

Design Prospective general population birth cohort study with data from birth to four years, drawn from the Southampton Women's Survey. Grip strength was measured using a Jamar handgrip dynamometer at age four years. We also measured height and weight and assessed body composition (lean mass) using dual energy x-ray absorptiometry. Multiple regression was used to relate grip strength to birthweight allowing for adjustment for confounding factors.

Setting Southampton, UK.

Participants 968 children took part in a sub-study assessing body composition and had their grip strength measured at age four years. Their socio-demographic characteristics were similar to the remainder of the cohort.

Main outcome measure Grip strength in kilograms.

Results Birthweight was positively associated with grip strength, with each kilogram of birthweight being associated with a 0.5 kg increase in grip strength (95% CI 0.30 to 0.70). Grip strength was also strongly related to current body size and adjustment of the birthweight relationship for height and weight attenuated the relationship such that it became non-significant with a 1kg increase in birthweight being associated with 0.15kg (95% CI -0.05 to 0.34kg) increase in grip strength. Adjustment for absolute and percentage lean mass instead of height and weight attenuated the relationship still further such that only a 0.07kg (95% CI -0.16 to 0.30) increase in grip strength was seen in relation to a 1kg increase in birthweight.

Conclusion Birthweight is associated with muscle strength in children aged 4 years. Adjustment for current body size or lean mass explains the relationship suggesting that muscle size is on the causal pathway. Early influences on muscle growth and development appear to impact on grip strength in children as well as adults.

030

THE EFFECT OF MISSING DATA ON THE RELATIONSHIP BETWEEN LIFECOURSE SOCIO-ECONOMIC POSITION AND VERBAL COGNITIVE ABILITY AT OLDER AGES

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Objective To compare the effects of accounting for different missing data mechanisms in an investigation of the role of lifecourse socio-economic position (SEP) on later-life verbal cognitive ability.

Design Two UK prospective cohort studies.

Participants A nationally representative sample born in 1946 (NSHD) (original N=5362), and a sample of British civil servants (Whitehall II) (original N=10308).

Methods Linear regression models were used to test associations between SEP at different life stages and verbal ability. Results from complete case analysis (assuming missing completely at random) were compared with those using multiple imputation (assuming missing at random) and a Heckman selection model (assuming missing not at random) for each cohort.

Main outcome measure Verbal cognitive ability in adulthood; the National Adult Reading Test at age 53 years (NSHD), and the Mill Hill Test at ages 55–79 years (Whitehall II).

Results NSHD: Educational qualifications and head of household occupational SEP at age 53 were significantly related to verbal ability using all missing data methods, after adjusting for sex and cognitive function at age 8. The effect of childhood SEP was not significant at the 5% level when using Heckman selection (regression coefficient 0.51 (95% CI -0.25 to 1.27)) but was significant for complete case analysis (regression coefficient 0.83 (95% CI 0.11 to 1.54)). Compared with complete case analysis, the coefficients for SEP were generally higher when multiple imputation was used, but the

overall conclusions remained the same. The coefficients using Heckman selection differed from those for the complete case and multiple imputation analyses, with lower coefficients for all SEP variables. Whitehall II: Educational qualifications and current occupational SEP were significantly associated with verbal ability for all missing data methods, after adjusting for age, sex, marital status, employment status (working/retired/long-term sick) and number of times the cognitive tests had been taken. The effect of childhood SEP was not significant. The coefficients were generally higher for multiple imputation than complete case analysis, whereas the Heckman selection coefficients were lower for educational qualifications and adult SEP (regression coefficient (95% CI) -4.46 (-5.12 to -3.78) for Heckman selection vs -5.15 (-5.75 to -4.55) for complete case).

Conclusion Educational qualifications and adult SEP were significant predictors of verbal ability in middle to older age, but results for childhood SEP were inconclusive. Greater differences exist between the results from different missing data methods in the older Whitehall II sample, which may be due to greater selective dropout, which is better accounted for by Heckman selection.

