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Socio-economic patterning of general health among young people and the role of disability: a cross-sectional analysis of the 2021 census

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Socio-economic patterning of general health among young people and the role of disability: a cross-sectional analysis of the 2021 census

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ABSTRACT

Objectives

To examine the association between self-reported health (SRH) and three indicators of socioeconomic position (SEP), and to assess whether disability modifies these relationships.

Design Cross-sectional study using nationally representative data from the 2021 Census in England and Wales.

Setting and participants

697 728 individuals aged 10–29 years from England and Wales.

Primary and secondary outcome measures

We examined associations between SRH and: (1) the National Statistics Socio-economic Classification (NS-SEC) of the household reference person (HRP), (2) individual-level NS-SEC, and (3) highest level of completed qualifications. Logistic regression models estimated odds of reporting poor health, adjusting for age, household-level deprivation indicators, region, and disability. Analyses were stratified by sex.

Results

SRH showed consistent socioeconomic patterning across all three SEP indicators. (1) NS-SEC of the HRP: Young people living in households classified as ‘never worked’ had the highest odds of reporting poor health. Adjustment for disability reduced the odds from 5.2 to 2.8 (95% CI 2.50–3.13) in males and from 3.5 to 2.4 (95% CI 2.11–2.70) in females. (2) Individual-level NS-SEC: Those who had ‘never worked’ also had substantially higher odds. Adjustment for disability reduced the odds from 8.6 to 1.8 (95% CI 1.70–1.98) for males and from 6.7 to 2.3 (95% CI 2.09–2.43) for females. (3) Qualifications**:** Having ‘no qualifications’ was associated with increased odds of poor health. After adjusting for disability, these reduced from 2.1 to 1.2 (95% CI 1.12–1.29) in males and from 1.8 to 1.4 (95% CI 1.31–1.52) in females.

Conclusions

Young people who have never worked, are long-term unemployed, or have no qualifications had the highest levels of poor SRH. Disability significantly attenuates these associations, but socioeconomic gradients remain statistically significant. Policies that improve access to education and employment for the most disadvantaged young people may help reduce health inequalities.

STRENGHTS AND LIMITATIONS OF THIS STUDY

- The main strength is large, nationally representative sample, which includes all population groups and therefore enables robust assessment of socioeconomic patterning in SRH among young people.
- The SEP measures used are theoretically based and linked to health inequalities. The NS-SEC captures employment relations and conditions that shape individuals' and households' material resources, job security, and life chances, while educational attainment reflects access to knowledge-based resources and future labour market opportunities.
- A key limitation is that SRH was collected at the household level, making it unclear whether responses were completed by the individual or by a proxy respondent, which may lead to under-reporting of poor health among young people.
- The cross-sectional design limits causal interpretation, meaning the direction of association between SEP and SRH cannot be explored.

INTRODUCTION

The usefulness of measures of socioeconomic position (SEP) in researching health inequalities among young people is uncertain. Since people from lower socioeconomic (SE) groups have higher burden of disease and die earlier compared to their counterparts from higher SE backgrounds potential opportunities to intervene are important.[1] Health and health

behaviours in adolescence carry into adulthood and are strongly shaped by SE factors.[2] Many chronic disease risk factors are present during adolescence.[3] This is an important issue because puberty occurs at a time of neural plasticity where experiences shape later functioning; therefore providing opportunities for public health and educational interventions to modify harmful risk-taking behaviours associated with early adversity.[2 4 5]

At the same time, knowledge about health inequalities among adolescents (10–19-year-olds) and young people (10–24-year-olds) is patchy. One challenge concerns measurement of health. Clinical morbidity is low in this age group; Barnett et al. [6] have estimated 0.16 conditions per person among 0-24 year olds. In this study, we used self-rated health (SRH) which is acknowledged as a summary measure capturing future health outcomes and physical, psychosocial and lifestyle aspects of health. [7 8]

A second challenge is measuring SEP in this age group, [9-11] and results often vary depending on the indicators used. [9] We reviewed the literature to identify SEP measures used to study SRH patterns among 10–24-year-olds; [12] studies utilising parental employment-based measures and young people's employment-and education-based measures are shown in Supplemental Table 1. Parental SEP was assessed using adolescent-reported parental occupation or employment status, [11 13-21] parents' own occupational reports, [22 23] parental labour-market attachment; [24] and the occupation of the household reference person (HRP) based on the Registrar General's (RG) classification or National Statistics Socio-economic Classification (NS-SEC). [25 26] Adolescents' own SEP was measured through subjective assessments of a family's financial status or SEP, [11 16 17 19 22 23] or school achievement. [15 27] Among older youth, the relationship between employment status and SRH was investigated. [28-30] Other studies used educational attainment, [31-37] economic activity or occupational social class. [32 34-36 38] Kestilä et al. [39] investigated how childhood and current circumstances shape educational health differences.

