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Original Article

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Abstract

Background. Perceived discrimination is associated with worse mental health. Few studies have assessed whether perceived discrimination (i) is associated with the risk of psychotic disorders and (ii) contributes to an increased risk among minority ethnic groups relative to the ethnic majority.

Methods. We used data from the European Network of National Schizophrenia Networks Studying Gene-Environment Interactions Work Package 2, a population-based case–control study of incident psychotic disorders in 17 catchment sites across six countries. We calculated odds ratios (OR) and 95% confidence intervals (95% CI) for the associations between perceived discrimination and psychosis using mixed-effects logistic regression models. We used stratified and mediation analyses to explore differences for minority ethnic groups.

Results. Reporting any perceived experience of major discrimination (e.g. unfair treatment by police, not getting hired) was higher in cases than controls (41.8% *v.* 34.2%). Pervasive experiences of discrimination (≥3 types) were also higher in cases than controls (11.3% *v.* 5.5%). In fully adjusted models, the odds of psychosis were 1.20 (95% CI 0.91–1.59) for any discrimination and 1.79 (95% CI 1.19–1.59) for pervasive discrimination compared with no discrimination. In stratified analyses, the magnitude of association for pervasive experiences of discrimination appeared stronger for minority ethnic groups (OR = 1.73, 95% CI 1.12–2.68) than the ethnic majority (OR = 1.42, 95% CI 0.65–3.10). In exploratory mediation analysis, pervasive discrimination minimally explained excess risk among minority ethnic groups (5.1%).

Conclusions. Pervasive experiences of discrimination are associated with slightly increased odds of psychotic disorders and may minimally help explain excess risk for minority ethnic groups.

Introduction

Perceived discrimination, the perception of unfair treatment of members of a social group, is associated with worse mental and physical health outcomes (Krieger, 2014; Lewis, Cogburn, & Williams, 2015; Paradies et al., 2015; Schmitt et al., 2014; Williams & Mohammed, 2009). It is posited that minority ethnic groups have more pervasive and more severe experiences of discrimination (Paradies et al., 2015; Schmitt et al., 2014), regardless of whether or not they explicitly attribute this unfair treatment to their race or ethnicity (Lewis et al., 2015; Williams & Mohammed, 2009). Discrimination is considered a key factor in driving mental health inequities among minority ethnic groups (Krieger, 2014; Lewis et al., 2015; Paradies et al., 2015; Schmitt et al., 2014; Williams & Mohammed, 2009). A meta-analysis confirmed that perceived ethnic discrimination is associated with worse mental health for minority ethnic groups in Europe, although this only included four studies on psychotic symptoms (de Freitas et al., 2018).

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A recent systematic review identified 24 studies on the relationship between perceived discrimination and psychosis, which produced suggestive findings that discrimination may be associated with increased risk of psychosis and tentatively indicated a dose-response relationship (Pearce, Rafiq, Simpson, & Varese, 2019). While these studies provide preliminary support for a link between discrimination and psychosis, the current body of evidence is limited in at least three ways. First, the majority of studies were of subthreshold psychotic experiences or clinical high-risk status, not psychotic disorders. While this information is important, subthreshold experiences are not sufficient to predict who goes on to develop psychotic disorders (Fusar-Poli et al., 2013). Second, measures of discrimination included in previous studies have often only used one or a few items, restricted these experiences to the past year and/or required attribution to race. Such measurement is unlikely to capture the full experience of discrimination or allow for testing of dose-response relationships; requiring attribution to race also underestimates experiences of unfair treatment among minority ethnic groups (Williams & Mohammed, 2009). Third, most previous study samples have typically lacked an ethnic majority comparison group, preventing investigation of how discrimination may uniquely affect psychosis risk in minority ethnic groups relative to the ethnic majority.

