Is socioeconomic position related to the prevalence of metabolic syndrome? Influence of social class across the life-course in a population-based study of older men

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Abstract

OBJECTIVE: To examine whether adult and childhood social class are related to metabolic syndrome (MetS) in later life, independent of adult behavioural factors.

RESEARCH DESIGN AND METHODS: A population-based cross-sectional study comprised 3134 men aged 60-79.

RESULTS: Adult and childhood social class were both inversely related to MetS. Mutual adjustment attenuated the relation of childhood social class; that of adult social class was little affected. However, the relation of adult social class was markedly attenuated by adjustment for smoking, physical activity, alcohol consumption. High waist circumference was independently associated with adult social class.

CONCLUSIONS: The adult social class-MetS association was largely explained by behavioural factors. Central adiposity, a MetS component, was associated with adult social class. Focussing on health behaviours and obesity, rather than specific efforts to reduce social inequalities in MetS, is likely to be particularly important in reducing social inequalities in coronary disease.

Introduction

There has been increasing interest in the relationship between socioeconomic position and metabolic syndrome, which has been postulated to form a direct pathway linking adverse social conditions and coronary heart disease (CHD), possibly working through neuroendocrine mechanisms causing obesity, dyslipidemia, hypertension and insulin resistance.(1,2) However, the association between socioeconomic position and metabolic syndrome has not been completely consistent between studies,(1,3,4) and the relationship is possibly confounded by behavioural factors, which are strongly related to metabolic syndrome, and to socioeconomic position.(3-6) Additionally, few studies have explored the independent relationships of adult and early life social circumstances with metabolic syndrome.(4,7,8) We have, therefore, examined whether adult and childhood social class are associated with metabolic syndrome in older men (60-79 years) independent of adult behavioural factors.

Research design and methods

The British Regional Heart Study is a population-based cohort comprising men initially recruited in 1978-80 when aged 40-59 from 24 British towns.(5) 99% of the cohort has been followed-up. In 1998-2000 all surviving subjects, now aged 60-79, were invited to a physical examination and provided fasting blood samples, used to measure metabolic parameters.(5) 4252 men (77%) attended the examination and 4094 men (74%) had at least one measurement of biological factors.

Adult socioeconomic position was measured as social class based on longest-held occupation recorded at study entry (aged 40-59), using the Registrar General's classification of occupations; I (professionals, e.g. physicians, engineers), II (managerial, e.g. teachers, sales managers), IIInon-manual (semi-skilled non-manual, e.g. clerks, shop assistants), IIImanual (semi-skilled manual, e.g. bricklayers), IV (partly skilled, e.g. postmen) and V (unskilled, e.g. porters, general labourers). Childhood social class was based on father's longest-held occupation, collected in a questionnaire in 1992 and classified with Registrar General's Classification of Occupations 1931 (close to the mid-year of birth of study participants) into six social classes from I to V.(9)

Questionnaires in 1998-2000 collected information on cigarette smoking, alcohol intake and physical activity.(5) Metabolic syndrome, defined using National Cholesterol Education Programme/Adult Treatment Panel III criteria, included three or more of: 1) fasting plasma glucose ≥110 mg/dL (6.1 mmol/L), 2) serum triglycerides ≥150 mg/dL (1.7 mmol/L), 3) serum HDL-cholesterol <40 mg/dL (1.04 mmol/L), 4) blood pressure ≥130/85 mmHg or on anti-hypertensive treatment, 5) waist circumference >102 cm.(10) Insulin resistance was estimated using the homeostasis model assessment (HOMA) as the product of fasting glucose (mmol/l) and insulin (μU/ml) divided by the constant 22.5.(11)

Men with prevalent diabetes (doctor-diagnosed diabetes or fasting glucose of ≥7 mmol per litre; n=385), or men whose own (n=112, 3%) or father's (n=81, 2%) longest-held occupation was in the armed forces were excluded from the analysis. Multiple logistic regression was carried out using SAS version 9.1.

Results

Among 3134 men aged 60-79 without prevalent diabetes, 817 men (28%) had metabolic syndrome. Both adult and childhood social class showed an inverse gradient in metabolic syndrome, with lower social classes having greater odds of metabolic syndrome (see table). When mutually adjusted, the association of childhood social class with metabolic syndrome was diminished, while the association of adult social class was little altered. However, when adjusted for adult behavioural factors, the association of adult social class was markedly attenuated. Manual social class both in childhood and adulthood was associated with the highest odds of metabolic syndrome compared with non-manual childhood and adult social class; this was appreciably reduced when adjusted for adult behavioural factors (see table). There was no evidence that the relation of childhood social class with metabolic syndrome was different in adult non-manual or manual social classes (P for interaction 0.17).

[Table]

Of the individual components of the metabolic syndrome, only high waist circumference was associated with adult social class independent of childhood social class and adult behavioural factors (adult social class V vs. I OR 1.71, 95%CI 1.02-2.88; P for trend=0.0006). Childhood social class was not independently associated with the individual components. The association of adult social class with HOMA (P for trend 0.02) was attenuated when adjusted for adult behavioural factors (P for trend 0.17). There was no evidence of a relationship between childhood social class and insulin resistance.