This study examined SRH across three SEP measures and extends existing research in several ways. First, we sought conceptual clarity to aid interpretation. SEP is used as an aggregate concept incorporating individual and household resource-based aspects,

perceived social position, and life chances. [40 41] 'Health inequalities' follows the Public Health Scotland definition of "systematic, avoidable and unfair" differences in health."[42] Second, UK census data allowed use of theoretically based measures of SEP linked to health inequalities. [1 41 43-45] NS-SEC classifies jobs by employment relations and conditions - central dimensions of modern societies that reflect material and symbolic benefits shaping individuals' and families' life chances. [1 41 44 45] NS-SEC can be assigned both at individual- and household-levels; the latter reflects the household as a basic structural unit with shared conditions.[45] The second SEP indicator, highest level of qualifications, captures knowledge-based assets or cultural capital but is also influenced by early-life circumstances.[33 44]

Third, we addressed critiques that observational studies often exclude underrepresented groups. [46] UK census data provides a detailed picture of entire population,[47] and NS-SEC classification includes a group of residual operational categories of never worked, long-term unemployed, and full-time students; these groups are often omitted because they are difficult to define. [40 45] Employment conditions and relations, and precarity of work are social determinants of health affecting individuals and families.[48 49] Fourth, we examined whether disability modifies the SEP–SRH association after observing high levels of poor health in the 'never worked' NS-SEC group. Socioeconomic patterning of long-standing illness or disability in young people has been shown in previous research; [15 19-21 25 32 33 35] and Bauldry et al. [50] demonstrated that parental health influences SRH in adolescence and early adulthood. In this study, disability is conceptualised as a functional measure of health highlighting the consequences of illness.[35] The rationale for including disability draws on Popham et al. [51] who suggested that combining SRH with limiting illness can better identify groups experiencing the greatest inequalities. Further, while census data are used to study health inequalities in adults, [52-54] research using these population-level data to investigate young people is limited. [55]

This study therefore examined socioeconomic patterning of SRH using: (1) NS-SEC of the HRP, (2) individual-level NS-SEC, and (3) highest qualification achieved. Given the markedly

higher levels of poor health among residual NS-SEC groups, we also investigated (4) whether disability modifies associations between SEP and SRH.

METHODS

Data and sample design

Nationally representative data were used from the 2021 UK Census for England and Wales [56]. This dataset is a 5% sample of individuals from Wales, regions within England, and London. We expanded the common age categorisation of young people from 10–24-year-olds to include up to 29-year-olds to allow us to observe the effect of individual-level SEP measures.

The dataset included 3 021 455 observations; we limited it to 10–29-year-olds and cases without general health information were removed. Third, we removed observations where NS-SEC of the HRP and household-level deprivation indicators were 'not applicable' (NA). The final study dataset included 697 728 10–29-year-olds (Table 1).

Table 1. Sample design and number of observations

	Number of observations
Total	**3, 021, 455**
Health NA NSSEC HRP NA Total Females Males	35 091 55 880 **2 930 484** 1 495 296 1 435 188
10-29-year-olds	**697 728**
Females Males	346 282 (49.6%) 351 446 (50.4%)
10–18-year-olds	**307 790**
Females Males	149 630 (48.6%) 158 160 (51.4%)
19-29-year-olds	**389 938**
Females Males	196 652 (50.4%) 193 286 (49.6%)

Variables

The outcome variable SRH was measured by the question '*how is your health in general? Is it very good, good, fair, bad, or very bad?*'. For logistic regression analysis, a binary measure of SRH was calculated: '*Good health'* consists of those who reported 'very good' or 'good' health, and *'Poor' health* includes categories of 'fair', 'bad' and 'very bad' health.