In this study, we analyzed data from Work Package 2 of the European Network of National Schizophrenia Networks Studying Gene-Environment Interactions (EU-GEI) study, a population-based incidence and case–control study of psychotic disorders and the largest international investigation of psychotic disorders in the last 40 years, to examine the relationship between perceived discrimination and psychotic disorders. We sought to test three hypotheses: (1) there will be an association between *any* experience of major discrimination and odds of psychotic disorders; (2) there will be a dose-response association between *more types* of major discrimination and increasing odds of psychotic disorders; (3) experiencing more types of major discrimination will *partially explain* the association between minority ethnic groups and excess odds of psychotic disorders.

Methods

Study population

Work Package 2 of the EU-GEI study ran from May 2010 to April 2015 and the incidence and first-episode case–control program included 17 clearly defined catchment areas across six countries (Brazil, France, Italy, Netherlands, Spain, UK) (Gayer-Anderson et al., 2020). The primary goal was to study genetic and socio-environmental interactions in the onset of psychosis. Catchment sites were selected for large migrant and minority ethnic populations and to represent a mix of urban and rural regions. Incidence data included anyone who came into contact with specialist mental health services with a first-episode psychotic disorder. A subset of these incident cases was approached for participation in the concurrent case–control study to collect and analyze data on putative risk factors (41% of incidence sample). In analyses for this paper, we excluded 36 cases from the site in Paris (where no control participants were recruited) and 84 participants missing all discrimination data. Participants who were excluded from analyses had similar characteristics (e.g. age, sex, parent social class) to those included. Ethical approval was provided by research ethics committees in each site. The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. Written informed consent was obtained from all participants.

Variables

Case–control status

Cases were individuals aged 18–64 years residing in the specified catchment areas who made contact with specialist mental health services with a first-episode psychotic disorder (e.g. schizophrenia, schizoaffective disorder, bipolar disorder) based on the International Classification of Diseases, Tenth Edition (ICD-10) research diagnoses (codes F20-F33) during the time frame of the study (median 25 months, range 12–48 months depending on site). Individuals were excluded if they had previous contact with mental health services for psychosis, or if there was evidence that their psychotic symptoms were precipitated by an organic cause or due to acute intoxication. Controls were volunteers selected from the same catchment areas using a mixture of random and quota sampling to maximize representativeness, including randomly selecting from general practitioner lists and housing lists in some sites and more ad hoc approaches (e.g. leaflets at local stations, shops and job centers, Internet and newspaper advertisements) in others. Controls were excluded if they reported a prior diagnosis of or treatment for any psychotic disorder (Gayer-Anderson et al., 2020). Some sites also oversampled minority ethnic groups among the controls to enable subsequent sub-group analyses; in sites where oversampling was used, sampling weights were created to account for this in the analysis.

Ethnic group

Respondents provided self-reported ethnic categorizations relevant to each country's context, which were then collapsed into six categories for standardization across sites: Asian, Black, Mixed, North African, White and Another. White is the majority ethnic group in all six countries included in this dataset. A binary variable was created to distinguish the ethnic majority (White) and minority ethnic groups (Asian, Black, Mixed, North African, Another) based on these classifications, as we were most interested in assessing whether there was a difference in the association across all minority ethnic groups compared with the ethnic majority.

Perceived discrimination

Perceived discrimination refers to perceptions of unfair treatment. This study specifically addressed perceived lifetime experiences of discrimination that might have major interference with advancing socioeconomic position (referred to as 'major discrimination'), rather than day-to-day, routine, and relatively minor experiences of unfair treatment. These experiences of major discrimination were assessed using a modified version of the Major Experiences of Discrimination Scale originally developed by Williams and colleagues (1997) for the Detroit Area Study in Michigan, USA. The scale has demonstrated good reliability and validity (Williams et al., 1997) and has been widely used in the literature (Kessler, Mickelson, & Williams, 1999; Taylor, Kamarck, & Shiffman, 2004). Respondents were asked whether they have ever *unfairly* experienced any of the following 12 events: being fired; not being hired; being denied a promotion; being stopped, questioned, or

