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Exposure to Discrimination and Subsequent Changes in Self-Rated Health: Prospective Evidence from the UK's *Life Opportunities Survey*

Abstract

Objectives: We sought to estimate risk of poor self-rated health (SRH) following exposure to disability-related and other forms of overt discrimination in a cohort of working age adults.

Study design: Population-based cohort survey

Methods: Secondary analysis of data collected in Waves 1 and 2 of the UK's *Life Opportunities Survey* which at Wave 2 involved the participation of 12,789 working age adults. Adjusted prevalence rate ratios were used to estimate the impact of exposure to disability and non-disability discrimination on two measures of SRH at Wave 2, controlling for SRH status at Wave 1.

Results: Exposure to disability discrimination in the previous year was reported by 3.9% of working-age British adults. Other forms of discrimination were reported less frequently (age 3.7%, ethnicity 2.5%, gender 1.6%, religion 0.8%, sexual orientation 0.4%). In all analyses there were ~~markedly~~ stronger associations between exposure to disability discrimination and poor SRH at Wave 2 when compared to exposure to ~~all~~ other forms of discrimination.

Conclusions: Disability discrimination represents a violation of human rights. It is also likely to be a major contributor to the health inequities experienced by working age adults with disability.

Keywords: Discrimination, disability, working age adults, self-rated health

Introduction

Exposure to discrimination is an important public health issue. It represents a violation of the rights of people to participate in society on equal terms with others, thereby increasing the risk of exposure to well-established social determinants of poorer health (e.g., poverty, poor housing and ~~,~~ unemployment). A growing body of evidence also suggests that exposure to overt acts of discrimination may be detrimental to an individual's health and may be an important determinant of health inequities experienced by marginalised groups.[1-4]

People with disability are a marginalised group at risk of experiencing discrimination.[5] Recognition of this issue has underpinned the enactment of disability discrimination legislation in many countries, and the ratification by the majority of countries of the UN Convention on the Rights of Persons with Disabilities.[6]

However, there has been limited attention to the health-effects of discrimination among people with a disability; only four of the 65 review papers published before 2014 on the association between discrimination and health addressed disability discrimination.[1] This is problematic as: (1) disability discrimination is often more prevalent than discrimination based on other characteristics such as gender or ethnicity;[7] and (2) a small number of cross-sectional studies have suggested that exposure to disability discrimination may have a stronger association with poor health than exposure to other forms of discrimination.[8, 9]

The few population-based studies that have investigated the association between disability discrimination and health are primarily cross sectional and have reported that exposure to disability discrimination is associated with poorer self-reported health[8-11] and psychological distress.[10-12] We are aware of only two ~~The one~~ longitudinal studies which have addressed this issue. First, ~~y of which~~ it has been reported that among ~~we are aware reported that in~~ older adults in the US discrimination based on physical disability at baseline was associated with declines in self-reported health and life satisfaction, and an increase in disease burden over a four-year follow-up period.[13] Second, it has

recently been reported that among adults (age 17+) with a disability in the UK exposure to disability related discrimination was associated with increased psychological distress and worse mental functioning four-years later.[14]

To address this ~~omission~~ gap in knowledge, our primary ~~we~~ aim (through analysis of a longitudinal population-based study)~~,~~ was to estimate the strength of association between exposure to overt acts of interpersonal discrimination and subsequent changes in self-reported health (SRH). Our secondary aim, given that a small number of cross-sectional studies have suggested that exposure to disability discrimination may have a stronger association with poor health than exposure to other forms of discrimination,[8, 9] was to ~~,~~compar~~e~~~~ing~~ the magnitude of effects of discrimination based on disability with discrimination based on other personal characteristics.

Methods

We undertook secondary analysis of de-identified data from the UK's *Life Opportunities Survey* (LOS). Data were downloaded from the UK Data Service (https://www.ukdataservice.ac.uk/). Full details of the surveys' development and methodology are available in a series of reports,[15-23] key aspects of which are summarised below.