Household-level SEP was operationalised by the NS-SEC of the HRP, utilising a five-class version: 1) higher managerial, administrative and professional occupations, 2) intermediate occupations, 3) small employers and own account workers, 4) lower supervisory and technical occupations, 5) semi-routine and routine occupations, and residual categories of 6) never worked, 7) long-term unemployed, and 8) full-time students. [41] It must be noted that the general health question appears in the household questionnaire, so it is unclear whether responses were self - or proxy-reported. We cross-tabulated the NS-SEC of the HRP with individual-level NS-SEC, the results indicated that most 16–18-year-olds whose HRP was a full-time student were also full-time students; therefore, we assumed that they had self-reported their health. For clarity, we assumed that health status for under 16-year-olds was reported by a parent or guardian. Individual level measures of SEP were individual-level NS-SEC and highest level of qualifications with six categories of 1) no qualifications, 2) level 1 qualifications (1 to 4 GCSEs or vocational equivalent), 3) level 2 qualifications (5 or more GCSEs or vocational equivalent), 4) level 3 qualifications (2 or more A levels or vocational equivalent), 5) level 4 qualifications (degree BA, BSc or higher or professional equivalent), 6) other qualifications.

Covariates

Age was categorised into 10-15-, 16-18-, 19-24- and 25-29-years groups. Household-level deprivation of education, housing and employment were binary variables indicating if household was deprived or not deprived. Region included ten categories. The final covariate included was disability. In the census data, the ‘never worked’ term indicates involuntary exclusion from the labour market and comprises people who would like to work; however, it is acknowledged that these groups are hard to define. The disability variable includes three categories: 1) Disabled under the Equality Act: Day-to-day activities limited a lot; 2) Disabled under the Equality Act: Day-to-day activities limited a little; 3) Not disabled under the Equality Act.

Statistical analysis

The sample of individuals aged 10–18 years was used to examine the association between SRH and the NS-SEC of the HRP. The sample of individuals aged 19–29 years was used to assess the association between SRH, individual-level NS-SEC, and highest qualification level. All analyses were stratified by sex variable. Bivariate analyses using χ^2 tests and Cramér's V were used to describe variable distributions and explore associations between SRH and explanatory variables. Stepwise logistic regression models were fitted to estimate odds ratios (ORs) for reporting poor health based on: (1) NS-SEC of the HRP for those aged 10–18 years; (2) individual-level NS-SEC for those aged 19–29 years; and (3) highest qualification level for those aged 19–29 years. Baseline models were adjusted for age. For NS-SEC analyses, the managerial and professional group served as the reference category; for qualification level, young people with Level 3 qualifications (two or more A levels) were used as the reference group.

Patient and public involvement

This study did not include patients or public involvement. We utilised secondary data from the 2021 Census for England and Wales made available by the UK Data Service .[56]

RESULTS

Prevalence of poor health by three measures of SEP

Supplemental Table 2 summarises self-rated health (SRH) across all variables used in this study. Figure 1 shows the prevalence of poor health by the three socioeconomic position (SEP) measures, stratified by sex and age group. Owing to small numbers, 'bad' and 'very bad' health were combined into a single category. Across NS-SEC measures, the lowest prevalence of poor health was consistently observed among those in the managerial and professional group. Using the NS-SEC of the household reference person (HRP),

prevalence ranged from 2.3% among males and females aged 10–15 years to 4.9% among females aged 16–18 years. The highest prevalence (15.3%) was seen among 16–18-year-old males whose HRP had ‘never worked’. When using individual-level NS-SEC, prevalence ranged from 4.3% among 19–24-year-old males in the managerial and professional group to 36.4% among 25–29-year-old males classified as ‘never worked’. By qualification level, the lowest prevalence occurred among 19–24-year-old males with degree-level education (4.8%), and the highest among 25–29-year-old females with 1–4 GCSEs (18.2%).

Before conducting logistic regression analyses, we examined bivariate associations between SEP and SRH stratified by disability. We observed a strong concentration of poor health among young people with disabilities, whereas among those without disabilities, fair health remained more common in disadvantaged groups than in their better-off peers (Appendix 1; Supplemental Figures 1–3).