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threatened by the police; being treated unfairly by the court system; being discouraged in education; being prevented from renting or buying housing; experiencing poor treatment by neighbors or family; being denied a loan or preferable mortgage rate; receiving worse service than others; experiencing unfair treatment when getting medical care; and experiencing unfair treatment when using public transport. For each affirmative response, participants were then asked to select one reason why they believe they had been treated unfairly (gender, race or ethnicity, religion, mental illness, sexuality, age, other; a binary variable was created for each reason ever endorsed). For analysis, two aggregate variables of perceived lifetime experiences of major discrimination were created: (1) A binary variable for endorsement of any experience of major discrimination across the 12 items and (2) a categorical variable for the number of different types of experiences of major discrimination grouped into 0, 1, 2, and ⩾3 types consistent with prior studies (Oh et al., 2016). For this paper, perceived experiences of ⩾3 types of major discrimination will be described as 'pervasive experiences of discrimination' to distinguish it from a single isolated experience of discrimination (Schmitt et al., 2014).

Other variables

Information on potential confounders was collected at the time of assessment and selected a priori based on their established relationships with perceived discrimination and psychosis: age (continuous), sex (male/female), parent social class (professional, intermediate, working-class, long-term unemployed), parent history of psychosis (yes/no) and cannabis use (never, past, current).

Statistical analysis

All analyses were conducted in Stata 15 (StataCorp, 2017). Frequency distributions of sociodemographic and lifestyle characteristics of participants were explored. Continuous variables were expressed as mean ± standard deviation (S.D.). Categorical variables were expressed as number (%). Chi-square and *t* tests were used to compare sociodemographic characteristics, types of major discrimination, and reasons for major discrimination among cases *v.* controls and minority ethnic groups *v.* the ethnic majority (all comparisons between ethnic groups were restricted to controls to provide population-representative estimates since the cases would over-represent ethnic minorities).

To test the hypothesis of an association between *any* experience of major discrimination and case–control status, we used mixed-effects logistic regression models while accounting for clustering by catchment site. Inverse probability weights were used to account for oversampling of minority ethnic groups among the controls relative to the populations at risk. First, a parsimonious model adjusting for age and sex was constructed. Next, a fully adjusted model taking measured confounding variables into account was fitted (i.e. age, sex, parent social class, parent history of psychosis, cannabis use). These confounders were chosen *a priori* based on our literature review. A sensitivity analysis was conducted to substitute parent social class with participant social class.

To test the hypothesis of a dose-response association for the number of types of discrimination and case–control status, we constructed the next model by treating the number of types of major discrimination (0, 1, 2, 3+) as an ordinal variable to test the linear trend and then as indicator variables to assess the odds ratio for each number of types.

To test the hypothesis that the binary and dose-response associations between perceived discrimination and case–control status were stronger among minority ethnic groups compared with the ethnic majority, each association was tested for modification by ethnic group by (i) running the analyses separately among minority ethnic groups and the ethnic majority (stratification) and (ii) assessing whether the addition of cross-products between ethnic group and case status improved the fit of the model (likelihood ratio test).

Finally, to test the hypothesis that more types of discrimination partially explained the association between minority ethnic status and case–control status, exploratory mediation analysis was conducted by specifying ethnic group as the independent variable, case status as the dependent variable, and a binary variable of three or more *v.* two or fewer types of major discrimination as the mediating variable. We consider these analyses as exploratory since we are using data collected at a single moment of time that limit inferences about temporal ordering and also cannot adjust for exposure-mediator, exposure-outcome, and mediator-outcome confounding. This mediation model did not allow for adjustment for clustering by catchment site or sampling weights for the oversampling of minority ethnic groups among the controls. Bootstrapping was used to generate bias-corrected confidence intervals (CI) (1000 repetitions, seed specified as 1234) (Valeri & VanderWeele, 2014; VanderWeele & Vansteelandt, 2010). The odds ratios reflecting total effect (OR^{MTE}), natural direct effect (OR^{NDE}) and natural indirect effect (OR^{NIE}) are used to be consistent with the terminology of mediation analysis, not to imply causality. The proportion mediated was calculated by using the formula $[OR^{NDE}*(OR^{NIE} - 1)]/(OR^{NDE}*OR^{NIE} - 1)$ (VanderWeele & Vansteelandt, 2010).