Sample

Undertaken by the UK's Office for National Statistics (ONS), LOS is a longitudinal study focusing on the life experiences of disabled people in Great Britain. In the first wave of data collection (Wave 1; June 2009 to March 2011), random unclustered sampling from the small users Postcode Address File identified 34,004 eligible households. Face to face interviews were completed with 37,513 individuals aged 16 or older from 19,951 households, giving a household response rate of 59%. Of these, 27,819 were aged 18-64, the operational definition of the working age population used in this paper. Respondents were followed up approximately 1 year after their initial interview (Wave 2).

Impairment status at Wave 1 was used by the ONS to assign participants to one of three groups for inclusion in Wave 2: (1) adults with at least one impairment; (2) control; (3) onset-screening.[21, 23]

1. All adults who reported at least one impairment at Wave 1 (29%), along with all adult members of their households, were invited to be interviewed in person at Wave 2.
2. A 'control' group designed to be 50% of the sample size of the group of adults with at least one impairment at Wave 1 was selected from among adults who did not have an impairment at Wave One. It is reported that 'the adults in this group were chosen to provide a comparison group that was similar to the adults with at least 1 impairment on the following characteristics: sex, age, region of residence, urban or rural classification of residence'.[24] No information is provided on how this 'matching' was achieved. All the adults in the control group, as well as all adult members of their households, were invited to be interviewed in person at Wave 2.
3. Adults who did not have an impairment at Wave 1 and who were not selected for the control group, were assigned to a 'onset screening group'. They were only invited to be interviewed in person at Wave 2 if they, or an adult member of their household, had acquired an impairment between Wave 1 and Wave 2. Acquisition of impairment was determined by a brief telephone interview. Sample weights were included with the released data to ensure that the Wave 2 sample was representative of the British population.

Wave 2 achieved a household level response rate of 77% and an individual response rate of 74% among adults who were invited for face-to-face interview. At Wave 2 interviews were undertaken with 12,789 working age adults.

Procedures

All data used in the present study were collected using Computer Assisted Personal Interviewing. ONS report that 'proxy interviews with adults were taken strictly as a last resort' and accounted for 10% per cent of all adult interviews at Wave 1.[17]

Measures

Discrimination

Participants were asked: '*In the last 12 months, do you feel that you have been treated unfairly by others for any of the reasons on this card?*' *(1) Age, (2) Sex, (3) A health condition, illness or impairment, (4) Disability related reasons, (5) Ethnicity, (6) Religion, (7) Sexual orientation, (8) None of these reasons, (9) Other (please specify).* This item was recoded to give three additional variables per Wave: (1) exposure to any discrimination; (2) exposure to disability discrimination (unfair treatment based either on '*a health condition, illness or impairment'* or *'disability related reasons'*); (3) exposure to non-disability related discrimination. Discrimination data was missing for 13.1% of working age respondents at Wave 2.

Health

At each Wave participants were asked: '*How is your health in general; would you say it was ... (1) very good, (2) good, (3) fair, (4) bad, (5) or very bad?*' Self-rated health data were missing for 3.2% of working age respondents at Wave 1 and 6.9% of working age respondents at Wave 2. At Wave 1 36% of working age respondents reported their health was '*very good*', 39% '*good*', 17% '*fair*', 6% '*bad*' and 1% '*very bad*'. In common with other researchers, we recoded responses into a binary variable,[25-29] as: (1) evidence suggests that dichotomisation produces very similar results to treating the scale as an ordinal measure;[30] and (2) dichotomisation enables the estimation of effect sizes by prevalence rate ratios, a ~~much~~ more intuitive measure of effect size than odds ratios and other ~~than~~ coefficients produced by ordinal regression.[31, 32] Our primary binary measure compared very good/good health vs. fair/bad/very bad health.[27-29] The grouping of fair to very bad health represents the lowest quartile in SRH of the study population. Given that choice of cut point for dichotomisation can influence the effect sizes for predictors of self-rated health,[33] we also created a secondary binary variable that compared very good/good/fair health vs. bad/very bad health.[25, 26] The grouping of fair to very bad health represents the lowest 7.6% of SRH of the study population.