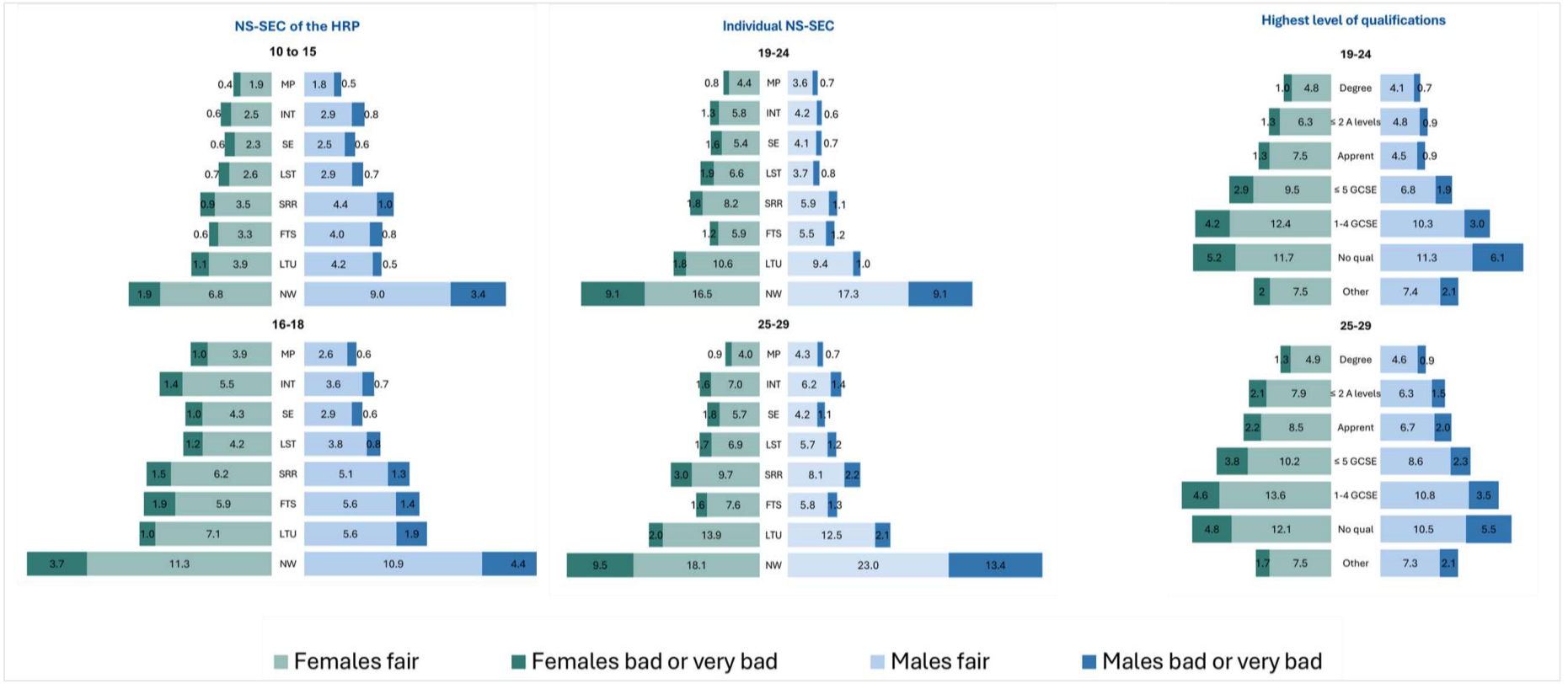


Figure 1. Prevalence of poor health by three indicators of SEP stratified by sex and age group

Key: MP – managerial and professional, INT – intermediate occupations, SE – self-employed, LST – lower supervisory and technical occupations, SRR – semi-routine and routine occupations, FTS – full time students, LTU – long term unemployed, NW – never worked

Logistic regression analysis

Figure 2 displays odds ratios (OR) and 95% confidence intervals (CI) for reporting poor health when respondents were grouped by the NS-SEC of the household reference person (HRP); odds are shown relative to individuals whose HRP belonged to the managerial and professional occupational group.

After adjustment of the baseline models for household-level deprivation measures and region, the odds of reporting poor health decreased across all socioeconomic groups, except for females whose HRP was classified as a full-time student. Further adjustment for disability led to additional reductions in odds, with the largest decreases observed among individuals whose HRP had 'never worked'. Among males, the odds declined from OR 5.20 (95% CI 4.74–5.71) to OR 2.80 (95% CI 2.50–3.13), and among females from OR 3.50 (95% CI 3.16–3.85) to OR 2.40 (95% CI 2.11–2.70).