Results

The final analytic sample was 2507 participants, of which 41.5% were cases (69.7% non-affective psychosis, 28.3% affective psychosis, 2.0% unspecified psychotic diagnoses) and 27.3% were classified as members of minority ethnic groups. Cases and controls differed on all measured sociodemographic characteristics. Cases were more likely to be younger [$t(2503) = 10.2$, $p < 0.001$), men ($\chi^2(1) = 50.2$, $p < 0.001$], from a minority ethnic group [$\chi^2(1) = 66.5$, $p < 0.001$], have parents who had psychosis [$\chi^2(1) = 42.6$, $p < 0.001$], have parents who were working-class or long-term unemployed [$\chi^2(3) = 23.9$, $p < 0.001$], and have ever used cannabis [$\chi^2(2) = 94.2$, $p < 0.001$] (Table 1).

Lifetime prevalence of perceived experiences of major discrimination

Over a third (37.3%) of participants reported any perceived experience of major discrimination and this was higher in cases than in controls [41.8% *v.* 34.2%, $\chi^2(1) = 15.3$, $p < 0.001$] and in minority ethnic groups than the ethnic majority [45.8% *v.* 31.0%, $\chi^2(1) = 23.9$, $p < 0.001$, restricted to controls]. Only 7.9% of participants reported pervasive experiences of discrimination (i.e. ⩾3 different types of major discrimination) and this was higher in cases [11.3% *v.* 5.5% in controls, $\chi^2(3) = 33.7$, $p < 0.001$] and minority ethnic groups [9.4% *v.* 4.4% in ethnic majority, $\chi^2(3) = 36.9$, $p < 0.001$, restricted to controls]. See online Supplementary Table 1 for the prevalence of the 12 individual types of major discrimination in the total sample, by case–control status and by ethnic group status. See Supplemental Figure 1 for the prevalence of the perceived reason for experiences of major discrimination (i.e. ethnicity, age, gender, mental illness, religion, sexuality, other) in the total sample, by case–control status, and by ethnic group status.

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Association between any experience of major discrimination and psychosis

The unadjusted, age- and sex-adjusted, and fully adjusted models for the associations between major discrimination and psychosis are presented in Table 2. After adjusting for age, sex, parent social class, parent history of psychosis, and cannabis use, there was no evidence of a difference in odds of psychosis after experiencing any major discrimination compared with no discrimination (OR = 1.20, 95% CI 0.91–1.59).

Dose-Response association of more types of major discrimination and psychosis

In fully adjusted models, there was a dose-response association between more types of major discrimination and increasing odds of psychosis (OR: 1.16, 95% CI 1.02–1.31). Participants reporting pervasive experiences of major discrimination (i.e. ⩾ 3 types) had 1.79-fold greater odds of psychosis than those who experienced no discrimination (95% CI 1.19–2.71).

Differences in associations for discrimination and psychosis by ethnic group

In fully adjusted models, minority ethnic groups had 1.42-fold greater odds of psychosis (95% CI 1.08–1.85) compared with the ethnic majority (Table 2). In analyses stratified by minority ethnic groups and ethnic majority group, the association between pervasive experiences of major discrimination (i.e. ⩾3 types) and odds of psychosis was OR = 1.73 (95% CI 1.12–2.68) for minority ethnic groups and OR = 1.42 (95% CI 0.65–3.10) for the ethnic majority. To test for interaction, we compared results from this model with those from a model with the interaction terms (cross-product with ethnic group) using a likelihood ratio test. We found no strong evidence of interaction for pervasive experiences of major discrimination ($\chi^2 = 5.96$, $p = 0.11$).

In exploratory mediation analysis, pervasive experiences of major discrimination (i.e. ⩾3 types) minimally explained the association between ethnic group and risk of psychosis. Pervasive experiences of major discrimination only accounted for a small proportion (5.1%) of the total effect of being a member of a minority ethnic group on odds of psychosis ($OR^{MTE} = 1.90$, 95% CI 1.55- 2.34; $OR^{NDE} = 1.85$, 95% CI 1.50–2.30; $OR^{NIE} = 1.02$, 95% CI 1.00–1.07).