Covariates

We used three covariates related to personal characteristics (age, gender, ethnicity), six covariates that have previously been used as indicators of socio-economic position (income poverty, financial stress, material hardship, educational attainment, housing tenure, employment status) and one covariate based on urban/rural location.

Personal characteristics

Age was coded in years and gender was based on a simple binary question where participants self-identified as male or female with no options for other gender identity categories. Both were available for 100% of working age respondents at Wave 1. Ethnicity was recorded in 14 categories. Given the low numbers of working age participants from some minority ethnic groups, we created a simple binary variable white vs. other ethnic groups. Ethnicity data were missing for 3.1% of working age respondents at Wave 1.

Income poverty

Income poverty was defined as living in a household whose equivalised household income was less than 60% of the sample median at Wave 1.[34] Total household income was equivalised using the modified OECD scale.[35] Income poverty data were missing for 3.0% of working age respondents at Wave 1.

Financial stress

Financial stress was assessed by a single question: '*Thinking of your household's total monthly or weekly income, is your household able to make ends meet, that is pay your usual expenses… (1) with great difficulty, (2) with some difficulty, (3) fairly easily, (4) or very easily?*' We recoded this into a binary variable; great difficulty vs. other valid response options. These data were missing for 0.1% of working age respondents at Wave 1.

Material hardship

Material hardship was assessed by inability to afford four items: (1) To pay for a week's annual holiday away from home; (2) To eat meat, chicken or fish (or vegetarian equivalent) every second day; (3) Pay an unexpected, but necessary, expense of £500; (4) To keep your home adequately warm. We recoded this into a binary variable; could not afford two or more items vs. could not afford one item or could afford all items. These data were missing for 0.1% of working age respondents at Wave 1.

Educational attainment

Highest level of educational attainment was recorded in eight categories: (1) Degree level qualification (or equivalent); (2) Higher educational qualification below degree level; (3) A-Levels or Highers; (4) ONC / National Level BTEC; (5) O Level or GCSE equivalent (Grade A-C) or O Grade/CSE equivalent (Grade 1) or Standard Grade level 1-3; (6) GCSE grade D-G or CSE grade 2-5 or Standard Grade level 4-6; (7) Other qualifications (including foreign qualifications below degree level); (8) No formal qualifications. Due to small counts in some cells we recoded this into a six-category variable by combining groups (1) and (2) and groups (4) and (5). These data were missing for 3.2% of working age respondents at Wave 1.

Housing tenure

Housing tenure was recoded into a binary variable; private renting vs., other tenure options (primarily purchasing through a mortgage). These data were missing for 0.1% of working age respondents at Wave 1.

Employment status

Employment status was recorded in terms of three International Labour Organisation categories in employment, unemployed, economically inactive. These data were missing for 3.2% of working age respondents at Wave 1.

Urban/rural location

Location was derived from household postcode and coded as urban or rural according to 2011 ONS urban/rural classifications.[36] These data were available for all working age respondents at Wave 1.

Approach to Analysis

We assessed potential confounders at Wave 1 (including baseline SRH at wave 1), reported exposure to discrimination in the past 12 months at Wave 2 and the outcome SRH at Wave 2. First, we performed a simple descriptive analysis of included variables. Second, we estimated the strength of association (prevalence rate ratios; PRRs) between reported exposure to discrimination in the one-year period between Waves 1 and 2 and SRH at Wave 2 for different forms of discrimination adjusting for the potential confounders. We used two distinct analytic strategies. In our primary analyses we undertook the analysis with the full Wave 2 sample including Wave 1 SRH as a covariate in the model. To examine the robustness of the results we also undertook a sensitivity analysis in which we restricted our analytic sample to participants who reported very good/good SRH at Wave 1. PRRs were estimated in IBM SPSS 24 using Poisson regression with robust standard errors.[32] We undertook complete case analyses (i.e., only including cases for which data were available on all variables) using cross sectional weights provided by ONS designed to take account of the complex sample design and known biases in initial recruitment and retention to Wave 2. Basic descriptive statistics for all variables included in the analyses are presented in Supplementary Table 1. The unweighted sample sizes for the analyses were 9,389 participants (Model 1: primary analysis) and 7,103 participants (Model 2: sensitivity analysis); 76.5% and 57.9% of eligible participants (12,272).