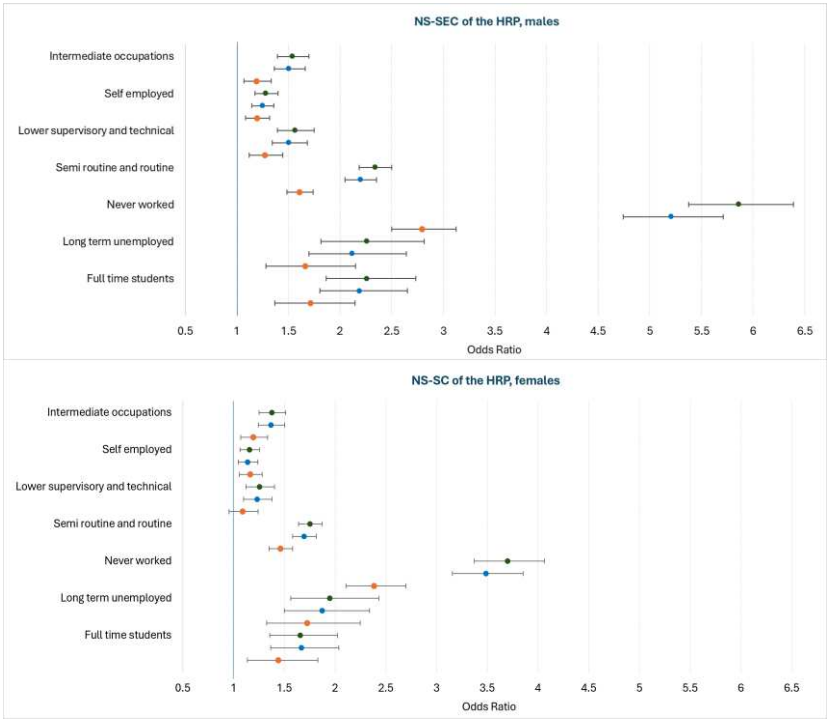


Figure 2. Odds of reporting poor health by the NS-SEC of the HRP, odds ratios and 95% confidence intervals

Reference group: Managerial and professional occupations. Green dots refer to the age-adjusted baseline model. Blue dots refer to the Model 4 adjusted for age, household deprivation of education and housing, and region. Orange dots refer to Model 5 additionally adjusted for disability status

Substantial reductions were also observed for those whose HRP was long-term unemployed: among males, from OR 2.10 (95% CI 1.70–2.64) to OR 1.66 (95% CI 1.28–2.15), and among females from OR 1.87 (95% CI 1.50–2.34) to OR 1.73 (95% CI 1.32–2.25). The lowest odds of reporting poor health, relative to the managerial and professional

group, were found among individuals whose HRP was self-employed. Notably, among females, inclusion of disability in the model resulted in a slight increase in odds, from OR 1.14 (95% CI 1.05–1.24) to OR 1.16 (95% CI 1.06–1.28), while among males the odds declined from OR 1.25 (95% CI 1.14–1.36) to OR 1.19 (95% CI 1.08–1.32). Differences in odds were no longer statistically significant for females whose HRP was classified within the lower supervisory and technical group.

Figure 3 shows that the patterning of SRH is consistent when individual-level NS-SEC is used as the measure of SEP. After adjustment of the baseline models for household-level deprivation measures and region, the odds of reporting poor health decreased across all socioeconomic groups compared with individuals in the managerial and professional occupational category. Further adjustment for disability produced additional reductions in the odds of reporting poor health. The largest declines were observed in the 'never worked' NS-SEC group: among males, odds decreased from OR 8.60 (95% CI 8.09–9.13) to OR 1.83 (95% CI 1.70–1.98), and among females from OR 6.70 (95% CI 6.30–7.09) to OR 2.30 (95% CI 2.09–2.43). For long-term unemployed females, the odds decreased from OR 3.20 (95% CI 2.85–3.55) to OR 2.00 (95% CI 1.77–2.30), while among males they declined from OR 2.90 (95% CI 2.61–3.18) to OR 1.72 (95% CI 1.53–1.93). Substantial reductions were also observed among females in semi-routine and routine occupations, with