All results were similar in direction, magnitude, and significance in sensitivity analyses.

Discussion

This study is the largest to date to investigate the relationship between perceived discrimination and psychosis. We extend previous investigations by including participants with a diagnosis of a psychotic disorder; an established scale that measures lifetime experiences of major discrimination that does not require attribution to race; and an ethnic majority comparison group. While over a third of participants reported ever experiencing major discrimination, a much smaller proportion (7.9%) reported pervasive experiences of major discrimination (i.e. ⩾3 different types). Reporting pervasive experiences of major discrimination was associated with increased odds of psychosis of around two-fold after adjusting for measured confounders (age, sex, parent social class, parent history of psychosis, cannabis use). This is one of the first studies to show that perceived discrimination is also associated with an increased risk of psychosis among the ethnic majority. Among controls, who are expected to represent the underlying source population, reporting pervasive experiences of major discrimination was twice as common among minority ethnic groups compared with those among the ethnic majority. Exploratory mediation analyses suggested that these higher levels of pervasive experiences of major discrimination might help explain a small part of the excess risk for psychosis among minority ethnic groups and also suggest that perceived discrimination is relatively rare and only a small part of what is likely a larger constellation of social adversities that cumulatively contribute to excess risk among minority ethnic groups.

Study limitations

The case–control design limits any inferences about causality since it is collected at a single moment of time; however, embedding the case–control study within a population-based incidence study is a powerful and efficient approach to measure exposures at the presumed onset of the outcome. Case–control studies are typically the most feasible study designs for rare outcomes such as psychosis but are subject to recall bias. It is well established that mood-dependent recall, including due to current symptoms, influences recollection of prior life events. This is particularly a consideration in a first-episode study, where cases are identified based on current symptoms and may not yet have fully recovered. Within psychotic disorders, symptoms of paranoia, in particular, may influence retrospective perceptions of unfair treatment. This could lead to an overestimation of the association, including for dose-response relationships (Dohrenwend, 2006). However, it would not be appropriate to adjust for paranoia as discrimination also leads to paranoia symptoms (Pearce et al., 2019) and so it is likely to be on the causal pathway between discrimination and psychosis. Some research suggests that severe events tend to be recalled better than less severe ones, as might be the case for the major experiences of discrimination reported here (Williams & Mohammed, 2009). Nevertheless, current paranoia remains a major limitation as it may influence reporting of perceived lifetime experiences of major discrimination.

An ethnic group is a crude proxy of the social status of groups of people classified as members of minority ethnic groups (Bhopal, 1997) and misses variability in socioeconomic status, health status, exposure to adversity, timing and context of migration and reception. This applies both across ethnic groups and across national boundaries. Nonetheless, it provides important preliminary evidence about the potential consequences of relatively lower social status and is strengthened by comparison to the ethnic majority. Clinical diagnosis of psychotic disorder required contact with specialist mental health services, which does not capture all individuals with psychosis. However, it is considered to be fairly comprehensive at measuring the treated incidence of psychosis in these countries (Jongsma et al., 2018). Importantly, using research diagnoses expands upon prior research that predominantly relied on subthreshold psychotic experiences, which have an indeterminate relationship with subsequent psychotic disorder diagnoses. Like most research, the measure of discrimination relied on self-report. However, many of the proposed mechanisms emphasize the importance of *perceiving* treatment by society as unfair and pervasively so. This measure has not yet been cross-culturally validated in all the countries included in this dataset. The measure also did not capture all dimensions of discrimination

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Table 1. Sociodemographic characteristics of the EU-GEI case–control sample by case status and by minority ethnic group status

