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Highlights

- UK adults commonly experience discrimination and probable mental health problems

- Social inequalities exist within these experiences

- Discrimination in part explains some social inequalities in mental health problems

- SES moderated some associations between disadvantaged subgroups and outcomes

Prevalence of perceived discrimination and associations with mental health inequalities in the UK during 2019-2020: A cross-sectional study.

Rosanna May Maletta[a*], Michael Daly[b], Laura Goodwin[c], Rob Noonan[a1], I Gusti Ngurah Edi Putra[a], Eric Robinson[a]

Author Affiliations:
[a] Department of Psychology, University of Liverpool, Liverpool, UK
[b] Department of Psychology, Maynooth University, Co. Kildare, Ireland
[c] Spectrum Centre for Mental Health Research, Division of Health Research, Lancaster University, Lancaster, UK

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[*]Rosanna Maletta, Department of Psychology, University of Liverpool, Eleanor Rathbone Building, Bedford Street South, Liverpool, L69 7ZA, United Kingdom. Email: hlrmalet@liverpool.ac.uk
[1] Present address: Faculty of Health and Wellbeing, University of Bolton, Bolton, UK

Abstract

Experiencing discrimination is associated with poorer mental health and demographic patterning of discrimination may explain inequalities in mental health. The present research examined prevalence of perceived discrimination in the UK and associations with inequalities in mental health. Data were taken from the UK Household Longitudinal Study (n = 32,003). Population subgroups (sex, age, ethnicity, health, religiousness, income, education, and occupation), perceived personal discrimination (personal experience) and perceived belonging to a discriminated group (identified as belonging to a group discriminated against in this country), and probable mental health problems (GHQ-12 assessed, cut off 4+) were reported on in 2019/2020. Nineteen percent of participants perceived personal discrimination in the last year, 9% perceived belonging to a discriminated group, and 22% had probable mental health problems. There were significant inequalities in both perceived discrimination and mental health. Being a younger adult, of mixed ethnicity, having health problems, having a university degree, and being unemployed increased risk of mental health problems and these associations were partially explained by perceived discrimination being more common among these groups. Perceived discrimination is common among UK adults, but prevalence differs by

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population subgroup. Perceived discrimination may contribute to social inequalities in mental health.

Keywords: Social Inequalities; Personal Discrimination; Discriminated Group; Mental Health; Socioeconomic Status; Multiple Disadvantage

1. Introduction

Discrimination is defined in the UK Equality Act (2010) as treating one individual less favourably than another due to a protected characteristic (e.g., sex, age, race, disability, religion). There is consistent evidence that protected characteristic groups frequently report experiencing discrimination (perceived discrimination). In a recent cross-sectional study of Canadians, 32.0% of Black adults sampled reported very high scores on a race-based everyday discrimination scale (Kogan et al., 2022). In a US study, 43.5% of a nationally representative adult sample reported experiencing racial discrimination occasionally or regularly (Lee et al., 2019). Furthermore, a recent Australian study found that 19.7% of the men sampled reported experiencing any form of discrimination in the last two years, with the risks of experiencing discrimination differing depending on ethnicity, sexuality, disability, and body weight (Armstrong et al., 2022).

Less research has examined the prevalence of perceived discrimination in the UK. In 2009/2010, 20.4% of a non-White UK sample reported experiencing racial discrimination (Hackett, Ronaldson, et al., 2020), 13.4% of a UK sample with self-reported disabilities perceived disability discrimination (Hackett, Steptoe, et al., 2020), and 19.5% of UK women sampled perceived sex discrimination (Hackett et al., 2019). Moreover, in 2010/2011, 34.8% of sampled adults aged 52 years or over, perceived age-based discrimination in England, which was significantly higher than the 29.1% who perceived this in a comparable US sample (Rippon et al., 2015).

Within the same time period, in a sample of adults aged over 50 years in England, 9.1% perceived disability-based discrimination, 6.7% perceived financial status-based discrimination, 9.1% perceived sex discrimination, and 17.8% perceived racial discrimination (Amirova et al., 2022). More recently, in 2017, a study commissioned by the Equality and Human Rights Commission revealed that 42.0% of adults sampled in Great Britain reported experiencing some type of prejudice (bias towards a group) or discrimination (actions based on this bias) in the last year (Abrams et al., 2018). Furthermore, there have also been suggestions in mainstream media of heightened racial discrimination as a result of the UK's referendum and exit from the EU in 2016-2020 (BBC News, 2019; Booth, 2019).

Experiencing discrimination is thought to contribute to the development or worsening of mental health problems (Hatch et al., 2016; Pascoe and Smart Richman, 2009). Mental health problems are common in England with approximately 17.0% of adults experiencing common mental health disorders (CMD; e.g., anxiety and depression) according to data collected in 2014 (Stansfeld et al., 2016). Women and younger adults are more likely to experience CMD (Stansfeld et al., 2016). A small number of studies have shown that experiencing discrimination may in part explain why belonging to some population subgroups (e.g., gender, ethnicity) is associated with poorer mental health (Cokley et al., 2011; Dambrun, 2007). We expand on this work by exploring a wider range of population subgroups and addressing the lack of research exploring whether perceived discrimination is a possible explanatory factor of inequalities in mental health amongst a large, representative UK adult sample.