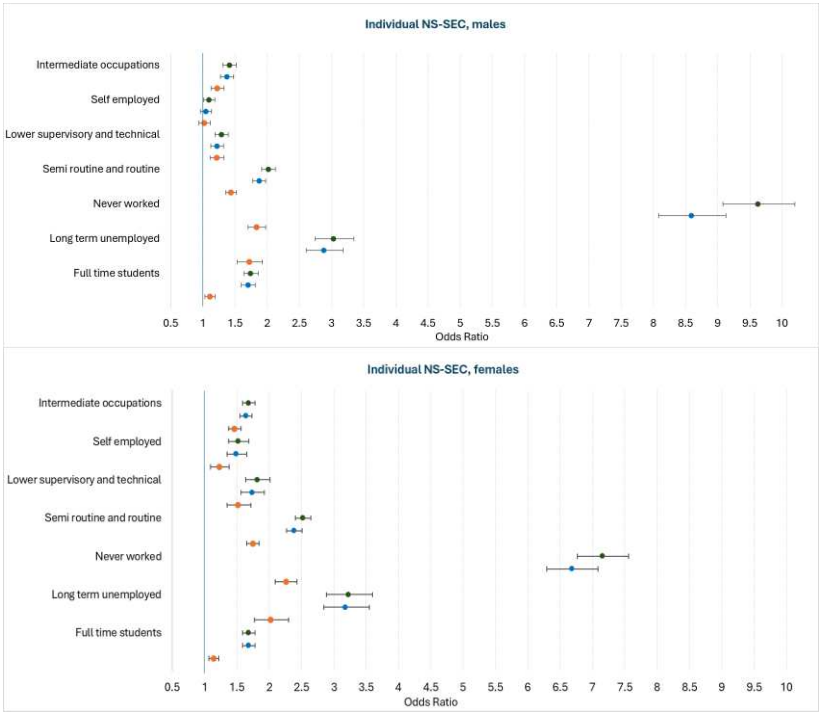


Figure 3. Odds of reporting poor health by individual-level NS-SEC, odds ratios and 95% confidence intervals

Reference group: Managerial and professional occupations. Green dots refer to the age-adjusted baseline model. Blue dots refer to the Model 4 adjusted for age, household deprivation of education and housing, and region. Orange dots refer to Model 5 additionally adjusted for disability status

odds decreasing from OR 2.40 (95% CI 2.27–2.51) to OR 1.75 (95% CI 1.65–1.85). Despite these reductions, disparities in the odds of reporting poor health remained statistically significant for all groups compared with the managerial and professional category, except for males in the self-employed NS-SEC group.

Figure 4 presents OR and 95% CI for reporting poor health relative to young people with two or more A levels (level 3 qualifications). After adjustment of the baseline models for household-level deprivation measures and region, the odds of reporting poor health decreased across most qualification groups, although a small increase was observed among individuals with degree-level education (level 4) in both sexes. Further adjustment for disability produced additional reductions in the odds of reporting poor health for most groups, except for males and females with degree-level qualifications and females with apprenticeship qualifications.

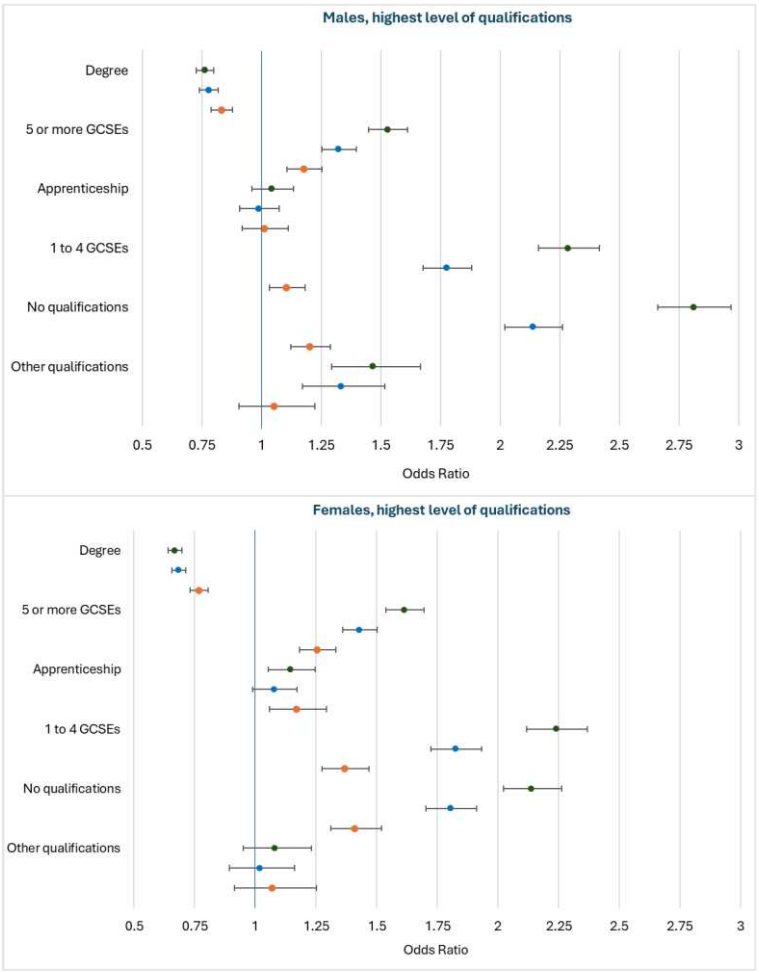


Figure 4. Odds of reporting poor health by highest level of qualifications, males and females; odds ratios and 95% confidence intervals