	All ($N = 2507$)		Case *v.* control ($N = 1040$ cases)		Minority *v.* majority ($N = 683$ minorities)	
	n	Total %	Case %	Control %	Minority %	Majority %
Age in years[a]	34.1 (12.3)		31.2 (10.6)	36.2 (12.9)	31.5 (11.0)	35.1 (12.6)
Catchment site						
London	395	15.8	18.1	14.1	29.4	10.6
Cambridge	146	5.8	3.9	7.2	2.2	7.2
Amsterdam	197	7.9	9.2	6.9	13.8	5.6
Gouda/Voorhout	207	8.3	9.4	7.4	2.8	10.3
Madrid	75	3.0	3.6	2.6	1.5	3.6
Barcelona	65	2.6	2.7	2.5	0.6	3.3
Oviedo	76	3.0	2.6	2.7	1.8	3.5
Valencia	80	3.2	4.6	2.2	1.2	3.9
Créteil	154	6.1	5.2	6.8	11.4	4.2
Puy de Dôme	62	2.5	1.4	3.2	0.7	3.1
Bologna	129	5.2	6.3	4.4	2.6	6.1
Palermo	151	6.0	5.0	6.7	1.3	2.8
Ribeirão Preto	493	19.7	18.3	20.6	29.1	16.1
Santiago	65	2.6	2.6	2.6	0.1	3.5
Verona	156	6.2	4.3	7.6	0.6	8.3
Cuenca	56	2.2	1.7	2.6	0.9	2.7
Ethnic group						
White	1823	72.8	64.1	78.9	0	100
Black	279	11.1	15.8	7.8	40.8	0
Mixed	219	8.7	10.0	7.8	32.1	0
Asian	63	2.5	3.0	2.2	9.2	0
North African	67	2.7	4.1	1.6	9.8	0
Another	55	2.2	3.0	1.6	8.1	0
Sex						
Female	1177	46.9	38.6	52.9	45.8	47.4
Male	1330	53.1	61.4	47.1	54.2	52.6
Parent social class						
Professional	657	29.3	25.9	31.5	24.2	31.1
Intermediate	611	27.2	26.1	28.0	25.7	27.8
Working-class	958	42.7	46.4	40.3	48.8	40.5
Unemployed	17	0.8	1.6	0.2	1.3	0.6
Parent with psychosis						
No	2145	96.1	92.9	98.3	95.5	96.3
Yes	88	3.9	7.1	1.7	4.5	3.7
Cannabis use						
Never	1128	45.7	35.6	52.8	50.2	44.1
Past use	963	39.0	42.6	36.6	32.8	41.4
Current use	376	15.2	21.9	10.6	16.9	14.6

(*Continued*)

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Table 1. (*Continued.*)

	All ($N = 2507$)		Case *v.* control ($N = 1040$ cases)		Minority *v.* majority ($N = 683$ minorities)	
	n	Total %	Case %	Control %	Minority %	Majority %
Major discrimination						
None	1571	62.7	58.2	65.8	50.2	67.4
1 type	504	20.1	20.2	20.0	22.3	19.3
2 types	235	9.4	10.4	8.7	12.9	8.1
3 + types	197	7.9	11.3	5.5	14.6	5.3

[a]Mean (s.d.); due to missing data, *n* may not add to the sample totals.

(e.g. structural discrimination, other forms of major discrimination, any measures of chronic, everyday discrimination, and experiences not perceived as discriminatory by the individual) and therefore likely underestimates experiences of discrimination, yet it is a more comprehensive measure than most prior studies investigating discrimination and psychosis.