Conclusions

Although the metabolic syndrome has been proposed as a link between low socioeconomic position and CHD,(2) we did not find an independent association between social class (either in adulthood or childhood) and metabolic syndrome in older British men. Adult behavioural factors (physical activity, smoking, alcohol consumption) were responsible for the relationship between adult social class and metabolic syndrome. There was some increased risk of metabolic syndrome in men of manual social class both in childhood and adulthood which was to a large extent explained by adult behavioural factors. There was no evidence of an independent association of adult/childhood social class with insulin resistance. Adult social class was strongly related to high waist circumference, a component of the metabolic syndrome. It is therefore likely that the role of metabolic syndrome in social inequalities in CHD is largely due to behavioural factors and central adiposity/obesity, which are important coronary risk factors in their own right.(12) Focussing efforts on understanding and reducing levels of behavioural factors and obesity could be particularly important in reducing social inequalities in CHD.

Although these findings are consistent with some previous studies, other studies have reported an independent association between social class (adult and childhood) and metabolic syndrome, and a stronger relationship of metabolic syndrome with adult risk factors than early life factors.(1,3,4,7) Since childhood social class is related to adult socioeconomic position and behavioural factors,(13) the effect of childhood social class could well have been mediated through adult social class and behavioural factors. However, it was not possible to fully disentangle this issue in our study.

This paper indicates the lack of an independent association between socioeconomic position and metabolic syndrome in a socioeconomically representative sample of British men. The results are, however, limited to older men and are not directly generalisable to women, although other studies suggest a stronger association between social class and metabolic syndrome in women than men.(14,15)

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Table: Prevalence and odds ratios for metabolic syndrome in 3134 non-diabetic men aged 60-79 according to adult and childhood social class

	Metabolic syndrome n (%)	**Age-adjusted odds ratio (95%CI)**	**Odds ratio (95%CI) adjusted for age and social class***	**Odds ratio (95%CI) adjusted for age and adult behavioural factors†**
Adult social class				
I (n=324)	70 (23)	1.00	1.00	1.00
II (n=900)	209 (24)	1.08 (0.80, 1.48)	1.06 (0.78, 1.45)	1.02 (0.74, 1.40)
III non-manual (n=339)	84 (27)	1.24 (0.86, 1.79)	1.19 (0.82, 1.73)	1.11 (0.76, 1.61)
III manual (n=1199)	348 (31)	1.47 (1.10, 1.98)	1.38 (1.02, 1.88)	1.27 (0.94, 1.73)
IV (n=280)	77 (29)	1.37 (0.94, 1.99)	1.26 (0.86, 1.86)	1.15 (0.78, 1.70)
V (n=92)	29 (33)	1.64 (0.98, 2.76)	1.50 (0.88, 2.54)	1.22 (0.71, 2.08)
P for trend		0.0005	0.008	0.06
Manual (IIImanual, IV, V) vs. non-manual (I, II, IIInon-manual)		1.33 (1.13, 1.57)	1.27 (1.07, 1.50)	1.21 (1.02, 1.43)
Childhood social class				
I (n=144)	28 (21)	1.00	1.00	1.00
II (n=480)	118 (26)	1.33 (0.84, 2.13)	1.26 (0.79, 2.01)	1.23 (0.77, 1.97)
III non-manual (n=372)	91 (26)	1.35 (0.83, 2.18)	1.27 (0.78, 2.05)	1.27 (0.78, 2.07)
III manual (n=1246)	321 (27)	1.44 (0.93, 2.22)	1.27 (0.82, 1.99)	1.28 (0.82, 1.99)
IV (n=508)	150 (32)	1.80 (1.14, 2.84)	1.55 (0.96, 2.48)	1.57 (0.99, 2.51)
V(n=384)	109 (30)	1.66 (1.03, 2.65)	1.40 (0.86, 2.28)	1.45 (0.90, 2.34)
P for trend		0.006	0.10	0.05
Manual (IIImanual, IV, V) vs. non-manual (I, II, IIInon-manual)		1.24 (1.04, 1.49)	1.13 (0.93, 1.37)	1.17 (0.97, 1.41)
Adult and childhood social class				
Childhood and adult non-manual social class (N=635)	156 (25)	1.00	-	1.00
Childhood non-manual and adult manual social class (N=230)	58 (25)	1.04 (0.73, 1.47)	-	0.94 (0.66, 1.35)
Childhood manual and adult non-manual social class (N=817)	205 (25)	1.03 (0.81, 1.31)	-	0.99 (0.78, 1.28)
Childhood manual and adult manual social class (N=1240)	391 (32)	1.41 (1.14, 1.76)	-	1.26 (1.00, 1.58)
P for trend		0.001		0.03

*Adult and childhood social class adjusted for each other; †Adult behavioural factors included smoking, physical activity and alcohol consumption