Reference group: 2 or more A levels of equivalent qualifications (level 3 qualifications). Green dots refer to the age-adjusted baseline model. Blue dots refer to the Model 4 adjusted for age, household deprivation of employment and housing, and region. Orange dots refer to Model 5 additionally adjusted for disability status

Among individuals with no qualifications, the odds of reporting poor health declined from OR 2.10 (95% CI 2.02–2.26) to OR 1.20 (95% CI 1.12–1.29) in males, and from OR 1.80 (95% CI 1.70–1.91) to OR 1.40 (95% CI 1.31–1.52) in females. For those with level 1 qualifications, the odds decreased from OR 1.83 (95% CI 1.72–1.93) to OR 1.37 (95% CI

1.27–1.47) in females, and from OR 1.78 (95% CI 1.68–1.88) to OR 1.10 (95% CI 1.03–1.18) in males. Among females with apprenticeship qualifications, the odds of reporting poor health became statistically significantly higher compared with those with two or more A levels, increasing to OR 1.17 (95% CI 1.06–1.29), while for males in this group the association remained statistically non-significant. For individuals with degree-level qualifications, the odds of reporting poor health increased slightly after adjustment; however, they remained lower than for the reference group - OR 0.77 (95% CI 0.73–0.81) in females and OR 0.83 (95% CI 0.79–0.88) in males. Differences in odds were not statistically significant for males with apprenticeship qualifications or for females with 'other' qualifications.

We observed r-squared values for the stepwise modelling by three measures of SEP, McFadden's R^2 measures (Pseudo R^2) are reported in Supplemental Table 9; the inclusion of disability variables resulted in significant increase in the variation explained by all three models. Full results of stepwise logistic regression modelling are shown in Supplemental Tables 3-8.

DISCUSSION

This study examined the association between SRH and three measures of SEP: NS-SEC of the HRP, individual-level NS-SEC, and highest qualification level; and assessed whether disability modified these relationships. All three indicators showed a clear socioeconomic gradient. Young people in managerial and professional occupations or with degree-level qualifications consistently had the lowest prevalence of poor health, whereas those from less advantaged occupational groups or with lower educational attainment had higher rates. The highest levels of poor health were observed among young people in the residual NS-SEC categories of 'never worked' and 'long-term unemployed', at both household and individual levels. Those with no qualifications or only 1–4 GCSEs similarly showed elevated levels of poor health. Although disability substantially attenuated these associations, SEP effects remained statistically significant. Differences across the five main NS-SEC groups were less

pronounced, though semi-routine and routine occupations had higher levels of poor health than higher-ranking groups. After full adjustment, differences in poor health remained significant for most SEP categories remained significant.

We identified significantly higher rates of poor health among young people whose HRP was classified as 'never worked' or 'long-term unemployed', and among those in the same categories based on their own NS-SEC. This supports the view of household as an important structural unit with shared conditions;[45] and draws attention to the groups often excluded from health inequalities research.[46] Disability attenuated the relationship between SRH and SEP for the most disadvantaged groups - those in residual NS-SEC categories and those with no qualifications or only 1-4 GCSEs. While this may raise questions about directionality, it is important to remember that 'never worked' NS-SEC category includes individuals who would like to work.[45] It is known that people with disabilities face barriers that limit their access to opportunities available to their non-disabled peers; these can lead to socioeconomic disadvantage and poorer health outcomes. [55 57-60] The consistent socioeconomic gradient across three SEP indicators highlights the importance of employment- and knowledge-based assets as social determinants of health affecting young people's health.[33 34 48 49]

Our findings align with UK census research on socioeconomic patterning of SRH in the general population,[52-54] and limiting long-term illness among children and young people.[55] They are also consistent with studies using alternative data sources. Evidence from the Health Behaviour in School-aged Children (HBSC) study, the Health Survey for England (HSE), and the US Add Health study has shown persistent inequalities in SRH by the SEP of the HRP [13 14 25 26] A Danish cohort study[24] likewise demonstrated an association between parental unstable labour-market attachment and poorer adolescent health. Studies incorporating both parental employment-based measures and adolescents' own SEP have shown mixed results. Some reported that adolescents' SEP attenuated the effect of objective parental measures; [17 22 27] others found additive effects, [16] independent associations, [18] or complementary functions, with traditional indicators capturing structural health inequalities. [15]

Pförtner et al. [11] showed multiple SEP indicators capture distinct dimensions. Lower parental occupational status was associated with poor SRH in the studies by Plenty and Mood, [18] and Rattay et al. [23] Sleskova et al [19] found that, after adjusting for perceived family affluence and financial stress, fathers' employment status remained a significant determinant of boys' SRH. Young people's own SEP - unstable or precarious employment, long working hours, [28-30] and low educational attainment [31-35 37] are associated with poorer SRH.