Perceived discrimination and psychosis

These limitations noted, our finding that broadly reporting any experience of major discrimination was not associated with increased odds of psychotic disorders aligns with the one prior case–control study that also used clinical diagnoses (Pearce et al., 2019; Veling, Hoek, & Mackenbach, 2008) and suggests this may not be a sufficient risk factor on its own. The finding that experiencing multiple types of major discrimination (i.e. pervasive experiences of discrimination) was associated with increased risk of psychotic disorders aligns with the recent systematic review that identified multiple studies that also found dose-response relationships using subthreshold psychotic experiences (Pearce et al., 2019). One of these prior studies also used the Major Experiences of Discrimination Scale, albeit a nine-item version restricted to items attributed to race or ethnicity, and also found ⩾3 types of major discrimination were associated with the highest risk for psychotic symptoms (Oh et al., 2016). Social adversities such as perceived discrimination are postulated to influence the risk of psychosis via both biological processes (e.g. stress dysregulation, abnormal dopaminergic functioning) (Berger & Sarnyai, 2015; Misiak et al., 2017; Morgan & Gayer-Anderson, 2016; Murray et al., 2017; Van Winkel et al., 2013) and psychological mechanisms (e.g. affective dysfunction, maladaptive cognitive schema) (Bentall et al., 2014; Collip et al., 2008; Howes & Murray, 2014; Misiak et al. 2017; Morgan & Gayer-Anderson, 2016; Williams et al. 2018).

Study implications

While advances in genetics and neurobiology offer critical insights into the onset and progression of psychosis, there is now growing evidence for the additional role of social adversities (Murray et al., 2017). Social adversities affect risk across groups, including the ethnic majority as demonstrated by inclusion in this study, although the relative importance of social adversities appears to be greater for minority ethnic groups. Current findings support this idea that greater experiences of social adversities such as perceived discrimination may contribute to the excess risk of psychosis among minority ethnic groups (Dykxhoorn & Kirkbride, 2018; Morgan et al., 2010; Morgan, Knowles, & Hutchinson, 2019). Recent global meta-analyses have found being a migrant and/or member of a minority ethnic group are consistently associated with increased risk of psychotic symptoms (Leaune et al., 2019) and psychotic disorders (McGrath et al., 2004; Selten, van der Ven, & Termorshuizen, 2020), as confirmed in the recent EU-GEI incidence study (Jongsma et al., 2018) from which this case–control study is drawn. These rates vary both by region of ethnic origin and the specific catchment region, further supporting differences due to the social context (Termorshuizen et al., 2020). Self-reported experiences of major discrimination operationalize one aspect of potential unfair treatment for individuals perceived as members of minority ethnic groups within these contexts. Further, even when the prevalence of these types of major experiences are similar across ethnic groups with psychotic disorders, minority ethnic groups are more likely to attribute them to discrimination based on race or ethnicity (Gilvarry et al., 1999).

It is important to note that the higher prevalence of social adversities among minority ethnic groups are part of the broader fabric of racism that leads to systemic, avoidable, and unfair inequalities in power, resources, capacities and opportunities across racial or ethnic categorizations perceived as inferior (Paradies et al., 2015; Williams, Lawrence, & Davis, 2019). Racism occurs simultaneously across multiple levels including structural (e.g. institutions, policies), interpersonal (between individuals), and internalized (negative beliefs and stereotypes applied to self) levels. For example, it is postulated that minority ethnic groups experience greater economic disadvantage, a sense of being a member of a devalued, low-status group, and the personal experiences of racial discrimination (Nazroo, 2003). But studies including our own typically rely only on self-reported perceptions of interpersonal discrimination and therefore underestimate the full consequences of structural racism on health. The types of perceived major discrimination measured in this study hint at a further social disadvantage, as each domain can have a cascade of consequences of their own (e.g. being unfairly targeted by the police affecting employment opportunities, being unfairly fired preventing the purchase of basic needs). This may help contextualize why the exploratory mediation analysis found that discrimination only explained a small proportion of excess risk for psychosis among minority ethnic groups. It is worth considering the role of discrimination as a risk factor for psychosis among

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Table 2. Associations between major discrimination and psychosis in the EU-GEI case–control sample