Socio-economic status and cardiovascular risk

031

SOCIO-ECONOMIC PATTERNING OF THE TRENDS IN CARDIOVASCULAR DISEASE RISK FACTORS IN SCOTLAND: SCOTTISH HEALTH SURVEYS 1995 TO 2008

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Background In Scotland, as in other countries, cardiovascular disease (CVD) mortality has substantially declined over time. However, this decline may be slowing among younger groups and there are still large inequalities in mortality between socio-economic groups.

Objectives To examine secular changes in the prevalence of known CVD risk factors in the Scottish population according to socio-economic position.

Design Representative data on health and health-related behaviours from the Scottish Health Surveys, collected by stratified and clustered probability sampling.

Participants Data are available from four surveys: 1995, 1998, 2003 and 2008 (6190, 6656, 5497 and 4202 respondents respectively aged 25–64 years).

Main outcome measures Prevalence of cigarette smoking, excess alcohol consumption (men >21, women >14 units/week), hypertension (self-reported), diabetes (self-reported) and obesity (measured BMI ≥ 30 kg/m²).

Methods Prevalences, adjusted for survey weights, and stratified by gender and by gender/age were determined according to the individual's social class (Registrar General's) and educational level (highest qualification), standardised to the European standard population. Time-trends and trends across socio-economic categories were assessed using linear regression. The slope index of inequality (SII) was calculated for each risk factor in every survey.

Results In 1995 the prevalence of smoking among professionals was 14.1% (95% CI 9.5 to 18.8%) compared to unskilled workers 51.0% (46.1 to 55.8%) with SII of 39.0. By 2008 the SII for smoking had decreased slightly to 35.7, with decreased prevalence in all social classes, except in the unskilled. Self-reported hypertension increased moderately within most educational levels; in men the corresponding SII changed little between the first and last survey (8.8 and 8.2 respectively) while for women it increased from 4.2 to 12.1. Diabetes prevalence increased in all educational categories. By 2008, the

prevalence was 5.8% (3.9–7.7%) among all those with no qualifications and the SII had increased from 1.0, in 1995, to 3.9; (from 1.8 to 5.1 among women). The prevalence of obesity increased across the surveys with minimal change in the inequality gap. among those with no qualifications the prevalence increased from 23.3% (21.2–25.3%) at baseline to 31.2% (26.5–35.8%) in 2008. In the corresponding years the SII for obesity had increased from 10.7 to 13.0. Difficulties in reporting alcohol consumption trends arise from changes in recording practices between surveys; approaches will be presented.

Conclusions Individuals of lower socio-economic status continue to carry the heaviest burden of CVD risk factors. There has been little, if no reduction in the inequality gap over time; indeed for some factors it may be growing.

032 **RELATIVE IMPORTANCE OF SMOKING, PHYSICAL ACTIVITY AND SCREEN-BASED ENTERTAINMENT IN EXPLAINING SOCIO-ECONOMIC INEQUALITIES IN CARDIOVASCULAR DISEASE RISK**

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Objective To assess the extent to which smoking, moderate-to-vigorous physical activity (MVPA), and screen-based entertainment (SBE) explain the association between socio-economic position (SEP) and CVD risk.

Design Cross-sectional health examination survey linked to mortality data.

Setting The Scottish Health Survey 2003 is a survey of a random sample of the general population living in private households in Scotland.

Participants The cross-sectional component of this study included 2782 adults aged 16 and over who had complete information on all socio-economic and clinical measures used to calculate the SEP score and the cardio-metabolic risk score. The longitudinal component of this study considered 4621 respondents, aged 35 and over who consented to having their records linked to National Health Service administrative data.