Regarding disability, higher educational level is associated with lower limiting long-term illness [33 35] Glendinning et al. [32] reported that young people with disabilities attained lower qualifications and were more often employed in low-skilled jobs. Occupation of the HRP was associated with disability or long-standing illness in studies by Spencer et al. [55] and Hargreaves et al.; [25] Sleskova et al. [19] showed that mothers' long-term unemployment predicted long-standing illness among boys. Although our cross-sectional data cannot identify specific mechanisms explaining the association between SEP and SRH, previous studies offer potential explanations. Rattay et al. [23] suggested that poor family cohesion, low parental well-being and adverse health behaviours may mediate the effect of low SEP on SRH. Nordenmark et al. [38] found that labour-market disengagement negatively affects health. Bauldry et al. [50] show that childhood SEP and parental illness have independent effects on SRH in early adulthood, proposing mechanisms such as psychosocial stressors, poor health-behaviour modelling, and evidence that even non-severe disabilities can increase chronic household stress [61] and compromise social skills and competence at school. [62]

We observed sex differences broadly consistent with women reporting poorer SRH, [63 64] though among 10–15-year-olds, females had lower levels of poor health than males by the NS-SEC of the HRP; except for boys whose HRP was classified as 'never worked' (also seen at 16-18). Disability attenuated SEP–SRH more strongly among males in the 'never worked' group. Although the cross-sectional design limits further investigation, prior research suggests that women facing difficulties in the labour market may opt for alternative family-oriented roles. [65] Sex is a recognised determinant of health, and sex inequalities are

well documented in adult and adolescent populations.[2] SRH responses reflect cognitive processes in which individuals appraise multiple aspects of their health, [8] and studies have shown socioeconomic differences in both physical and psychological symptom reporting that widen with age. [17 66-68] However, sex differences may be more nuanced, particularly when analyses consider age, cohort, or specific health conditions.[69-71]

Strengths and limitations

The main strength of this study is its large, nationally representative sample, which enabled inclusion of underrepresented population groups and theoretically informed SEP measures. A key limitation is that the general health question was completed as part of the household questionnaire, making it unclear whether responses were self-reported or provided by the HRP, potentially leading to under-reporting of poor health. Previous research shows that household income, parental ill health and parental education are associated with children's health assessments,[72] while studies indicate only moderate concordance between proxy and young people's own ratings.[73-75] Bollen et al. [73] concluded that proxy-related measurement error increases unexplained variance but does not bias predictor coefficients. Patel et al. [75] found that mothers from higher socioeconomic groups rated their daughters' health more favourably than daughters did. Garbarski [74] reported associations between adolescents' SRH, health limitations, maternal SRH and sociodemographic characteristics. Johnson and Wang [76] showed that parents generally rated their children's health better than adolescents themselves, while both poorer parents and adolescents provided lower health ratings than their higher-income peers, integrating mental health into their assessments.

CONCLUSIONS

A key strength of this study is the use of nationally representative data, enabling inclusion of young people from residual NS-SEC groups often omitted from health inequalities research. We observed a consistent socioeconomic gradient in SRH across all three SEP indicators, with poorer health concentrated among those with lower educational attainment and in less advantaged NS-SEC groups. Young people classified as 'never worked' or 'long-term

unemployed' were most vulnerable. Although adjusting for disability reduced their odds of poor health, differences remained statistically significant. Viewing SEP as a fundamental cause of health inequalities highlights opportunities for prevention. Improving access to education and employment for the most disadvantaged young people may enhance wellbeing and reduce health inequalities.

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Contributors KM led on conceptualisation and development of research questions; these were discussed with AJW, JI and FS. KM obtained and prepared the data, completed analysis and wrote manuscript. AJW advised on data analysis; AJW, JI and FS reviewed results and manuscript for intellectual content. All authors have read and commented on the manuscript and approved the final version of the paper.
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Patient consent Not required.
Provenance and peer review Not commissioned; externally peer reviewed.
Data sharing statement Dataset used in this study is referenced and available through the UK Data Service.
Supplemental material was supplied by the authors.

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