Advancing our understanding of mental health outcomes in deprived communities

Charlotte Humphreys

Candidate ID: 100373521

Primary Supervisor: Dr Sheri Oduola

Secondary Supervisor: Dr Joanne Hodgekins

Doctoral Programme in Clinical Psychology

University of East Anglia

Faculty of Medicine and Health Sciences

Submission date: 1st April 20224

Thesis portfolio word count: 29,831

The author would like to acknowledge that material from their ClinPsyD thesis portfolio has been used throughout.

Abstract

Background Residents of deprived areas are at increased risk of experiencing poor well-being, common mental health difficulties and psychotic disorders, partially due to the social stressors present in their neighbourhoods. There is now greater recognition of the social determinants of mental health, with a focus on situating the individual and their treatment in the environment in which they live. However, unpicking social inequalities is likely to be complex, concerning the intersectionality of the different parts of an individual's identity.

Methods A systematic review using narrative synthesis was conducted which synthesised papers measuring the impact of community-based interventions on mental health outcomes in residents of deprived areas. A quantitative study was conducted examining the intersection of area-level deprivation, ethnicity and inpatient use (defined by risk of compulsory admission, admission to a Psychiatric Intensive Care Unit, length of stay and number of admissions). This study made use of anonymised electronic health records to identify a sample of 6767 patients with psychotic disorders who were admitted to hospital for psychiatric treatment in South London between 2016-2019. Data were analysed using stratified Logistic or Negative bionomical regressions.

Results Twenty-six papers, reporting on 21 studies were included in the systematic review. Overall findings about the impact of community-based interventions were mixed, with some promise for skills-based interventions and interventions with a narrower focus in their delivery and target audience. The empirical paper found living in all areas except the least deprived and belonging to a black ethnic minority group increased patients' risk of most inpatient-related outcomes. Living in the least deprived areas appeared to protect some ethnic minority groups from increased risk of compulsory admission, but not black British or Asian patients.

Conclusions The findings highlight the benefits of addressing social stressors for residents of deprived areas through community-based interventions and the potential consequences of failing to address these for residents with psychotic disorders who can be left at greater risk of severe symptomatology which requires inpatient hospital admission.

Access Condition and Agreement

Each deposit in UEA Digital Repository is protected by copyright and other intellectual property rights, and duplication or sale of all or part of any of the Data Collections is not permitted, except that material may be duplicated by you for your research use or for educational purposes in electronic or print form. You must obtain permission from the copyright holder, usually the author, for any other use. Exceptions only apply where a deposit may be explicitly provided under a stated licence, such as a Creative Commons licence or Open Government licence.

Electronic or print copies may not be offered, whether for sale or otherwise to anyone, unless explicitly stated under a Creative Commons or Open Government license. Unauthorised reproduction, editing or reformatting for resale purposes is explicitly prohibited (except where approved by the copyright holder themselves) and UEA reserves the right to take immediate ‘take down’ action on behalf of the copyright and/or rights holder if this Access condition of the UEA Digital Repository is breached. Any material in this database has been supplied on the understanding that it is copyright material and that no quotation from the material may be published without proper acknowledgement.

Table of contents

Appendices

List of tables

List of Figures

Acknowledgements

Firstly, I would like to thank my research supervisors for their guidance and support over the past three years. Sheri Oduola, thank you for sharing your passion and knowledge with me. Jo Hodgekins, thank you for providing feedback throughout this project. Your belief in my abilities has pushed me to become a better researcher and ultimately complete a thesis I am proud of. I would also like to thank the Clinical Record Interactive Search (CRIS) Team for their support with my empirical paper.

Thank you to my friends and peers on the course who have offered their encouragement and helped me to see I am more capable than I think. A special thank you to Nikki Wood who has shared most of this thesis journey with me and screened papers for my systematic review. Without your support, I could have not completed this work.

On a personal note, I would also like to thank the people in my life who have always cheered me, even when they did not fully understand what I was doing. To my family, thank you for believing in me. To my friends thank you for being patient and keeping me going through these past three years. Ian, you have been my rock, helping me move through more difficult moments and celebrating the small wins throughout this journey. Thank you for everything.

Chapter One- Introduction

This thesis aims to advance our understanding of mental health outcomes across the continuum of reduced well-being and mental health difficulties (MHD), both common MHD and psychotic disorders. This thesis hopes to highlight the importance of addressing the social stressors in these neighbourhoods through community-based interventions, decreasing the potential need for more restrictive interventions such as psychiatric inpatient admissions. This chapter will aim to define key terms pertinent to the thesis.

1.1 Mental health difficulties

Categorical approaches to understanding MHD define everyone as either having or not having a diagnosable MHD (Kraemer et al. 2004). These approaches have been criticized for encouraging more stigmatising views of MHD (Lahey et al. 2022), by viewing individuals experiencing MHD as fundamentally different to the general population (Peter et al. 2021). In comparison, continuum approaches view mental health and MHD as a single dimension, with one end representing mild or non-existent clinical symptoms, and the other end representing severe psychiatric symptoms or MHD. These approaches recognise that most people will experience decreases in well-being or some degree of mental illness symptomatology at some point. They view individuals experiencing MHD as having more severe symptoms than the general population, but not as being categorically different to them (Peter et al. 2021). Across the thesis portfolio, different parts of this continuum will be considered concerning residents of deprived areas, from being at risk of poor well-being and mental health to experiencing MHD.