Socioeconomic status (SES) is defined as the possession of social and economic resources which are valued by others and oneself within society

(Antonoplis, 2022). Hudson et al. (2012) observed a positive association between SES (household income and education level) and self-reported racial discrimination among African Americans, which may be explained by greater awareness of discrimination among higher SES groups (de Vroome et al., 2014). Similarly, Kessler et al. (1999) found that education was positively associated with major lifetime perceived discrimination in US adults. Rippon et al. (2015) also found that those with a higher education level had greater odds of perceiving age-based discrimination using a sample of adults aged 52+ years in England. However, lower SES may also increase risk for experiencing discrimination due to negative attitudes and stigma towards lower SES groups (Simons et al., 2018). In line with this, those in the lowest income group among US adults had a greater likelihood of frequent daily discrimination experiences (Kessler et al., 1999). Moreover, in a sample of individuals aged 52+ years, lower household wealth and being retired were associated with increased likelihood of perceiving age-based discrimination in England (Rippon et al., 2015). Additionally, in a sample of individuals aged over 50 years in England, perceived disability and financial status-based discrimination were more likely to be reported by those in the lower SES group, compared to the higher SES group (Amirova et al., 2022). Belonging to a lower SES group has also been associated with poorer mental health (Pierce et al., 2020; Yu and Williams, 1999).

Some of the aforementioned studies explore the SES of specific population subgroups (e.g., African Americans; Hudson et al., 2012), with evidence suggesting that belonging to multiple disadvantaged groups may lead to worsened health outcomes (Grollman, 2014). Specifically, Rhead et al. (2022) explored SES and ethnicity, finding that employed migrants and retired White British individuals had a higher likelihood of experiencing discrimination in the previous year, compared to

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employed White British individuals with degree-level education and management or professional occupations. Furthermore, Goodwin et al. (2018) explored the associations of SES, ethnicity, and migration combinations with CMD. Specifically, White British economically inactive renters (low household income/education), and Mixed ethnicity migrant economically inactive renters (low household income/mixed education) had higher likelihood of CMD, compared to White British professional homeowners (high household income/education). This evidence suggests that being in a minority group and of lower SES may increase discrimination and mental health risks.

Existing research has tended to focus on the combined impact of belonging to SES and ethnicity subgroups, as opposed to the potential impact of being of lower SES and belonging to other minority or marginalised social groups. In the present research, we address this by exploring the combined impact of SES and membership of a range of disadvantaged subgroups (e.g., sex, age, ethnicity, health, religiousness) to better understand social inequalities in probable mental health problems and perceived discrimination experiences. Due to the importance of considering different indicators of SES (Braveman et al., 2005), in the present research we treat SES as a multi-component construct and examine its different facets (income, education level, and occupational prestige).

Moreover, while past research has tended to explore the prevalence and patterning of perceived personal discrimination, we also examine perceived belonging to a group discriminated against. Where both personal and group-based discrimination have been explored previously, different results have been found. For example, Dambrun (2007) explored the mediating role of perceived gender discrimination in the relationship between gender and psychological distress. They

explored a measure of perceived personal discrimination (e.g., feeling they are discriminated against due to being a woman), and perceived group discrimination (e.g., feeling that women as a group are discriminated against). However, only perceived personal discrimination mediated the effect of gender on psychological distress. In addition, Suppes et al. (2021) found that perceived personal discrimination (personal experiences due to sexual orientation), and perceived group discrimination (expectations that sexual minority groups would be discriminated against) were both associated with worse mental health. Building on this evidence, we examine the role that both perceived personal discrimination and perceived belonging to a discriminated group may have in explaining social inequalities in mental health.

In the current study, we aimed to improve understanding of perceived discrimination and probable mental health problems in the UK by using a large representative sample of UK adults collected during 2019/2020. We had four aims: 1) To assess the prevalence and social patterning of perceived discrimination; 2) To assess the prevalence and social patterning of probable mental health problems; 3) To examine if belonging to both a lower SES group and protected characteristic group (e.g., sex, age, ethnicity) elevates risk of perceiving discrimination or experiencing mental health problems; 4) To explore the extent to which inequalities in probable mental health problems may be explained by perceived discrimination.

2. Method

2.1. Study Population

The 'UK Household Longitudinal Study' (UKHLS; University of Essex, Institute for Social and Economic Research [ISER], 2022) began in 2009/2010. Participants

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complete annual interviews/questionnaires on social, economic, and wellbeing related factors (ISER, 2019). For our cross-sectional analysis, we used data from wave 11 as this is the most recently collected data (2019/2020). Specifically, we made use of the UKHLS general population sample and the ethnic minority boost samples. The general population sample is a representative clustered and stratified probability sample of households from across the UK (ISER, 2021). The ethnic minority boost samples were selected from high-concentration ethnic minority areas, and included households where members belonged to an ethnic minority group, and in an additional sample, members born outside of the UK (ISER, 2021). For full information on sampling design see Lynn (2009); Lynn et al. (2017). Previous to wave 11, perceived discrimination measures were only asked to ethnic minorities and small comparison samples (ISER, 2019; McFall et al., 2020). For wave 11, approximately 22,077 households were issued the UKHLS, with the individual response rate being 87% for adults who had responded to the previous wave (Carpenter, 2021). For the difference in response rates for subgroups, and the effect of COVID-19 on data collection methods, see Carpenter (2021).

2.2. Measures

2.2.1. Population subgroups

Participants self-reported their sex (male or female), age in years (categorised into: 16-34, 35-50, 51-64, 65+), ethnic group (condensed into: White, Mixed, Asian, Black, Other, consistent with the UK census; GOV.UK, n.d.), religiousness (identified as belonging to a religion, or not), and health (identified as having a longstanding illness/disability, or not).

