (11%). Interest has been stimulated in preventive interventions, especially routine psychological "debriefing." Although widely used after trauma, no randomised controlled trials of debriefing have been reported, and debriefing may sometimes increase distress.[5] This randomised controlled study aimed to test whether a single debriefing could reduce post-traumatic psychopathology in road accident victims.

Subjects, methods, and results

The subjects were victims of road accidents admitted consecutively to the John Radcliffe Hospital. We excluded those who could not remember the accident and those with no psychological symptoms, who are at low risk of later problems. Others were excluded because they had been discharged or were not available when the researcher came to visit them. Eight people refused to participate. Those who agreed were allocated randomly to intervention or control group using a random number table. All subjects were screened initially using a semistructured interview based on previous research and two standard self report questionnaires, the impact of events scale for specific post-traumatic symptoms and the brief symptom inventory, which generates a global emotional distress score.

Interventions were undertaken within 24-48 hours of the accident in most cases; they comprised an hour's debriefing combining a review of the traumatic experience, encouragement of emotional expression, and promotion of cognitive processing of the experience. Advice was provided about common emotional reactions, the value of talking about the experience, and early graded return to normal road travel. All experimental subjects received an information leaflet consolidating this advice and encouraging the support of family and friends. Both groups were reassessed by interview and the self report questionnaires at four months.

The intervention group (n = 54) had a higher mean injury severity score and longer hospital stay than the controls (n = 52), but there was no significant difference in baseline post-traumatic or other psychiatric symptoms. It proved difficult to interview patients