MHD are typically understood in two main groups, common and severe (American Psychiatric Association, 2013). Common MHD include depression, phobias, social anxiety disorder, generalised anxiety, panic disorder, obsessive-compulsive disorder, and post-traumatic stress disorder (Kendrick & Pilling, 2012). While common, with an estimated global prevalence of 17.6% (Steel et al. 2014), symptom severity can vary greatly, with a general trend for lower rates of functional impairments and more positive treatment outcomes compared to severe mental illnesses like psychotic disorders (Evans et al. 2006).

In contrast, experiencing severe mental illnesses is associated with poorer long-term outcomes such as increased risk of unemployment (Lehman et al. 2002), greater physical health co-morbidities (Launders et al. 2022) and shorter life expectancy (Nielsen et al. 2020). In this thesis, we focus specifically on Psychotic disorders which encompass a range of severe mental illnesses including schizophrenia, schizoaffective disorder, schizophreniform disorder, and delusional disorder (NICE, 2014). Individuals diagnosed with psychotic disorders experience disruption to their thoughts, perception, mood, and behaviour which interferes with their sense of reality. Common experiences include hallucinations, delusions, apathy, and social withdrawal (NICE, 2014). While there are key differences between common mental illness and psychotic disorders, research has highlighted some overlap between the two. For example, on a clinical (and subclinical level) a co-occurring genetic vulnerability for depressive and psychotic symptomatology has been found (Klassen et al. 2013). Moreover, individuals with psychosis are significantly more likely to have subsequent experiences of common MHD such as generalised anxiety disorder, social phobia and depression (McGrath et al., 2016).

1.2 Social determinants of mental health

Historically medical or more biologically focused models for the aetiology of MHD have been favoured; however, these models were criticised for being too reductionist by failing to acknowledge the role psychosocial issues play in the development of MHD. The introduction of Biopsychosocial Models of MHD (Engel, 1977) emphasized the need to consider the psychological and social factors and how these interact with biological factors such as a person's genetic vulnerability to experiencing MHD symptomatology. The Fair Society, Health Lives review (Marmot, 2010) was pivotal in highlighting the extent to which social factors can determine mental health outcomes, linking inequalities in health with social inequalities. Since the initial development of the initial Biopsychosocial Model, several theories have been developed to explain why some groups in society are more vulnerable to experiencing MHD including the Social Causation theory (Johnson et al., 1999) and Social Stress theory (Aneshnsel, 1992). These theories are explained below, linking them to mental health inequalities experienced by residents of deprived areas and ethnic minority patients.

1.3 Area-level deprivation

Residents of deprived areas are one group identified as being at greater risk of experiencing both common MHD such as depression (Remes et al., 2015), and psychotic disorders such as schizophrenia (O'Donoghue et al. 2016). The Social Causation theory suggests that the characteristics of deprivation such as increased exposure to poor living conditions, decreased social capital and increased crime rates increase the risk of mental illness (Johnson et al., 1999). These environmental characteristics can have a psychological impact on residents who may be more vulnerable to experiencing decreased levels of well-being due to the lack of resources making it harder for them to leave behind their experience of deprivation (Jin et al., 2020). Moreover, exposure to specific domains of deprivation like neighbourhood criminal activity has been linked with an increased risk of psychosis, possibly due to the generation of social threats and increased likelihood of paranoia (Bebbington et al., 2004).

Definitions of deprivation have evolved from focusing on household-level poverty based on income to more broadly thinking about the characteristics of an area that may detract from or enhance its residents' living conditions (Perry, 2002). The concept of relative deprivation was pioneered by Townend (1979), who defined a deprived community as lacking the resources to have living conditions and amenities considered customary in the society they belong to. More recent definitions have begun to think about the types of resources these communities lack including necessities for living such as employment, economic investment, social organisation (Anderson et al., 1997), and the possibilities to choose their destination of residence (Piro et al., 2007). In the UK, relative deprivation is measured using separate Index of Multiple Deprivation (IMD) measures for each country (Noble et al. 2019). These measures combine 7 domains (income, employment, education, health, crime, living environment and barriers to housing) to give an overall measure of multiple deprivation experienced by people living in each neighbourhood. This measure can then be used to rank neighbourhoods relative to other areas in terms of deprivation. These measures are in line with the literature's more holistic approach to understanding area-level deprivation by considering the characteristics of the neighbourhood individuals live in more fully.

1.4 Intersectionality

While it is recognised that the residents of deprived areas are more vulnerable to experiencing MHD, unpicking this health inequality is likely to be complex as it concerns the interplay of various parts of individual identity, rather than a single linking mechanism (Bowleg, 2012). The term intersectionality was first used to conceptualise the multiple disadvantages Black women experienced where it was recognised that race and gender could not be seen as distinct characteristics (Falcon & Nash, 2015). This concept has since been applied to a range of fields including health inequalities and psychology (Bauer et al., 2021). Intersectionality assumes that parts of our identity such as the deprivation level of the area we live in, or our ethnicity, are mutually constructed and underlie interlaced systems of power that foster social formations of complex social inequalities (Gkiouleka et al., 2018).

Ethnicity refers to a multi-dimensional social construct which includes cultural traditions, nationality, shared language, and norms (Lu et al. 2022). Ethnic minority groups are numerically smaller in size and often possess cultural or ethnic characteristics different to the rest of the population (Krishnan et al. 2021). Ethnic minority patients have also been found to be at greater risk of experiencing mental health difficulties including psychotic disorders (Oduola et al., 2021), potentially due to the accumulation of stressors they experience due to disadvantaged minority status (Schofield et al. 2019).