SES indicators examined were household income, education level, and occupation. Equivalised household income per month (quintiles) was calculated by

dividing monthly household income by the OECD-modified conversion scale to account for differences in household financial requirements (Office for National Statistics [ONS], 2015). Education level was measured by the individuals' self-reported highest obtained education qualification, and as in previous research (e.g., Hackett et al., 2019) it was split into three categories: university degree, high school qualification, and other/no qualification. Occupational prestige was measured using The National Statistics Socio-Economic Classification (ONS, n.d.) and as in Green et al. (2020) this produced a three-category variable of: management and professional, intermediate, and routine occupations, with an additional category to include those not in paid employment in the last week.

2.2.2. Perceived Discrimination

Two measures of perceived discrimination were examined:

Perceived personal discrimination experiences – Participants were asked to report whether in the last 12 months they (a) felt unsafe, (b) avoided places, (c) were insulted, or (d) attacked in any of the following 12 locations: 1) school, 2) college/university, 3) work, 4) public transport, 5) bus/train stations, 6) shopping centres/commercial places, 7) cafes, cinema/theatres, 8) pub/disco/club, 9) car parks, 10) outside, street/park, 11) home, 12) other. If they indicated yes, they were asked to select the reason(s) for this experience from 9 response options: 1) sex, 2) age, 3) ethnicity, 4) sexual orientation, 5) health/disability, 6) nationality, 7) religion, 8) language/accent, 9) dress/appearance. An additional two options of 'other' or 'none of the above' were also provided as potential reasons for these experiences, however as these do not allocate a personal/protected characteristic as the reason for their experience, individuals who only selected these options were coded as not perceiving personal discrimination experiences. Consistent with previous research,

this measure is referred to as a measure of perceived discrimination (Hackett, Ronaldson, et al., 2020; Hackett et al., 2019; Hackett, Steptoe, et al., 2020). For analysis, we created a binary variable, where participants who selected any of the four experiences (in any location or for any of the nine reasons) were coded as perceiving personal discrimination experiences, and those who did not were coded as not perceiving these experiences.

Perceived belonging to a discriminated group – Participants were asked if they would describe themselves as being a member of a group that is discriminated against in this country and (if yes) selected one of the following 10 reasons: 1) colour/race, 2) nationality, 3) religion, 4) language, 5) ethnic group, 6) age, 7) gender, 8) sexuality, 9) disability, 10) other. We produced a binary variable of those who identified as being a member of a group discriminated against in this country vs. those who did not.

2.2.3. Probable mental health problems

The General Health Questionnaire (GHQ)-12 was used as a self-report measure of probable mental health problems (Goldberg et al., 1997; ONS, 2020). Participants were asked to independently respond to 12 questions about their feelings in the last few weeks (e.g., if they 'felt unhappy or depressed'). Responses were dichotomised following a standard system of scoring indicating whether participants had experienced each question or not, and totalled to create a 0-12 scale with higher responses indicating more mental health problems. As used by the ONS (2020) and in previous research (Morris and Earl, 2017; Pierce et al., 2020), a score of 4+ was used to indicate probable mental health problems. This cut-off has high sensitivity and specificity in UK samples (Goldberg et al., 1997).

2.3. Statistical Analyses

Initial data preparation was conducted using IBM SPSS Statistics v27, and analysed using Stata v17. To assess the inequalities in perceived discrimination, a series of multivariable logistic regression models were created with population subgroup variables (i.e., sex, age, ethnic group, health, religiousness, income, education level, and current job) as the predictors, and perceived personal discrimination experiences and perceived belonging to a group discriminated against as the outcomes. To assess the inequalities in probable mental health problems, the above predictors were included in a logistic regression model with probable mental health problems as the outcome. This model was then repeated whilst including the two perceived discrimination measures to observe whether the effect of population subgroups on mental health problems were attenuated (indicative of potential mediation by perceived discrimination measures). To identify whether any effects of belonging to a protected characteristic group were moderated by SES, the perceived discrimination and perceived discrimination adjusted mental health models were repeated to separately include interaction terms between each SES predictor and each non-SES population subgroup. Finally, mediation models were conducted to explore if perceived discrimination mediated the relationship between membership of a population subgroup and increased risk of probable mental health problems (we limited analyses to subgroups that met initial conditions of mediation, i.e., variables that predicted both perceived discrimination measures and mental health problems in the same direction). For each model, we restricted analysis to individuals with complete cases for all variables.

In Stata, the command *Logistic* was used to obtain odds ratios (*OR*), *p*-values, and 95% confidence intervals for population subgroup patterning models. For interactions, the command *testparm* was used to determine significance of the

interaction (set at *p* ≤.001 to correct for multiple comparisons). Predicted probabilities (i.e., the probability for having mental health problems) were also calculated for significant interaction terms and presented using the command *marginsplot.* To ensure that standard error estimates were non-biased and results were generalisable to the UK population, we applied a cross-sectional weight which accounted for unequal selection probability for subgroups, random attrition and non-response. We used survey analysis (*svy* prefix) to account for sampling weights and clustering effects due to complex survey design used in UKHLS. Exploratory mediation models were created using *khb* (Kohler et al., 2011) with the *logit* command for a binary outcome (see Supplementary A for full information).

2.4. Sensitivity Analyses

Analyses were also conducted with each individual perceived personal discrimination item separately. To examine consistency of findings in mental health models, models were repeated with a continuous GHQ-12 score. Due to the data collection time period (2019/2020), we also explored if there was an impact of data being collected before vs. after the COVID-19 outbreak.

3. Results

The analytical sample comprised 32,003 participants. The weighted sample was majority female (52.6%) and White (92.0%; for full sample characteristics see Table S1). In total, 18.7% perceived any personal discrimination, 9.2% perceived belonging to a group discriminated against and 21.8% reported probable mental health problems (for prevalence by subgroup see Table 1). For results by individual ethnic groupings see Table S2.