As noted above, the major source of missing data was due to non-completion of the discrimination module. Non-completion of this module was independently predicted at Wave 1 by being under age 25 (PRR=3.69, 95%CI 3.26-4.20), male (PRR=1.81, 95%CI 1.64-1.99), not living in private rental accommodation (PRR=1.81, 95%CI 1.51-2.16), in better health (PRR=1.45, 95%CI 1.24-1.68), in employment having lower educational attainment (none PRR=1.40, 95%CI 1.22-1.61), white

ethnicity (PRR=1.35, 95%CI 1.17-1.57), having lower educational attainment (none PRR=1.32, 95%CI 1.12-1.57) and not being in income poverty (PRR=1.27, 95%CI 1.09 -1.47).

Ethical Review

LOS was given independent ethical approval by the National Research Ethics Service (NRES) for both the survey's development and the data collection and was awarded ethical approval by Research Ethics Committees (REC) in England and Wales, and Scotland.[17]

Results

The association between exposure to discrimination between Waves 1 and 2 and fair/bad SRH Wave 2 are presented in Table 1. Analyses of the association between exposure to specific forms of non-disability-related discrimination between Waves 1 and 2 and fair/bad SRH Wave 2 are presented in Table 2.

[insert Tables 1 and 2]

Exposure to disability discrimination was reported by 3.9% (95% CI 3.6%-4.3%) of working age British adults. Other forms of discrimination were reported less frequently (age 3.7% [3.4%-4.1%], ethnicity 2.5% [2.2%-2.8%], gender 1.6% 1.4%-1.8%], religion 0.8% [0.7%-1.0%], sexual orientation 0.4% [0.3%-0.5%]). In all analyses there was a significantly stronger association between exposure to disability discrimination and poor SRH at Wave 2 than between exposure to non-disability discrimination and poor SRH. In our primary analyses (Model 1 including all participants at Wave 2 and controlling for level of self-rated health at Wave 1), exposure to disability discrimination between Waves 1 and 2 was associated with a 44% increase in the prevalence of poor SRH at Wave 2 once the effects of potential confounders had been considered (PRR=1.44, 95% CI 1.35-1.55). In contrast, exposure to non-disability discrimination was associated with a non-statistically significant 7% increase in prevalence of poor SRH (PRR=1.07, 95% CI 0.97-1.19).

In our sensitivity analysis (Model 2, only including participants reporting very good/good SRH at Wave 1) exposure to disability discrimination between Waves 1 and 2 was associated with a threefold increase in the prevalence of poor SRH at Wave 2 once the effects of potential confounders had been considered (PRR=3.27, 95% CI 2.68-3.97). In contrast, exposure to non-disability discrimination was associated with a more modest 31% increase in prevalence (PRR=1.31, 95% CI 1.05-1.64).

Analysis of the association between exposure to specific forms on non-disability-related discrimination and subsequent changes in SRH (Table 2) failed to reveal any statistically significant effects in our primary analyses and just one statistically significant association in our sensitivity analyses (discrimination on basis of religion being associated with a twofold increase in the prevalence of bad SRH (PRR=2.40, 95%CI 1.46-3.95)).

Repeating these analyses with our second categorisation of SRH, a binary measure of very good to fair health vs. bad/very bad health, resulted in a similar pattern of results (Supplementary Tables 2 and 3). In our primary analyses (Model 1), exposure to disability discrimination between Waves 1 and 2 was associated with an 81% increase in the prevalence of poor SRH at Wave 2 once the effects of potential confounders had been taken into account (PRR=1.81, 95% CI 1.58-2.06). In contrast, exposure to non-disability discrimination was associated with a non-statistically significant 20% increase in prevalence (PRR=1.20, 95% CI 0.99-1.45). In our sensitivity analysis (Model 2), exposure to disability discrimination between Waves 1 and 2 was associated with a sevenfold increase in the prevalence of poor SRH at Wave 2 once the effects of potential confounders had been considered (PRR=7.68, 95% CI 4.53-13.03). In contrast, exposure to non-disability discrimination was associated with a non-significant 76% increase in prevalence (PRR=1.76, 95% CI 0.92-3.36).