We know that ethnic minority groups are more likely to live in deprived areas (Tinsley & Jacobs, 2006). This increased likelihood is driven by several factors including migration and a lack of opportunities and resources (Ingelbey, 2012). Ethnic minority groups from the Old Commonwealth migrated to urban areas of England post-war seeking employment, which left neighbourhoods struggling to provide adequate housing and living conditions for its residents (Fenton et al.2010). Fenton et al. argue that the lack of opportunities (e.g. educational advancement) to escape income security constrained movement to less deprived areas, resulting in some distinct settlement patterns that can still be seen today. The Social Stress theory (Aneshnsel, 1992) suggests that individuals are affected by both intrapersonal factors, the larger sociocultural context they inhabit and their social interactions. Ethnic minority patients living in more deprived areas may therefore be vulnerable to experiencing a greater range of stressors linked to the various parts of their identity. Stressors may include labour market disadvantages (Jivraj and Alao, 2023), experiences of discrimination or racism (Webster et al., 2003), and limited access to protective resources may make individuals more vulnerable to poor mental health (Trauer et al., 2006).

1.5 Community-level treatment for mental health difficulties

Given the greater recognition of the social determinants of health, there has been a drive to promote positive mental health and prevent MHD at the population level. Public Health England has recognised the value of working with communities to achieve this (South, 2015). This is in contrast to the way typical mental health services are commissioned to focus on the individual in front of them without addressing the wider social context they sit in and cannot address themselves (Gask et al., 2012).The National Health Service (NHS) Long-term Plan acknowledges the importance of placing mental health services at the heart of communities to ensure all residents can access the support they need, addressing local population needs (NHS, 2019). The introduction of Integrated Care Systems and Integrated Care Boards in 2022 can be seen as a step in this direction (Thomson and Chatterjee, 2023). These systems depend on the collaboration of health care services with community-based voluntary partners and local authorities, who are responsible for public health and social care to ensure the population's health needs are met in their entirety (van der Feltz-Cornelis, et al. 2023). Rethink Mental Health (2022) emphasises that for individuals experiencing MHD to thrive, reforms should be made beyond the NHS to address the lack of wider community support in areas such as housing and employment. They recognise that without these, individuals with MHD are more vulnerable to reaching a crisis point and requiring more intensive and expensive NHS treatment such as inpatient admissions.

However, there is a potential for community-based interventions to be heterogeneous, with currently little consensus around what works best for residents of deprived communities. Therefore, consensus is needed to inform how the Integrated Care Systems could best target their resources to improve the mental health of these communities.

1.6 Treatment in psychiatric hospitals

Without addressing the social stressors residents of deprived areas currently experience, there is a risk they will remain at increased risk of experiencing psychotic disorders (Bebbington et al., 2004). Research has shown that there is an elevated risk of admission for individuals experiencing psychotic disorders, often associated with severe symptomatology (Niedzwiedz et al. 2023), with over one-third of individuals being admitted to hospital for psychiatric inpatient treatment within two years (Gannon et al. 2023). These risk factors include the lack of insight, care avoidance, unauthorised cessation of medication (Jong et al. 2017) and delayed help-seeking during subclinical stages of psychosis (Schultze-Lutter et al. 2015). Treatment in an inpatient hospital may be considered if an individual's MHD is having a significant impact on their functioning or if there is significant concern that an individual is unable to keep themselves safe (Rozalski & McKeegan et al. 2019). In England, inpatient admissions can be voluntary or under the Mental Health Act (Department of Health,1983). This is the main piece of legislation covering the assessment (Section 2 and 4), treatment (Section 3) and rights of patients admitted against their will to hospital for treatment. Patients can be admitted to either an acute ward or moved to secure Psychiatric Intensive Care Units if their symptoms are particularly difficult to treat (Cullen et al. 2018). There are also specialist forensic wards to treat individuals, who typically have a history of offending and/or risk of violence. The NHS has set specific targets to ensure all admissions are no longer than 32 days, recognising the potential negative outcomes that longer length of stay can have, such as loss of social functioning (Tesng et al. 2020). Research has found that involuntary in- patient care is often a distressing and frightening experience for individuals, particularly associated with the use of force and restraint (Akther et al. 2019). These experiences can have a negative impact on relationships with mental health professionals, engagement with treatment and ultimately individual recovery (Douglas & Donohue, 2021).

1.7 Thesis aims and overview

This thesis aims to advance our understanding of mental health outcomes in residents of deprived communities across the continuum of reduced well-being and MHD (both common MHD and psychotic disorders). In line with the introduction of Integrated Care Systems, this thesis hopes to highlight the importance of addressing the social stressors characteristic of deprived neighbourhoods through community-based interventions, decreasing the potential need for more restrictive interventions such as psychiatric inpatient admissions.

Given Public Health England's focus on including the community in the promotion of mental health at the population level, a systematic review (including a narrative synthesis and meta-analysis) aims to explore the impact of community-based interventions on mental health outcomes in deprived communities. There are a higher prevalence of psychotic disorders and poorer mental health outcomes in deprived areas and among ethnic minority people. Chapter four presents an empirical paper which aims to explore the intersection between area-level deprivation and ethnicity, concerning inpatient-related outcomes such as frequency of hospital admissions, length of stay and use of the Mental Health Act using anonymised electronic health data. The links between these chapters are discussed in a bridging (chapter three) and discussion chapter (chapter five) with strengths, limitations and implications for clinical practice and research also considered.

Chapter two

A systematic review of the impact of community-based interventions for improving mental health outcomes in deprived neighbourhoods.