Table 1. Prevalence of Perceived Personal Discrimination, Perceived Belonging to a Discriminated Group, and Probable Mental Health Problems by Subgroup.

Population Subgroup	Perceived Personal Discrimination[a] Weighted *n* & %	Perceived Belonging to a Discriminated Group [b] Weighted *n* & %	Probable Mental Health Problems[c] Weighted *n* & %
Sex	**31,159**	**31,174**	**30,196**
Male	13.4%	9.3%	17.9%
Female	23.5%	9.2%	25.3%
Age	**31,163**	**31,178**	**30,200**
16-34	27.9%	13.4%	27.0%
35-50	17.4%	10.1%	23.9%
51-64	16.2%	9.5%	22.7%
65+	13.9%	4.4%	14.3%
Ethnic Group	**30,906**	**30,916**	**29,953**
White	17.9%	7.2%	21.7%
Mixed	37.4%	32.5%	33.1%
Asian	26.1%	27.1%	21.3%
Black	27.1%	46.1%	23.6%
Other	23.5%	33.5%	14.1%
Religious (Identifies as belonging to a religion)	**29,238**	**29,251**	**28,329**
Yes	18.1%	10.1%	20.3%
No	17.9%	8.4%	22.7%
Health (Has longstanding illness/disability)	**31,083**	**31,097**	**30,134**
Yes	23.7%	11.9%	30.9%
No	15.5%	7.6%	16.1%
Equivalised Household Income per Month	**30,451**	**30,482**	**29,526**
≤£1142.0304 *(Category 1, lowest)*	17.6%	9.8%	24.1%
£1142.0305-£1556.0000 *(Category 2)*	20.0%	9.6%	23.8%
£1556.0001-£1993.3410 *(Category 3)*	19.3%	8.8%	22.1%
£1993.3411-£2612.6480 *(Category 4)*	18.9%	8.6%	20.8%
≥£2612.6481 *(Category 5, highest)*	17.3%	9.1%	17.9%
Education Level	**30,712**	**30,722**	**29,771**
Other/No Qualification	14.6%	5.9%	19.6%
High School Qualification	18.8%	8.5%	22.0%
University Degree	20.3%	11.3%	22.5%
Current Job	**30,149**	**30,153**	**29,207**
Not in paid employment in the last week	19.2%	9.1%	22.8%
Routine	18.2%	8.0%	20.7%
Intermediate	18.5%	9.7%	19.0%
Management & Professional	17.9%	10.3%	21.9%

Notes: [a]Prevalence of perceived personal discrimination was determined by self-reported feeling unsafe, avoiding places, being insulted, or being attacked due to a personal characteristic. [b]Prevalence of perceived belonging to a discriminated group was determined by self-reported identifying as belonging to a group discriminated against in this country. [c]Prevalence of probable mental health problems was determined by a GHQ-12 score of 4+.

3.1. Population Subgroup Patterning of Perceived Discrimination

Table 2 shows the multivariable associations between population subgroups and

perceived personal discrimination experiences and perceived belonging to a

discriminated group, respectively. For perceived personal discrimination, females,

those in the youngest age group, Mixed, Asian, and Black respondents, those with a

longstanding illness/disability, those in higher income groups, those with a high
school qualification or university degree, and those not in paid employment last week
had greater odds of perceiving any personal discrimination, compared to males,
those in older age groups (35-50, 51-64, 65+), White respondents, those without a
longstanding illness/disability, those in the lowest income group, those with other/no
qualification, and those in employment respectively. Patterning of perceived
belonging to a group discriminated against was consistent with personal
discrimination experiences, with the exception of sex and income not being
significantly associated with risk. We repeated the analysis unadjusted and found
that results were similar, with the exception that effects for the current job measure
were no longer significant across both perceived discrimination measures (for full
unadjusted estimates, see Table S3). Results were largely consistent when
individual perceived personal discrimination items were examined separately (see
Table S4).

Table 2. Predictors of Perceiving Discrimination.

Population Subgroup	Model 1: Perceived Any Personal Discrimination[a]	Model 2: Perceived Belonging to a Discriminated Group[b]
	OR (95% CIs)	OR (95% CIs)
Sex (Reference: Male)		
Female	1.84 (1.67-2.03)[***]	0.93 (0.82-1.05)
Age (Reference: 16-34)		
35-50	0.55 (0.48-0.63)[***]	0.65 (0.55-0.78)[***]
51-64	0.47 (0.42-0.54)[***]	0.60 (0.50-0.72)[***]
65+	0.31 (0.27-0.37)[***]	0.23 (0.18-0.29)[***]
Ethnic Group (Reference: White)		
Mixed	2.65 (1.87-3.75)[***]	5.50 (3.88-7.80)[***]
Asian	1.71 (1.42-2.06)[***]	4.48 (3.62-5.54)[***]
Black	1.66 (1.22-2.24)[**]	11.09 (8.42-14.60)[***]
Other	1.10 (0.51-2.36)	6.12 (3.66-10.24)[***]
Religious (Reference: Does not identify as belonging to a religion)		
Identifies as belonging to a religion	1.03 (0.94-1.14)	1.11 (0.97-1.27)
Health (Reference: Does not have a longstanding illness/disability)		
Has a longstanding illness/disability	2.16 (1.97-2.38)[***]	2.52 (2.20-2.89)[***]
Equivalised Household Income per Month (Reference: ≤ £1142.0304; *Category 1, lowest*)		
£1142.0305-£1556.0000 *(Category 2)*	1.36 (1.17-1.59)[***]	1.22 (0.99-1.50)