Analysis of the association between exposure to specific forms on non-disability-related discrimination and subsequent changes in SRH (Supplementary Table 3) in our primary analyses revealed significant effects for gender discrimination (PRR=1.52, 95%CI 1.11-2.10) and discrimination

based on ethnicity (PRR=1.38, 95%CI 1.04-1.83) and just one significant effect in our sensitivity analyses (discrimination onf basis of gender being associated with a fourfold increase in the prevalence of bad SRH (PRR=4.57, 95%CI 1.69-12.35)).

Discussion

Our analyses indicated that: (1) disability discrimination was the most common form of discrimination reported by British working age adults; and (2) in all four sets of analyses we found markedly stronger associations between exposure to disability discrimination and subsequent poor SRH when compared to exposure to non-disability discrimination.

Our study adds to the existing literature on the association between discrimination and health in two main ways. First, it is the only the second ~~first~~ longitudinal study to investigate the association between disability discrimination and subsequent changes in SRH among working age adults with a disability. Second, it is the first longitudinal study to ~~one of the very few studies that has~~ examine~~d~~ the association between discrimination on health across different forms of discrimination. Our results are consistent with those of two previous cross-sectional studies in finding that exposure to discrimination based on disability has a stronger association with poor SRH than exposure to other forms of discrimination.[8, 9]

The main strengths of our study are: (1) the use of a relatively large cohort of working age adults that are representative of the British population; (2) the collection of data on exposure to different forms of discrimination; (3) adjusting for baseline SRH to try to disentangle the temporal relationship between discrimination and SRH; and (4) the consistency of results from sensitivity analysis and different categorisations of SRH.

The main limitations of our study are: (1) the possibility of selection bias arising from missing data and non-response; ~~and~~ (2) the use of SRH as our sole measure of health; and (3) reliance on self-report of experiences of overt acts of 'unfair treatment' as an indicator of discrimination. ~~.~~ While SRH is a

commonly used indicator of general health status that has been shown to be a robust predictor of mortality and correlates strongly with objective health indicators,[37-39] as an evaluative measure it is likely to capture aspects of physical and mental health and contextual factors in a manner that may vary across population subgroups.[40, 41] Future research in this area would benefit from the use of multiple measures of health status.

Previous research has suggested that self-report measures of exposure to discrimination can be under and over-reported.[42] In addition, perceptions of overt acts of interpersonal discrimination may not capture the effects of exposure to structural, systemic or institutional discrimination that arise from laws, policies and the ingrained habits of social institutions. Finally, no information is available within the dataset to determine whether instances of discrimination reported by participants would meet the definition of discrimination used in specific legal codes.

Future research is required to determine why disability discrimination has a stronger impact on subsequent changes in SRH than other forms of discrimination. This ~~Such~~ research will need to disaggregate the health effects of exposure to discrimination *per se* from differential resilience/vulnerability among groups who are exposed to discrimination.

Conclusion

An emerging body of evidence suggests that exposure to discrimination on the basis of disability may: (1) be one of the most common forms of discrimination experienced by adults in the UK; and (2) have significantly detrimental effects on future health and wellbeing. While additional research is needed to fully untangle the causal pathways involved, there is sufficient evidence to suggest that public health practice should focus on eliminating disability-related discrimination and the stigma associated with disability as a viable strategy for improving the health of people with disabilities and reducing health inequities experienced by people with disabilities.