Charlotte Humphreys[1,2], Dr Joanne Hodgekins[1], Dr Sheri Oduola[2]

Submission to Health and Place

Word count in line with journal guidelines: 5,723

Author affiliations

1. Department of Clinical Psychology and Psychological Therapies, Norwich Medical School, University of East Anglia NR4 7TJ
2. Cambridge and Peterborough NHS Foundation Trust, Elizabeth House, Fulbourn, Cambridgeshire, CB21 54F
3. School of Health Sciences, University of East Anglia, Norwich Research Park, Norwich, NR4 7TJ, UK

*Corresponding author: Charlotte Humphreys, charlotte.humphreys@uea.ac.uk

2.1 Abstract

Residents of deprived communities face inequalities in their mental health outcomes. Community-based interventions which attempt to situate treatment in a person's social context have potential benefits for improving mental health and well-being. However, there is limited evidence of the impacts of these interventions in deprived communities. Medline, CINHAL, EMBASE, PYSHINFO and ASSIA databases were searched. Studies were included if they reported mental health outcomes in relation to a community-based intervention where the majority of patients lived in a deprived area. Using a narrative synthesis of 26 studies this paper synthesises evidence on the impact of community-based interventions on the mental health of residents in deprived communities. Findings about the impact of community-based intervention were mixed, with some promise for skills- based and more focused (in their delivery and target audience) interventions. However, there are clear research gaps in this area, which need addressing to enhance our understanding of the impact of community-based interventions in deprived areas such as how to make these interventions accessible to residents to improve engagement.

Key words: Community-based interventions, Deprivation, Communities, Mental health, Area-level characteristics.

2.2 Introduction

Living in deprived areas increases residents' health risks due to the ecological concentration of poverty, economic disinvestment, and social disorganisation (Anderson et al., 1997). These risk factors extend beyond individual households to the characteristics of individuals residing community (Thomson et al., 2020). The Fair Society, Healthy Lives Marmot review (Marmot, 2010) linked the characteristics of deprived neighbourhoods with wider health inequalities, supporting the social causation hypothesis (Johnson et al., 1999). Living in highly deprived areas exposes individuals to many stressors such as higher incidence of crime and poorer quality housing thus, having negative implications for mental health. These implications include a lack of well-being, which is defined as lacking positive emotions, control over one's life, a sense of purpose, and positive relationships (Ruggeri et al., 2020), as well as common (e.g. depression) (Stafford et al., 2007) or severe (e.g. psychosis) mental illness symptomatology. During the Covid-19 pandemic, the well-being of residents from deprived areas declined significantly. (Bezzo et al., 2021). Equally, men in deprived areas have a 50% higher chance of experiencing depression compared to those in less deprived areas (Remes et al., 2019)

Residents of deprived areas also face inequalities in treatment access (Delgadillo et al., 2016). This is possibly due to the paucity of interventions to address mental health outcomes in deprived communities. Despite health policy highlighting the need for community engagement in ensuring sustainable health gains at the population level, many socio-environmental stressors residents in deprived communities experience lie outside of the remit of mental health services (Alegria et al., 2018). These services are not designed to address the wider social, economic, and political context that can contribute to health inequalities such as poor-quality housing (Pevalin et al 2017).

Instead, they are clinically orientated and patient-centred e.g., treating the individual using medication, psychological therapy, or case management (Gask et al., 2012).

Community-based interventions can offer an alternative to the individual-focused interventions discussed above, by attempting to situate the individual and their care within their residing community. Typically, these interventions are actioned through a variety of public, and third-sector organisations within local communities (Bach-Mortensen et al. 2018), with facilitators often being peer mentors from the community themselves or lay people who have received some training to deliver interventions (Rose-Clarke et al, 2019) Interventions may use the community as a setting, delivered in accessible and familiar (compared to traditional clinical) spaces (Baskin et al., 2023). These interventions often target individuals within the community to reduce the population's risk of poor mental health. Examples include delivering exercise groups in community halls to improve mental health outcomes (Marzolini et al., 2009).

Equally, community-based interventions may directly target mental health improvement at a community level, creating a healthy community environment through broad changes in public policy and services (McLeroy et al., 2003). For example, increasing the amount of green space per capita to improve resident’s health (Benton et al., 2021). Community-based interventions can also view the community as a resource, marshalling a community's internal resources, working across community and voluntary sectors, and involving external facilitators to achieve positive health outcomes (McLeroy et al., 2003). This approach emphasizes community participation and ownership to sustain positive health outcomes at the population level (Castillo et al., 2019). For example, setting up a community garden run and maintained by the community itself (Tharrey et al., 2020) or the Healthy Start community-based federal program in America seeking to eliminate national disparities in infant mortality (Minkler et al., 2001). These different approaches to community-based interventions reflect different conceptions of the nature of community, the role of public health in addressing population health outcomes and how change is created.

Previous systematic reviews have focused on the impact of community-based interventions on mental health outcomes in other marginalised populations including those with severe mental illness (Killaspy et al., 2022), older adults (Lee et al., 2022), refugees (Siddiq et al., 2023) and ethnic minority groups (Baskin et al. 2021). In their review, McGrath et al., (2021) found certain community-based interventions (e.g. link workers) positively impacted the mental health of adults facing financial hardship. Moreover, a systematic review of non-pharmaceutical co-location interventions in primary care found interventions which focus on connecting individuals with their community had a positive impact on the well-being of deprived communities (Tanner et al., 2023). It is important to see if a wider range of community-based interventions can be of similar benefit to these communities.

To our knowledge, this is the first review to consider the impact of all community-based interventions on mental health in deprived areas. The lack of previous reviews in this area may reflect the lack of consistency in definitions for ‘deprived area’ and ‘community-based intervention’ within the literature. Given the likely heterogeneity between studies and the lack of previous systematic reviews, this systematic review is warranted. We employed a narrative synthesis approach to address the following research question: What effect do community-based interventions have on the mental health of residents of deprived communities?