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£1556.0001-£1993.3410 *(Category 3)*	1.26 (1.08-1.48)[**]	1.13 (0.91-1.40)
£1993.3411-£2612.6480 *(Category 4)*	1.24 (1.06-1.45)[**]	1.11 (0.89-1.37)
≥£2612.6481 *(Category 5, highest)*	1.19 (1.01-1.42)[*]	1.19 (0.95-1.50)
Education Level (Reference: Other/No Qualification)		
High School Qualification	1.18 (1.02-1.37)[*]	1.21 (0.96-1.52)[***]
University Degree	1.54 (1.32-1.80)[***]	1.81 (1.44-2.27)[***]
Current Job (Reference: Not in paid employment in the last week)		
Routine	0.73 (0.63-0.85)[***]	0.67 (0.54-0.82)[***]
Intermediate	0.77 (0.65-0.90)[**]	0.77 (0.62-0.96)[*]
Management & Professional	0.73 (0.64-0.83)[***]	0.77 (0.64-0.93)[**]

Note: These are multivariable models.
[a]Unweighted *n* = 27,199; Weighted *n* = 28,804.
[b]Unweighted *n* = 27,208; Weighted *n* = 28,825.
[*] p <.05 [**] p <.01 [***] p <.001.

3.1.1. Population Subgroup Patterning of Perceived Discrimination: Interactions with SES

There were interactions with some SES indicators by gender and age. Females had higher probability of perceiving personal discrimination experiences than males across all education and current job levels, however the difference was larger in the highest SES indicator level compared to the lowest (see Figure S1 and Figure S2). In addition, those aged 16-34 had a higher probability of perceived belonging to a group discriminated against, compared to the oldest age group across all current job levels, however the difference tended to be larger in the lowest SES indicator level compared to the higher levels (see Figure S3). No other significant interactions between population subgroups and SES were observed.

3.2. Population Subgroup Patterning of Mental Health

Table 3 shows associations between population subgroups and probable mental health problems. Model 1 is a multivariable model which is adjusted for all population subgroup factors (e.g., sex, age, ethnic group, religiousness, health, household income, education level, current job). Within this model, females, those in the youngest age group, Mixed ethnic group respondents, those with a longstanding

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illness/disability, those in the lowest income group, those with a university degree, and those not in paid employment last week all had greater odds of probable mental health problems, compared to males, those in the older age groups, White respondents, those without a longstanding illness/disability, those in the highest income group, those with other/no qualification, and those in employment, respectively. Additionally, White respondents had significantly greater odds of probable mental health problems, compared to Other respondents.

Following the additional adjustment for the perceived discrimination measures (Model 2), both perceived personal discrimination experiences and identifying as a belonging to a group discriminated against predicted greater odds of probable mental health problems. Effect estimates were reduced (but remained significant) for females, all age groups (except 35-50), those with a longstanding health problem, and those employed after adjustment for perceived discrimination. Effects for those aged 35-50, Mixed respondents, and those with a university degree were attenuated to non-significance. For unadjusted estimates, see Table S3. Models with a continuous measure of mental health problems produced similar results (See Table S5).

There was little evidence that associations between population subgroups and probable mental health problems differed based on SES. Although participants with a longstanding illness/disability had higher probability of mental health problems across all current job levels, compared to those without a longstanding illness/disability. Specifically, the difference was most pronounced in the lowest level of the SES indicator compared to the higher levels (see Figure S4).

Table 3. Predictors of Probable Mental Health Problems, Before and After Adjustment for Perceived Discrimination Measures.

Population Subgroup	Mental Health Model 1[a] OR (95% CIs)	Mental Health Model 2[b] OR (95% CIs)
Sex (Reference: Male)		
Female	1.54 (1.42-1.68)[***]	1.44 (1.32-1.57)[***]
Age (Reference: 16-34)		
35-50	0.83 (0.72-0.95)[**]	0.93 (0.81-1.07)
51-64	0.66 (0.57-0.75)[***]	0.75 (0.65-0.86)[***]
65+	0.25 (0.21-0.29)[***]	0.31 (0.26-0.36)[***]
Ethnic Group (Reference: White)		
Mixed	1.48 (1.07-2.06)[*]	1.13 (0.82-1.57)
Asian	0.96 (0.78-1.19)	0.81 (0.65-1.01)
Black	1.05 (0.75-1.47)	0.77 (0.53-1.11)
Other	0.52 (0.29-0.96)[*]	0.45 (0.24-0.86)[*]
Religious (Reference: Does not identify as belonging to a religion)		
Identifies as belonging to a religion	0.98 (0.90-1.08)	0.97 (0.89-1.07)
Health (Reference: Does not have a longstanding illness/disability)		
Has a longstanding illness/disability	2.85 (2.60-3.13)[***]	2.53 (2.30-2.78)[***]
Equivalised Household Income per Month (Reference: ≤ £1142.0304; *Category 1, lowest*)		
£1142.0305-£1556.0000 *(Category 2)*	1.05 (0.91-1.21)	1.01 (0.87-1.16)
£1556.0001-£1993.3410 *(Category 3)*	1.00 (0.87-1.15)	0.97 (0.84-1.12)
£1993.3411-£2612.6480 *(Category 4)*	0.92 (0.80-1.07)	0.89 (0.77-1.03)
≥£2612.6481 *(Category 5, highest)*	0.84 (0.72-0.98)[*]	0.81 (0.69-0.95)[**]
Education Level (Reference: Other/No Qualification)		
High School Qualification	1.03 (0.90-1.18)	1.01 (0.88-1.16)
University Degree	1.19 (1.03-1.37)[*]	1.11 (0.96-1.28)
Current Job (Reference: Not in paid employment in the last week)		
Routine	0.66 (0.57-0.77)[***]	0.69 (0.59-0.80)[***]
Intermediate	0.56 (0.48-0.66)[***]	0.58 (0.50-0.68)[***]
Management & Professional	0.74 (0.65-0.84)[***]	0.77 (0.67-0.88)[***]
Perceived Any Personal Discrimination Experiences (Reference: No)		
Yes	-	2.18 (1.97-2.43)[***]
Identifies as belonging to a group discriminated against (Reference: No)		
Yes	-	1.73 (1.50-1.99)[***]