Conflict of Interest

The authors have no conflict of interest to declare

References

1. Krieger N. Discrimination and Health Inequities International Journal of Health Services. 2014; 44:643-710.
2. Lockwood KG, Marsland AL, Matthews KA, Gianaros PJ. Perceived discrimination and cardiovascular health disparities: a multisystem review and health neuroscience perspective. Annals of the New York Acadamy of Sciences. 2018; 1428:170-207.
3. Schmitt MS, Branscombe NR, Postmes T, Barcia A. The consequences of perceived discrimination for psychological well-being: A meta-analytic review. Psychological Bulletin. 2014; 140:921-48.
4. Paradies Y, Ben J, Denson N, Elias A, Priest N, Pieterse A, et al. Racism as a determinant of health: a systematic review and meta-analysis. PLoS One. 2015; 10:e0138511.
5. Emerson E, Milner A, Aitken Z, Krnjacki L, Vaughan C, Llewellyn G, et al. Overt acts of discrimination reported by British working age adults with and without disability. Journal of Public Health. online 2019.
6. Convention on the Rights of Persons with Disabilities (2006).
7. Office for Disability Issues. Life Opportunities Survey: Wave one results, 2009/11. London: Office for Disability Issues2011.
8. Alvarez-Galvez J. Measuring the effect of ethnic and non-ethnic discrimination on Europeans' self-rated health. International Journal of Public Health. 2016; 61:367–74.
9. Du Mont J, Forte T. Perceived discrimination and self-rated health in Canada: an exploratory study. BMC Public Health. 2016; 16:742.
10. Krnjacki L, Priest N, Aitken Z, Emerson E, King T, Llewellyn G, et al. Disability-based discrimination and health: findings from an Australian based population study. Australian & New Zealand Journal of Public Health. 2018; 42:172-4.
11. Emerson E. Self-reported exposure to disablism is associated with poorer self-reported health and wellbeing among adults with intellectual disabilities in England: cross sectional survey. Public Health. 2010; 124.
12. Wamala S, Bostrom G, Nyqvist K. Perceived discrimination and psychological distress in Sweden. British Journal of Psychiatry. 2007; 190:75-6.
13. Sutin AR, Stephan Y, Carretta H, Terracciano A. Perceived discrimination and physical, cognitive, and emotional health in older adulthood. American Journal of Geriatric Psychiatry. 2015; 23:171–9.
14. Hackett R, Lang R, Steptoe A, Jackson S. Disability discrimination and mental health: A prospective analysis. BMJ Open. in press.
15. Cuddeford J, Duncan D, Howe T, Glen F. Life Opportunities Survey: Development findings. Newport: Office for National Statistics2008.
16. Dawe F. Life Opportunities Survey Wave One Technical Report, 2009/11. Newport: Office for National Statistics2011.
17. Howe T. Life Opportunities Survey: Technical Report 2009/10. Newport: Office for National Statistics2010.
18. Howe T. Life Opportunities Survey: User Guide to Coding and Defining Disability. Newport: Office for National Statistics2010.
19. Office for National Statistics. Life Opportunities Survey. Newport: Office for National Statistics2011.