2.3 Methods

2.3.1 Search strategy

This systematic review was registered on the International Register of Prospective Systematic Reviews (registration number: CRD42023385472). Searches were completed using MEDLINE, PsycINFO, CINHAL, EMBASE and ASSIA databases in January 2024. The search strategy incorporated a mix of keywords adapted for each database. The search terms were:

(Depriv* adj3 (place* OR area OR neighbo* OR district* OR communit* OR region* OR town* OR city or borough OR location* OR index))

AND
(wellbeing OR "mental health" OR "mental illness" OR "mental disorder" OR anxi* or depress* OR Psycho* or Bipolar OR "at-risk mental state" OR " schizophre*")

AND
((Community OR Outreach or Peer) adj5 (project* or representative* OR approach* engagement OR programme* OR based or intervention* OR treatment* OR worker* OR practitioner* OR supporter* OR training* OR help* Or group OR worker* OR project* or hubs)) OR (Befriend* OR "green space" OR "food security" OR "physical activity" OR "social activi*" OR training OR "signposting" OR "social prescrib*")

Backward citation searching was completed from reference lists of papers included in the full-text screening. Grey literature was not sought as we wanted to focus on peer-reviewed literature.

2.3.2 Inclusion and exclusion criteria

Inclusion and exclusion criteria were determined using the PICOS framework (see Table 1).

Table 1

Inclusion criteria

Population	
Inclusion	• Where at least 51% of the main beneficiaries of intervention must be individuals of all ages live in deprived areas of high-income counties (as defined by the World Bank). In line with other reviews (Visser et al. 2021) focusing on deprivation and mental health outcomes, high income countries were chosen as they likely have more comparable mental health expenditure per capita compared to low- and middle-income countries (Morris et al. 2012). • Authors must report how deprived area was operationalised using validated measures of deprivation, or by reporting the characteristics of the deprived area e.g., crime or unemployment levels. This is in line with previous systematic reviews focusing on deprived areas (Algren et al. 2015, Visser et al. 2021, Vos. A et al. 2014,) which allowed authors to come up with their own definition of a deprived area • Beneficiaries should be at risk of or with a diagnosis of a common (e.g., anxiety, depression), serious mental illness or poor well- being. Previous reviews of community-based interventions targeting other populations have also included both those at risk of and experiencing mental-ill health (Lee et al. 2021). Serious mental illness is defined as ICD-10 codes F20-33 in line with Nesvåg et al. (2017).
Exclusion	• Where 51% of individuals do not live in deprived areas and/or live in low- or middle-income countries (as defined by the world bank) • Where beneficiaries primary difficulty relates to something other than the defined mental health difficulties above such as physical health difficulties, dementia, or a learning disability.

Intervention	
Inclusion	• Inline with a mapping exercise by Duncan et al. (2021) interventions that took place in a non-clinical setting within the community, targeting both the individuals or/and the communities in which they live. This may include individual support and practical assistance to mobilising community connections and resources. Interventions could include co-location services such as social prescribing which is delivered in General Practice clinics but helps individuals access resources in the community (Duncan et al., 2021; Lee et al., 2022)
Exclusion	• Clinical or pharmaceutical interventions including medication and psychological therapy.
Comparator	
Inclusion	• Either a non-exposed comparison group or before-after intervention measurement in the intervention groups
Exclusion	• Studies without preintervention and postintervention measurements or a comparison group
Outcomes	
Primary	• Studies that collect pre-post, change score data or comparison data to a control group from commonly used validated measures for common mental health difficulties (e.g., anxiety and depression), general mental health/well-being or serious mental illnesses (psychosis).

2.3.3 Screening

Abstracts and full texts were screened by CH using Rayyan (Ouzzani et al. 2016) in line with the inclusion criteria (Figure 1). Twenty per cent of articles considered eligible during abstract screening were checked independently by a second reviewer (n=635), with an agreement rate of 99.69% (K=0.92). Discrepancies were discussed in a consensus meeting with SO.

2.3.4 Data extraction

An extraction form was developed including the following aspects: study design, population/sample details, intervention details, mental health outcomes, and results. Data were extracted independently by CH. Authors of papers were contacted to obtain additional information, with one supplying this.