Note: These models are multivariable.
[a]Model 1 does not include perceived discrimination. Unweighted *n* = 26,373; Weighted *n* = 28,595.
[b]Model 2 is adjusted for perceived discrimination measures. Unweighted *n* = 26,148; Weighted *n* = 28,422.
[*]*p* <.05 [**]*p* <.01 [***]*p* <.001.

3.3. Mediation Analyses

Separate single exploratory mediation models were created to explore if

relationships between age (reference: aged 16-34), ethnic group (reference: White

respondents), health (reference: those without a longstanding illness/disability),

education level (reference: other/no qualification), current job (reference: those not in paid employment last week), and probable mental health problems were mediated by increased likelihood of perceived personal discrimination experiences and/or perceived belonging to a group discriminated against (see Table 4). All other population subgroups were included as covariates.

The indirect effect of both perceived discrimination measures tended to in part account for the increased risk of mental health problems among young adults vs. older adults (variance explained ranging from 13.8-55.0% dependent on age comparison group), as well as the association between having a longstanding health condition and mental health problems (11.5%). The indirect effect of both perceived discrimination measures also partially accounted for the increased risk of mental health problems among Mixed vs. White respondents (68.7%), but other ethnic groups did not meet mediation requirements (non-significant total effects). Similarly, the indirect effect of both perceived discrimination measures partially accounted for the increased risk of mental health problems among respondents with a university degree vs. no/other qualification (39.0%), but it was non-significant for other education levels. Likewise, the increased odds of significant mental health problems among those not in paid employment was partially mediated by being more likely to have perceived discrimination (7.2-15.5% of the association).

Separating the indirect effects for each mediator revealed perceived personal discrimination and perceived belonging to a group discriminated against were significant mediators in all models. There was a greater effect of perceived personal discrimination experiences on these associations (mean variance mediated = 19.0%), compared to perceived belonging to a group discriminated against (mean variance mediated = 8.9%). For the percentage of associations between population

subgroups and probable mental health problems separately accounted for by each mediator, see Table 4.

We also explored the effect of perceived personal discrimination experiences as a single mediator on the above relationships, and additionally on the relationship between sex and probable mental health problems. We found that perceived personal discrimination experiences accounted for 16.6% of the association between sex and probable mental health problems. For results, see Supplementary I.

Table 4. Mediation Models Exploring Perceived Personal Discrimination Experiences and Perceived Belonging to a Group Discriminated Against as Mediators of the Association Between Population Subgroup Variables and Probable Mental Health Problems.

Population Subgroup	Mental Health		Effect Ratio
	B	95% CIs	
Age (Reference: 16-34)			
Total effect of age (35-50)	-0.17[*]	-0.30 to -0.03	
Direct effect of age (35-50)	-0.07	-0.21 to 0.06	
Indirect effect via perceived discrimination	*-0.09****	*-0.13 to -0.05*	*55.0%*
Indirect effect via perceived personal discrimination experiences	*-0.07****	*-0.09 to -0.05*	*43.0%*
Indirect effect via perceived belonging to a discriminated group	*-0.02****	*-0.03 to -0.01*	*12.0%*
Total effect of age (51-64)	-0.40^{***}	-0.53 to -0.27	
Direct effect of age (51-64)	-0.29^{***}	-0.42 to -0.16	
Indirect effect via perceived discrimination	*-0.11****	*-0.15 to -0.07*	*27.7%*
Indirect effect via perceived personal discrimination experiences	*-0.09****	*-0.11 to -0.07*	*21.8%*
Indirect effect via perceived belonging to a discriminated group	*-0.02****	*-0.03 to -0.01*	*5.9%*
Total effect of age (65+)	-1.37^{***}	-1.53 to -1.22	
Direct effect of age (65+)	-1.18^{***}	-1.34 to -1.02	
Indirect effect via perceived discrimination	*-0.19****	*-0.23 to -0.15*	*13.8%*
Indirect effect via perceived personal discrimination experiences	*-0.13****	*-0.16 to -0.11*	*9.8%*
Indirect effect via perceived belonging to a discriminated group	*-0.06****	*-0.07 to -0.04*	*4.1%*
Ethnic Group (Reference: White)			
Total effect of ethnic group (Mixed respondents)	0.40[*]	0.06 to 0.73	
Direct effect of ethnic group (Mixed respondents)	0.12	-0.21 to 0.46	
Indirect effect via perceived discrimination	*0.27****	*0.13 to 0.41*	*68.7%*
Indirect effect via perceived personal discrimination experiences	*0.14****	*0.08 to 0.21*	*36.1%*
Indirect effect via perceived belonging to a discriminated group	*0.13****	*0.08 to 0.18*	*32.6%*
Health (Reference: Does not have a longstanding illness/disability)			
Total effect of health (has a longstanding illness/disability)	1.05^{***}	0.96 to 1.14	
Direct effect of health (has a longstanding illness/disability)	0.93^{***}	0.84 to 1.02	
Indirect effect via perceived discrimination	*0.12****	*0.10 to 0.14*	*11.5%*
Indirect effect via perceived personal discrimination experiences	*0.08****	*0.07 to 0.10*	*8.0%*
Indirect effect via perceived belonging to a discriminated group	*0.04****	*0.03 to 0.05*	*3.5%*
Education Level (Reference: Other/No Qualification)			
Total effect of education level (university degree)	0.17[*]	0.03 to 0.30	
Direct effect of education level (university degree)	0.10	-0.03 to 0.24	
Indirect effect via perceived discrimination	*0.07****	*0.04 to 0.09*	*39.0%*
Indirect effect via perceived personal discrimination experiences	*0.04****	*0.03 to 0.06*	*26.3%*
Indirect effect via perceived belonging to a discriminated group	*0.02****	*0.01 to 0.03*	*12.7%*
Current Job (Reference: Not in paid employment in the last week)			
Total effect of current job (routine)	-0.42^{***}	-0.56 to -0.28	
Direct effect of current job (routine)	-0.37^{***}	-0.51 to -0.23	
Indirect effect via perceived discrimination	*-0.05***	*-0.09 to -0.02*	*12.6%*
Indirect effect via perceived personal discrimination experiences	*-0.04****	*-0.05 to -0.02*	*8.5%*
Indirect effect via perceived belonging to a discriminated group	*-0.02****	*-0.03 to -0.01*	*4.1%*
Total effect of current job (intermediate)	-0.58^{***}	-0.74 to -0.43	
Direct effect of current job (intermediate)	-0.54^{***}	-0.70 to -0.39	
Indirect effect via perceived discrimination	*-0.04**	*-0.08 to -0.01*	*7.2%*
Indirect effect via perceived personal discrimination experiences	*-0.03****	*-0.05 to -0.01*	*5.2%*
Indirect effect via perceived belonging to a discriminated group	*-0.01**	*-0.02 to -0.00*	*2.0%*
Total effect of current job (management & professional)	-0.31^{***}	-0.44 to -0.18	