20. Office for National Statistics. Life Opportunities Survey: Analysis of barriers to participation across a range of life areas, 2009/10 Newport: Office for National Statistics2011.
21. Office for National Statistics. Life Opportunities Survey: Wave 2, Part 1. Newport: Office for National Statistics2012.
22. Office for National Statistics. Life Opportunities Survey: Wave 2, Part 2. Newport: Office for National Statistics2014.
23. Office for National Statistics. Life Opportunities Survey: Wave Three, Final Report, October 2012 to September 2014. Newport: Office for Ntaional Statistics; 2015.
24. Dawe F. Life Opportunities Survey Wave Two Interim Technical Report, 2010/11. Newport: Office for National Statistics2012.
25. Maheswaran H, Kupek E, Petrou S. Self-reported health and socio-economic inequalities in England, 1996-2009: Repeated national cross-sectional study. Social Science & Medicine. 2015; 136-7:135-46.
26. Subramanian SV, Huijts T, Avendano M. Self-reported health assessments in the 2002 World Health Survey: how do they correlate with education? Bulletin of the World Health Organization. 2010; 88:131-8.
27. Sieber S, Cheval B, Orsholits D, Van der Linden BW, Guessous I, Gabriel R, et al. Welfare regimes modify the association of disadvantaged adult-life socioeconomic circumstances with self-rated health in old age. International Journal of Epidemiology. 2019 online; doi: 10.1093/ije/dyy283.
28. Zajacova A, Dowd JB. Reliability of Self-rated Health in US Adults. American Journal of Epidemiology. 2011; 174:977–83.
29. Pförtner T, Schmidt-Catran AW. In-Work Poverty and Self-Rated Health in a Cohort of Working Germans: A Hybrid Approach for Decomposing Within-Person and Between-Persons Estimates of In-Work Poverty Status. American Journal of Epidemiology. 2017; 185:274–82.
30. Manor O, Matthews S, Power C. Dichotomous or categorical response? Analysing self-rated health and lifetime social class. International Journal of Epidemiology. 2000; 29:149–57.
31. Zocchetti C, Consonni D, Bertazzi P. Relationship between prevalence rate ratios and odds ratios in crosssectional studies. International Journal of Epidemiology. 1997; 26:220-3.
32. Knol MJ, Le Cessie S, Algra A, Vandenbroucke JP, Groenwold RHH. Overestimation of risk ratios by odds ratios in trials and cohort studies: alternatives for logistic regression. Canadian Medical Association Journal. 2012; 184:895-9. DOI:10.1503/cmaj.101715.
33. Manderbacka K, Lahelma E, Martikainen P. Examining the continuity of self-rated health. International Journal of Epidemiology. 1998; 27:208–13.
34. Department for Work and Pensions. Measuring child poverty. London: Department of Work and Pensions2003.
35. Hagenaars AJM, De Vos K, Zaidi A. Poverty statistics in the late 1980s: Research based on micro-data. Luxembourg: Office for official publications of the European Union 1994.
36. Bibby P, Brindley P. Urban and Rural Area Definitions for Policy Purposes in England and Wales: Methodology (v1.0). London: Government Statistical Service; 2013.
37. Idler EL, Benyamini Y. Self-rated health and mortality: A review of twenty-seven community studies. Journal of Health and Social Behavior. 1997; 38:21-37.
38. Idler EL, Benyamini Y. Community studies reporting association between self-rated health and mortality: additional studies, 1995 to 1998. Research on Aging 1999; 21:392-401.
39. Mavaddat N, Parker RA, Sanderson S, Mant J, Kinmonth AL. Relationship of self-rated health with fatal and non-fatal outcomes in cardiovascular disease: a systematic review and metaanalysis. PLoS One. 2014; 9:e103509.
40. Jylha M. What is self-rated health and why does it predict mortality? Towards a unified conceptual model. Social Science & Medicine. 2009; 69:307-16.
41. Idler EL, Cartwright K. What do we rate when we rate our health? Decomposing age-related contributions to self-rated health. Journal of Health & Social Behavior. 2018; 59:74-93.

42. Lewis TT, Cogburn CD, Williams DR. Self-reported experiences of discrimination and health: scientific advances, ongoing controversies, and emerging issues. Annual Review of Clinical Psychology. 2015; 11:407–40.

Table 1: Association between forms of Disability and non-disability related discrimination between Waves 1 and 2 and fair/poor self-rated health at Wave 2			
Form of Discrimination	Weighted n/% exposed	Prevalence of fair/bad self-rated health at W2 (with 95% CI)	Adjusted PRR (with 95% CI)
Model 1: Analyses conducted on full Wave 2 sample with SRH at Wave 1 included as a covariate			
Any Discrimination			
Y	1200 (10.6%)	35.0% (32.3%-37.6%)	1.30 (1.21-1.39)***
N	10,076 (89.4%)	15.4% (14.6%-15.9)%	1
Disability Discrimination			
Y	438 (3.9%)	66.5% (62.2%-70.9%)	1.44 (1.35-1.55)***
N	10,838 (96.1%)	15.5% (14.8%-16.2%)	1
Any Non-Disability Discrimination			
Y	849 (7.5%)	22.3% (19.5%-25.1%)	1.07 (0.97-1.19)
N	10,838 (92.5%)	17.1% (16.4%-17.8%)	1
Model 2: Sensitivity analysis restricted to participants with very good/good SRH at Wave 1			
Any Discrimination			
Y	816 (8.7%)	15.7% (13.2%-18.2%)	1.97 (1.67-2.33)***
N	8,606 (91.3%)	6.8% (6.2%-7.3%)	1
Disability Discrimination			
Y	178 (1.9%)	36.5% (29.5%-43.6%)	3.27 (2.68-3.97)***
N	9,422 (98.1%)	7.0% (6.4%-7.5%)	1