2.3.5 Quality appraisal

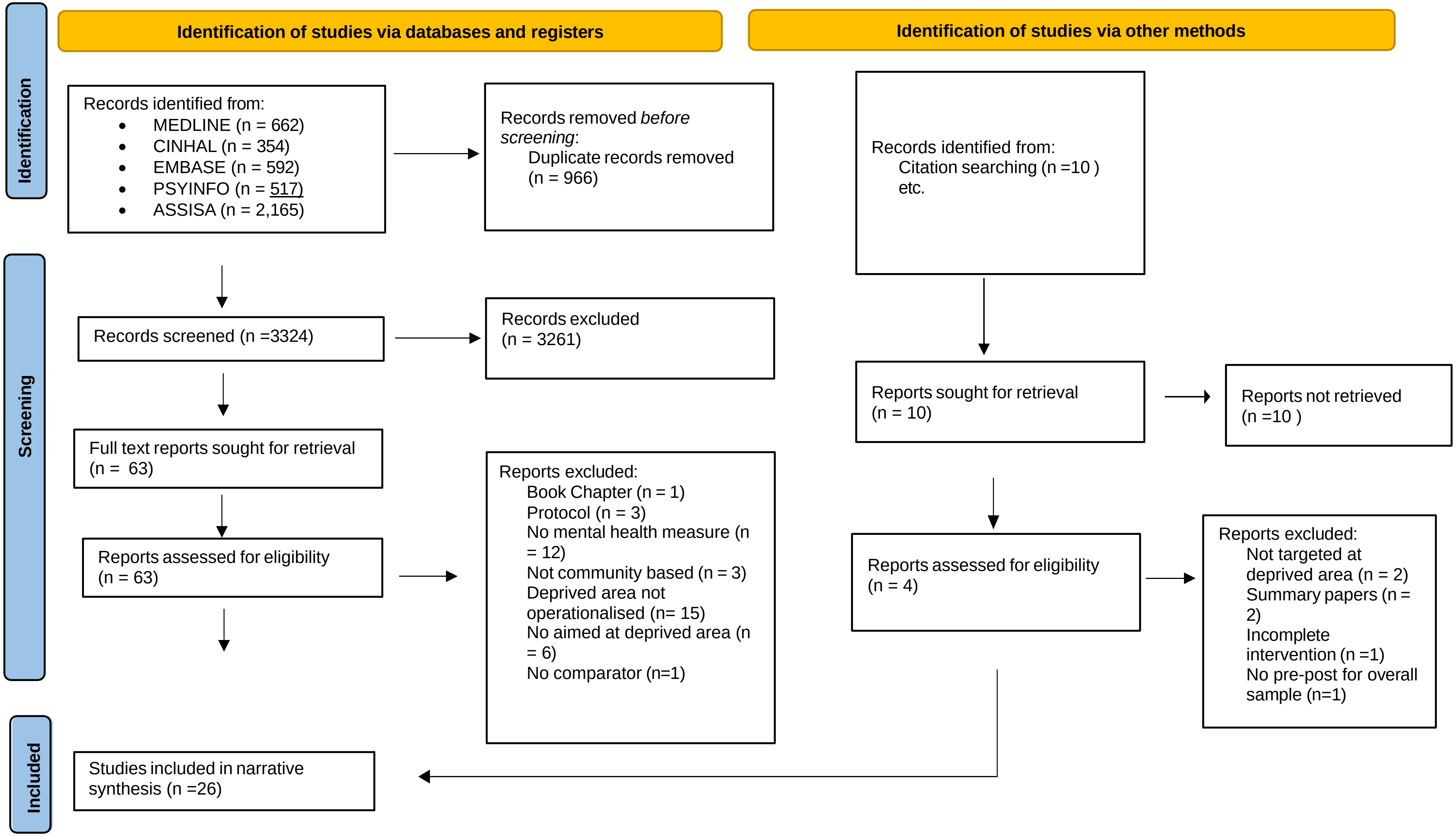
The methodological quality of studies was assessed using the Quality Assessment Tool for Quantitative Studies (Thomas et al., 2004) which was designed for use with a range of public health topics and has been used in reviews on community-based interventions in other populations (McGrath et al., 2021). Quality was assessed against eight domains: selection bias, study design, confounders, blinding, data collection methods, withdrawals, intervention integrity and analysis, with each study being assigned an overall rating of ‘high’, ‘moderate’ or ‘weak’. Individual study quality was assessed by CH, with 20% (n=6) being independently checked by a second reviewer, with an agreement rate of 73.3%. Discrepancies were discussed in a consensus meeting with the SO. Studies were not excluded based on their quality assessment.

2.3.6 Data synthesis plan

A narrative synthesis was conducted on all papers following guidance by Popay et al., (2006). Alongside SMD, where available odds ratios (for having poor mental health at last follow-up compared to control) were extracted (See Appendix D). Tabulation was used to synthesise similarities and differences between study findings, characteristics, and intervention features. A harvest post approach was taken, which is suited to combining research with different study designs and outcomes, to give an overall visual display of intervention impact (Ogilvie et al., 2008). Following, Cochrane's guidance, this assessment was based on direction of change, not statical significance (McKenzie & Brennan, 2023). This part of the review does not aim to understand the effectiveness of interventions but to understand their ability to create positive change more broadly. Each study's findings were assessed as either favouring the intervention's ability to create positive change (reporting a positive change in pre-post scores or outcomes favouring the treatment group compared to the control) or not favouring the intervention's ability to create positive change (reporting no between groups or pre–post differences, or pre-post difference in unwanted direction or outcomes favouring the control group). Where the direction of outcomes differed within one study, the majority direction was taken (Richards et al., 2018). Where this was difficult to determine, discussion with another member of the research team was held. A harvest plot was constructed to map interventions, research designs, study quality and reported outcomes to describe the scope and strength of each intervention.

Figure 1

Process of Identifying, Screening and Assessing Eligibility for Inclusion of Studies



2.4 Results

2.4.1 Study characteristics

Figure one shows the study selection process. Twenty-six papers met the inclusion criteria, reporting on 21 interventions. Table 2 summarises study characteristics. Two papers reported on the WellLondon intervention, one on adults (Phillips et al., 2014) and one on adolescents (Frostick et al., 2017). Three papers reported on the Dutch District approach (DDA), with one reporting outcomes in older adults (Timmermans et al., 2020) and three on adults. Linked to this (but considered separate interventions in this review), one paper focused on green area interventions as part of the DDA on mental health outcomes in adolescents and adults (Gubbels et al., 2016) and one on districts that had an additional public health focus on adults only (Ruijsbroek et al., 2022). Three papers were reported outcomes in adults for the New Deal for Communities (NDC) (Stafford et al., 2014, 2008; Walthery et al., 2015). All other papers (16) reported independent interventions, with 15 targeting adults and one targeting children.