	Sample		Unadjusted		Age- & sex-adjusted		Fully adjusted[a]	
	N	%	OR	95% CI	OR	95% CI	OR	95% CI
Minority ethnic group								
No	1823	72.8	*Reference*		*Reference*		*Reference*	
Yes	683	27.2	1.58	1.21, 2.07	1.41	1.06, 1.87	1.42	1.08, 1.85
Any discrimination								
No	1571	62.7	*Reference*		*Reference*		*Reference*	
Yes	936	37.3	1.27	0.91, 1.78	1.36	0.99, 1.88	1.20	0.91, 1.59
Discrimination types								
None	1571	62.7	*Reference*		*Reference*		*Reference*	
1 type	504	20.1	1.11	0.79, 1.57	1.16	0.83, 1.62	1.08	0.77, 1.51
2 types	235	9.4	1.19	0.72, 1.96	1.30	0.78, 2.19	1.14	0.69, 1.87
3 + types	197	7.9	2.02	1.25, 3.24	2.26	1.46, 3.50	1.79	1.19, 2.71
Age	2505	99.9			0.94	0.93, 0.96	0.94	0.93, 0.96
Sex								
Female	1177	46.9			*Reference*		*Reference*	
Male	1330	53.1			1.52	1.33, 1.75	1.42	1.15, 1.76
Parent social class								
Professional	657	29.3					*Reference*	
Intermediate	611	27.2					1.18	0.91, 1.53
Working-class	958	42.7					1.56	1.15, 2.12
Long-term unemployed	17	0.8					7.02	2.20, 22.44
Parent with psychosis								
No	2145	96.1					*Reference*	
Yes	88	3.9					3.52	2.39, 5.19
Cannabis use								
Never	1128	45.7					*Reference*	
Past	963	39.0					1.54	0.99, 2.37
Current	376	15.2					1.89	1.10, 3.24

[a]Separate models were fit for minority ethnic group, any discrimination, and types of discrimination; each model adjusted for age, sex, parent social class, parent history of psychosis, cannabis use; ORs for covariates are from the models for types of discrimination.

minority ethnic groups within the constellation of other social adversities (e.g. Jongsma et al., 2020).

In this context, the higher prevalence of multiple different types of discrimination among minority ethnic groups could contribute to stronger feelings of distrust and hostility, as these experiences of unfair treatment start to feel pervasive rather than isolated events (Schmitt et al., 2014). It has been posited that greater exposure to systemic social adversities over time, particularly those involving high levels of interpersonal threat, hostility, and violence, could help explain the excess rates of psychotic disorders in some minority ethnic groups (Morgan et al., 2019). This could also be exacerbated by the additional unfair treatment of members of minority ethnic groups *with psychosis*, such as more harmful entries into care (e.g. compulsory admission, police and criminal justice contact) (Halvorsrud et al., 2018). This becomes complex given the symptoms of psychosis such as paranoia, in which individuals have persistent concerns that others intend to cause them harm. It will be crucial to parse symptoms of psychosis such as paranoia and delusions from a reasonable response to prior experiences of discrimination or else risk additional harms by the very institutes that are supposed to support these individuals.

Future studies should consider how perceived discrimination fits into the broader constellation of social adversities that may interactively increase the risk of psychosis. Much of the evidence to date for the role of social adversities on the risk of psychosis points to the role of early life adversities, the influence of early life adversities on later life adversities, and the cumulative experience of adversities across the life course (e.g. Morgan et al., 2014; Stilo et al., 2017; Varese et al., 2012), so it will be valuable to assess multiple social adversities simultaneously. Future studies should expand their measures of discrimination to include structural discrimination, additional domains of major discrimination, and

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chronic, everyday experiences of discrimination. They should also consider related consequences of perceived experiences of major discrimination, such as changes in employment, housing, and social relationships, which could lead to further social disadvantage and also increase the risk of psychosis. These future studies should consider protective factors that may attenuate the risk of psychosis among members of minority ethnic groups even after experiences of discrimination.

Conclusions

In this international investigation of psychotic disorders, pervasive experiences of major discrimination were associated with almost two-fold increased odds of a psychotic disorder. This appears to be driven in part by the much higher prevalence of pervasive experiences of discrimination among minority ethnic groups. This study bolsters prior ones by including psychotic disorder diagnoses, a more robust measure of discrimination, and an ethnic majority comparison group. Future studies should continue to investigate how additional aspects of discrimination, in combination with other social adversities, might help explain the excess risk of psychosis among minority ethnic groups.

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