Any Non-Disability Discrimination			
Y	665 (7.0%)	10.5% (8.2%-12.8%)	1.31 (1.05-1.64)*
N	8,757 (93.0%)	7.3% (6.8%-7.8%)	1

Note: Adjusted PRR adjusted for age, gender, ethnicity, income poverty, financial stress, material hardship, educational attainment, employment status, housing tenure, urban/rural location measured at Wave 1

* p<0.05, ** p<0.01, *** p<0.001

Table 2: Association between specific forms of non-disability related discrimination between Waves 1 and 2 and fair/poor self-rated health at Wave 2			
Form of Discrimination	Weighted n/% exposed	Prevalence of fair/bad self-rated health at W2 (with 95% CI)	Adjusted PRR (with 95% CI)
Model 1: Analyses conducted on full Wave 2 sample with SRH at Wave 1 included as a covariate			
Age Discrimination			
Y	415 (3.7%)	23.9% (19.9%-28.0%)	1.06 (0.93-1.19)
N	10,861 (96.3%)	17.3% (16.6%-18.0%)	1
Sex Discrimination			
Y	186 (1.6%)	21.0% (15.1%-26.8%)	1.08 (0.88-1.34)
N	11,091 (98.4%)	17.5% (16.8%-18.2%)	1
Racial/Ethnic Discrimination			
Y	280 (2.5%)	22.5% (17.6%-27.5%)	1.05 (0.88-1.24)
N	10,997 (97.5%)	17.4% (16.7%-18.1%)	1
Religious Discrimination			
Y	90 (0.8%)	35.6% (25.8%-45.4%)	1.11 (0.86-1.43)
N	11,187 (99.2%)	17.4% (16.7%-18.1%)	1
Sexual Orientation Discrimination			
Y	43 (0.3%)	23.3% (10.6%-35.9%)	1.22 (0.89-1.69)
N	11,233 (99.7%)	17.5% (16.8%-18.2%)	1
Model 2: Sensitivity analysis restricted to participants with very good/good SRH at Wave 1			
Age Discrimination			
Y	314 (3.3%)	10.5% (7.2%-13.8%)	1.25 (0.95-0.71)
N	9,108 (96.7%)	7.4% (6.9%-8.0%)	1

Sex Discrimination			
Y	148 (1.6%)	7.4% (3.2%-11.6%)	1.20 (0.67-2.14)
N	9,274 (98.4%)	7.5% (7.0%-8.1%)	1
Racial/Ethnic Discrimination			
Y	224 (2.4%)	9.8% (5.9%-13.7%)	1.13 (0.76-1.70)
N	9,199 (97.6%)	7.5% (6.9%-8.0%)	1
Religious Discrimination			
Y	54 (0.6%)	18.5% (8.2%-28.9%)	2.40 (1.46-3.95)**
N	9,368 (99.4%)	7.5% (6.9%-8.0%)	1
Sexual Orientation Discrimination			
Y	33 (0.3%)	3.0% (0.0%-8.9%)	1.11 (0.30-4.16)
N	9,389 (99.7%)	7.5% (7.0%-8.1%)	1

Note: Adjusted PRR adjusted for age, gender, ethnicity, income poverty, financial stress, material hardship, educational attainment, employment status, housing tenure, urban/rural location

* p<0.05, ** p<0.01, *** p<0.001