Nineteen papers were from the UK covering 16 interventions, five from the Netherlands covering three interventions, one from Canada and one from Australia. Of the 21 interventions, 10 focused on using the community as a setting to target individuals' mental health, and the other 11 focused on community-based interventions delivered at the community level, viewing the community as a target or a resource. Six papers used a pre-post design with no comparator group. Of the 20 papers including a comparator group eight used a randomised control trial design (RCT) or randomised feasibility design, with another 12 using a quasi-experimental design. Eleven of these 20 papers used a repeated cross-sectional design whereby surveys were given to different members of the intervention (or control) community pre-and post-intervention. Two papers recruited participants with pre-existing mental health difficulties (post-natal depression) (Daley et al., 2008, 2015). Two studies included children with behavioural difficulties, though one measured outcomes in parents, not children (Baurach et al., 2021, Day et al., 2022). The other 22 papers recruited participants at risk of mental health difficulties or poor psychological well-being or, where a portion of the sample met cut-off for poor mental health at baseline, but this was not part of the inclusion criteria.

Table 2

Characteristics of included studies

ID	Author/ Intervention type	Intervention name/ Country	Design	Population	Largest Ethnic group	Definition of deprivation	Comparison group	Outcome measure	Measure of Engagement	Times taken
	Community engagement									
A	Eden & Lowndes 2013	Salford Health Improvement Service, UK	Pre-post	Adults who took part in initiatives between April 2011 and March 2012	Not reported	18th worse ranked local authority (of 326) in the 2010 IMD with 33% of the LSOAS among the 10% most deprived in England.	Pre-post only	WHO-5		Baseline and 6-8 week follow up
B	Phillips et al. 2014	WellLondon, UK	RCT	Eligible household members aged 16 living in area	White British Intervention 23% Control 25.7%	The 20 London boroughs containing at least 4 LSOAS falling among the most deprived 11% in London were chosen	One of the four neighbourhoods was control	GHQ-12 **WEMWBS**		**2 years follow up**

ID	Author/ Intervention type	Intervention name/ Country	Design	Population	Largest Ethnic group	Definition of deprivation	Comparison group	Outcome measure	Measure of Engagement	Times taken
						and the 4 most deprived identified in IMD				
C	Frostick et al. 2017	WellLondon, UK	RCT	Adolescents (11-16) living in one of 40 intervention or control LSOAs	Black Intervention 36.9% Control 33.2%	The 20 London boroughs containing at least 4 LSOAS falling among the most deprived 11% in London were chosen and the 4 most deprived identified in IMD	One neighbourhood was used as control	SDQ		Baseline and 2 year follow up
	Exercise									

ID	Author/ Intervention type	Intervention name/ Country	Design	Population	Largest Ethnic group	Definition of deprivation	Comparison group	Outcome measure	Measure of Engagement	Times taken
D	Daley et al. 2015	Physical Activity for Mums- Promoting Health and Recovery, UK	RCT	Women (18+) who were within 6 months of giving birth and had depression	White Intervention 57% Control 68%	79% participants lived in the two highest deprivation quartiles on IMD	Usual care	**EDPS**	85% of women completing at least 4 exercise logs	Baseline and 6- and **12-months post-randomization**
E	Daley et al. 2008	Exercise Intervention, UK	Feasibility RCT	Women (16+) who had depression and whose youngest child was less then 12 months.	White Intervention 66% Control 80%	83.7% of control and 80% of intervention participants lived in the two highest deprivation quartiles on IMD	Usual care	**EDPS**	90.9% meeting the intervention exercise goal in	Baseline, **12 week follow up**

ID	Author/ Intervention type	Intervention name/ Country	Design	Population	Largest Ethnic group	Definition of deprivation	Comparison group	Outcome measure	Measure of Engagement	Times taken
	Food									
F	Cummins et al. 2005	Large scale food retailing, UK	Controlled pre-post	Men and women (16+) who lived in the postcode district	Not Reported	DEPCAT score of 7 on SIMD (the most deprived populations)	Area 5km away from supermarket of similar deprivation	GHQ-12	30% of switched to new supermarket	Baseline and 10-month follow-up
	Green Space									
G	Chalmin-Pui et al. 2021	Residential front garden horticultural intervention, UK	Pre-post with pooled data	Adult residents from two streets	93% White	10% most deprived areas using IMD	Pooled data across both groups so pre post only	SWEMWBS	36% actively engaging with their new garden	2 weeks before intervention and 3 months follow-up

ID	Author/ Intervention type	Intervention name/ Country	Design	Population	Largest Ethnic group	Definition of deprivation	Comparison group	Outcome measure	Measure of Engagement	Times taken
H	Gubbles et al. 2016	Dutch District Approach, Holland (Green interventions)	Pre-post	Adults and adolescents living in 10 districts part of the Dutch District approach	Dutch Adolescents 52.1% Adults 69.0%	Targeted the 40 most deprived districts in the Netherlands	Pre/Post only	CES-D		Baseline and two years follow-up
I	Thompson et al. 2019	Woods In and Around Towns (WIAT) programme, UK	Controlled pre-post (cross-sectional & longitudinal samples)	Individuals (16+) within 1.5km of the relevant woodland site in intervention or control area	White Intervention 99% Control 99%	the worst 30% of deprivation in Scotland as measured by (SIMD)	3 control groups	SWEMWBS	Non-significant increase in visits to Woods	Baseline, approx. 1 year after baseline and approx. two years follow-up