Main outcome measures We calculated the percentage of the association between lower SEP and CVD risk that smoking, MVPA, and SBE explain in two ways: a) cross-sectionally using a cardio-metabolic risk score (based on total cholesterol, HDL cholesterol, HbA1c, C-reactive protein, BMI, waist, hypertension) dichotomized as three or more / less than three risk factors as the main outcome, and b) longitudinally with CVD (fatal/non-fatal) events as the main outcome. The main exposure variable in both sets of analyses was a composite SEP score (based on social class, income, and education). A total of 179 incident cardiovascular events including deaths, which occurred over 19864 person years, an average of 4.3 years, was used in the analysis.

Results In both sets of analyses, SBE explained a larger percentage of the association between SEP and CVD risk than either smoking or MVPA. In the cross-sectional analysis, SBE accounted for 30.0% of the association between lowest SEP and having a cardio-metabolic risk score of three or more, followed by MVPA (16.4%) and smoking (10.9%). A similar pattern emerged from the longitudinal analysis, where SBE emerged as the largest contributor, accounting for 30.4%, to explaining the association between lowest SEP and increased risk of having a CVD event. Smoking explained the next highest percentage (26.7%) and MVPA the least (14.6%). The fully adjusted model with all three variables explained 52.5% of the relationship.

Conclusion Since SBE explains a larger proportion of the association between SEP and CVD risk than smoking or MVPA, public health policies aimed at reducing inequalities in health should include guidance on reductions of sedentary behaviour in addition to

guidance already available on smoking cessation and the promotion of physical activity.

033 **SOCIO-ECONOMIC TRENDS IN CARDIOVASCULAR RISK FACTORS IN ENGLAND, 1994–2008**

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Objective Recent large falls in Coronary Heart Disease (CHD) mortality rates have been attributed to reductions in behavioural and physiological risk factors, particularly smoking, cholesterol and high systolic blood pressure (SBP), and also to the increasingly widespread use of cardiological treatments. Such gains, however, have been partially offset by unfavourable trends in Body Mass Index (BMI), diabetes and physical inactivity, possibly exacerbating inequalities. Using data from the Health Survey for England from 1994 to 2007, we therefore examined differentials in CHD risk factors across socio-economic groups over recent years.

Methods The Health Survey for England (HSE) is an annual, nationally representative health interview and examination survey containing a core element – which includes risk factors such as smoking and BMI as well as biomarkers like blood pressure and saliva cotinine – and a regularly repeated disease module. In 1998, 2003 and 2006 the HSE focused on CHD risk factors. Socio-economic circumstance (SEC) was defined by grouped quintiles of residential deprivation. A series of regression models were used to analyse the influence of SEC and time on risk factor levels, separately for each gender. Interaction terms were used to test whether risk factor trends differed between SEC groups.

Results SEC gradients in risk factors were most pronounced for current smoking, fruit and vegetable consumption, BMI (women only) and diabetes (women aged 55–74). Recent trends present a mixed picture. Smoking and SBP declined year-on-year for most SEC groups; cholesterol levels fell significantly between 2003 and 2006; and (beneficial) physical activity and fruit and vegetable consumption increased. However, mean BMI and diabetes prevalence among older age-groups increased across all SEC groups. Despite favourable trends in major risk factors across all social groups, the inequality gap remained essentially unchanged between 1994 and 2007.

Conclusions Persistent SEC differentials in major risk factors (smoking and poor diet) highlight an important priority for more effective policies for healthy food and tobacco control. Furthermore, research is now crucial to quantify the extent to which these persistent inequalities in CHD risk factor levels might explain the substantial inequalities observed in CHD mortality.

034 **ASSOCIATION OF NEIGHBOURHOOD SOCIO-ECONOMIC STATUS AND INDIVIDUAL SOCIO-ECONOMIC STATUS WITH CARDIOVASCULAR RISK FACTORS IN AN EASTERN GERMAN POPULATION — THE CARLA STUDY 2002–2006**

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Background/objectives Socio-economic status (SES) has long been recognized as determinant of cardiovascular risk factors and disease. Recent studies suggest an association of neighbourhood SES with