Direct effect of current job (management & professional)	-0.26[***]	-0.39 to -0.13	
Indirect effect via perceived discrimination	*-0.05[**]*	*-0.08 to -0.01*	*15.5%*
Indirect effect via perceived personal discrimination experiences	*-0.04[***]*	*-0.05 to -0.02*	*12.0%*
Indirect effect via perceived belonging to a discriminated group	*-0.01[*]*	*-0.02 to -0.00*	*3.5%*

Note: *n* = 21,303. Each population subgroup is a separate mediation model. All models control for sex, religiousness, income, and the other mediation model's IVs. All models contain two mediators of perceived personal discrimination experiences and perceived belonging to a group discriminated against, which we collectively refer to as perceived discrimination. Only IV levels which meet criteria for mediation are reported (significant total and indirect effect).
[*] *p* <.05 [**] *p* <.01 [***] *p* <.001.

3.4. Impact of COVID-19

We examined if perceived discrimination and mental health estimates differed based on data being collected pre vs. post COVID-19 being declared a pandemic by the WHO (11/03/2020). Probable mental health problems were slightly higher post-pandemic outbreak and perceived discrimination did not differ. Controlling for pre vs. post pandemic outbreak did not change the results of the main analyses. See Supplementary J.

4. Discussion

In a large representative sample of UK adults, we found that 18.7% perceived personal discrimination experiences in the previous year, and 9.2% perceived belonging to a group discriminated against. Perceiving personal discrimination was more common among females, younger adults, Mixed, Black, and Asian ethnic groups, those with a longstanding health problem, higher household income, higher education qualifications, and those unemployed. These groups were also more likely to perceive belonging to a group discriminated against in the UK, with the exception of females and higher household income groups. Likewise, we found similar patterning of probable mental health problems, with higher incidence amongst females, younger age groups, Mixed ethnicity respondents, those with a longstanding health problem, those with a university degree, and those unemployed.

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However, we also found differences in demographic patterning of perceived discrimination and probable mental health problems. For example, those in the highest income group were more likely to perceive personal discrimination experiences, but less likely to report probable mental health problems. For groups with similar patterning across both perceived discrimination and probable mental health problems, perceived personal discrimination partially explained (mediated) increased likelihood of having probable mental health problems. Although perceived belonging to a group discriminated against also played some role in explaining social patterning of probable mental health problems, perceived personal discrimination experiences tend to explain a higher proportion of associations. For example, perceived personal discrimination experiences accounted for 8.0% of the relationship between having a longstanding illness/disability and mental health problems, whilst perceived belonging to a discriminated against group explained only 3.5%.

To our knowledge, there is only one recent study which explored the prevalence and patterning of perceived discrimination experiences across a nationally representative sample of adults in Great Britain. This 2017 analysis suggested that 42.0% of adults sampled in Great Britain reported experiencing some type of prejudice or discrimination in the last year (Abrams et al., 2018). This prevalence is higher than the present 2019/2020 estimate, which is surprising given suggestions of heightened discrimination experiences and a high number of hate crimes in the UK in recent years (BBC News, 2019; Booth, 2019; Home Office, 2021). However, unlike Abrams et al. (2018) our prevalence estimate exclusively explored perceived discrimination, and did not incorporate perceptions of prejudice. We did find similar social patterning of perceived discrimination, with females, younger age groups, and non-White respondents reporting more demographic-

based prejudice (Abrams et al., 2018). We also found that higher education levels and household incomes were associated with increased likelihood of perceived discrimination. Positive relationships have previously been found between these SES indicators and perceived racial discrimination experiences among African Americans (Hudson et al., 2012). Possible explanations are higher expectations of fair treatment, and greater awareness of discrimination (de Vroome et al., 2014; Nandi and Luthra, 2021). Additionally, the societal stigma associated with being unemployed (Karren and Sherman, 2012), may explain why unemployed individuals were more likely to perceive discrimination than those employed in the present study. Finally, we found that those with a longstanding illness/disability had greater odds of perceived discrimination, which is consistent with research into physical disability discrimination (Dammeyer and Chapman, 2018).

Consistent with previous research (Daly et al., 2020; ONS, 2019; Stansfeld et al., 2016), we found that females, younger adults, Mixed ethnicity respondents, those with a longstanding illness/disability, those with a university degree, those in the lowest income group, and those unemployed had a greater likelihood of probable mental health problems. We also found that those who had perceived personal discrimination were found to have increased likelihood of probable mental health problems. This observed association between perceived discrimination and negative mental health has been evidenced in previous literature (Hatch et al., 2016; Pascoe and Smart Richman, 2009), and previous prospective studies have highlighted the negative impact that forms of perceived discrimination have on future mental health measures (Hackett et al., 2019; Hackett, Steptoe, et al., 2020; Jackson et al., 2019).

In addition, we found that for age, ethnic group, health, education level, and current job subgroups that had increased probable mental health problems, the

greater incidence of perceived discrimination in these groups partially explained their increased likelihood of experiencing probable mental health problems. For sex, the greater incidence of perceived personal discrimination only, partially explained this increased likelihood of experiencing probable mental health problems. It has previously been shown that perceived discrimination partially explains why disability status, ethnic group membership, and gender differences are associated with worse mental health (Cokley et al., 2011; Dambrun, 2007; Namkung and Carr, 2020). We therefore provide novel evidence that social patterning of perceived discrimination may also partially explain why those in certain age groups, those with specific education levels, and those with specific employment statuses may have increased probable mental health problems within a representative UK adult sample.

To explore the impact of belonging to both a socioeconomically disadvantaged group and protected characteristic group, we examined if income, education level, and employment status moderated the relationships between disadvantaged subgroup membership (e.g., based on ethnicity, gender, age) and perceived discrimination or probable mental health problems. We found limited evidence for interactions with SES, except for females being more likely to perceive personal discrimination experiences than males, with the largest difference in the university degree and management & professional conditions. Moreover, we found that those aged 16-34 were more likely to report belonging to a group discriminated against than those in older age groups, with the largest difference in those unemployed. Finally, we found those with a longstanding health problem were more likely to report probable mental health problems than those without, with the largest difference in those unemployed. Consistent with explanations for other marginalised groups (de Vroome et al., 2014), females who are more highly educated may have

greater awareness of discrimination and this may explain findings. Moreover, young people are more likely to be unemployed than older adults (Powell et al., 2022). Due to this, young unemployed individuals may be more likely to perceive they are being discriminated against in the labour market. In addition, unemployed individuals with disabilities may have greater likelihood of mental health problems as longer durations of unemployment are associated with greater likelihood of mental health problems (Ford et al., 2010). We did not find any significant interactions between SES and ethnicity, unlike previous studies which have explored intersectionality in the prediction of these outcomes (Goodwin et al., 2018; Rhead et al., 2022). Further research will be required to explain why SES was associated with increased perceived discriminatory experiences among some population subgroups, but not others.

4.1. Limitations

Due to the cross-sectional design of this study longitudinal research examining the temporal order of how inequalities in perceived discrimination and mental health develop would now be valuable. The cross-sectional nature of this study means we are unable to account for prior experiences of mental health problems or prior perceived discrimination. For example, perceived personal discrimination experiences were only assessed within the previous 12 months, but historical experiences may also be associated with mental health problems (Kessler et al., 1999; Lyons et al., 2021). Perceived discrimination was self-reported and is likely to be influenced by recall bias. Moreover, the self-report nature of perceived discrimination means it is possible that participants who had similar experiences may have interpreted these differently (e.g., one individual may have perceived discrimination in the experience, whereas another did not). We were unable to adjust

for these differences or biases in attributions. Although we examined common SES indicators (Antonoplis, 2022; Braveman et al., 2005), we did not explore all indicators. For example, we were not able to examine childhood SES conditions or neighbourhood level deprivation, both of which have been suggested to influence mental health (Angelini et al., 2018; Fone et al., 2014). Furthermore, the questionnaire-based measure of likely mental health problems has been shown to be valid (Goldberg et al., 1997; ONS, 2020), but it does not constitute a medical diagnosis and can be prone to error. Finally, due to the time period of data collection participants were sampled pre and post COVID-19 outbreak. Consistent with other research we found a small increase in mental health problems attributable to COVID-19 (Daly and Robinson, 2021; Daly et al., 2020; Patel et al., 2022; Pierce et al., 2020), but critically results of primary analyses were unaffected by this.

4.2. Conclusions

Perceived discrimination is common among UK adults. Perceived discrimination also differs by population subgroup and may contribute to social inequalities in mental health.

Data Statement: Data are openly available via the UK Data Service:

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Author statement

Author Roles

Rosanna Maletta: Conceptualization, Methodology, Formal Analysis, Data Curation, Writing – Original Draft, Writing – Review & Editing, Visualization.

Michael Daly: Conceptualization, Writing – Review & Editing.

Laura Goodwin: Conceptualization, Writing – Review & Editing.

Rob Noonan: Conceptualization, Writing – Review & Editing, Supervision.

I Gusti Ngurah Edi Putra: Formal Analysis, Writing – Review & Editing.

Eric Robinson: Conceptualization, Methodology, Writing – Review & Editing, Supervision, Funding acquisition.