ID	Author/ Intervention type	Intervention name/ Country	Design	Population	Largest Ethnic group	Definition of deprivation	Comparison group	Outcome measure	Measure of Engagement	Times taken
	Peer mentoring									
J	Cupples et al. 2010	The MOMENTS Study, UK	RCT	Primigravidae women (16-30) less than 20 weeks' gestation	Not reported	The lowest tertile of deprivation scores on IMD	Usual care	**SF-36 – mental health component**	48.8% complying with mentoring	**12 months follow-up**
K	Slade et al. 2021	Facilitating Perinatal Access to Resources and Support (PeARS), UK	Feasibility RCT	Women (18+) under community midwifery led care	83% White British	85% of the sample lived in the most deprived 10% of the IMD scores.	A booklet about local resources	**HADS** SWEMWBS	50% completing their antenatal plan	Baseline at booking visit, 37 weeks' gestation; Follow up **6 months postnatally**

ID	Author/ Intervention type	Intervention name/ Country	Design	Population	Largest Ethnic group	Definition of deprivation	Comparison group	Outcome measure	Measure of Engagement	Times taken
L	Day et al. 2022	Being a Parent Course, UK	Pre-post	Primary parental caregiver who: 1) reported difficulties in managing behaviour of an index child aged 2–5 years, and 2) expressed concerns	67.9% White	67.0% of venues in lowest third of the most deprived UK neighbourhoods, 29.9% in the 10% most deprived. 75.3% of parents lived in areas with higher-than-average deprivation. 27.4% in the 10% most socially deprived	Pre/post only	SWEMWBS	73.5% of mothers completed the parenting course	Baseline and in final session (week 8)

ID	Author/ Intervention type	Intervention name/ Country	Design	Population	Largest Ethnic group	Definition of deprivation	Comparison group	Outcome measure	Measure of Engagement	Times taken
				about their parenting.						
	Regeneration									
M	Dunn et al. 2023	Hamilton's Neighbourhood Action Strategy (NAS), Canada	Controlled pre-post	Residents (18+) in six intervention areas or control	76.5% born in Canada	Description of each intervention area eg. Rolston - high rates of poverty and child poverty compared to the City of Hamilton, and has the highest poverty rate on Hamilton's Mountain	People living control areas neighbourhoods with similar socio-economic & demographic characteristics as those in the intervention group	MHI5		Baseline (2011 to 2014); Follow up (2013-2016)

ID	Author/ Intervention type	Intervention name/ Country	Design	Population	Largest Ethnic group	Definition of deprivation	Comparison group	Outcome measure	Measure of Engagement	Times taken
N	Jalaudin et al. 2012	Urban Renewal project, Australia	Pre-post	Residents (18+) in households in two streets in a fringe suburb of Sydney	79% Australian	Area Compared to Sydney -Unemployment (8% vs 5%) -Owns a car (8% vs 13%) -Social housing (12% vs 5%) - tertiary qualification (31% vs 43%)	Pre and post only	K10		Baseline and 8 months follow-up
O	Jongeneel-Grimen et al. 2016	Dutch District Approach, Holland	Controlled pre-post (cross-sectional)	Adults (18+) living in area	Dutch Intervention 64%	40 most deprived districts in Netherlands.	Broad and narrow comparator	MHI5		Baseline (2004-2008) and (2008-2011)

ID	Author/ Intervention type	Intervention name/ Country	Design	Population	Largest Ethnic group	Definition of deprivation	Comparison group	Outcome measure	Measure of Engagement	Times taken
					Control groups 80%		areas and rest of Netherlands			
P	Mohan, Longo & Kee 2017	Neighbourhood renewal, UK	Controlled pre-post (cross-sectional)	Residents (16+) living in area	Not reported	Neighbourhoods fell in the 10% most deprived urban wards in Northern Ireland on NIMD	Two control groups of comparable deprivation and the rest of NI as 3rd control	GHQ12		Baseline (2001-2008) and follow up (2009-12)
Q	Ruijsbroek et al. 2022	Healthy Districts Experiment, Holland	Controlled pre-post (cross-sectional)	Adults (18+) plus and lived in target or control district	59.6% Western	The HDE was implemented in 19 of the 40 most deprived urban districts in 18 large Dutch cities.	Non HDE-target districts in Dutch District Approach	MHI5		Baseline and 6 month and 12-month post randomisation follow up

ID	Author/ Intervention type	Intervention name/ Country	Design	Population	Largest Ethnic group	Definition of deprivation	Comparison group	Outcome measure	Measure of Engagement	Times taken
R	Ruijsbroek et al. 2017	Dutch District Approach, Holland	Controlled pre-post (cross-sectional)	adults (18+) who lived in the 40-target district or the control areas at January 1st 2008.	Western Intervention 64.7% Control 82.2%	the 40 most deprived districts located in 18 large cities using data on physical and socio-economic deprivation, physical and social problems	Comparator area with similar neighbourhood and individual characteristics.	MH-5		Baseline (2004-2008) and follow up (2009-2013)
S	Stafford et al. 2014	New Deal for Communities, UK	Controlled pre-post	Residents (16+) over in NDC or comparator area	White Intervention 77.1% Control 90.1%	29/39 NDC areas fall within the 10% most deprived wards in England (IMD) and a further eight are within the 20% most deprived wards.	Comparator area	MHI5		Baseline (2002) and every two years till 2008

ID	Author/ Intervention type	Intervention name/ Country	Design	Population	Largest Ethnic group	Definition of deprivation	Comparison group	Outcome measure	Measure of Engagement	Times taken
T	Stafford et al. 2008	New Deal for Communities, UK	Controlled pre-post (cross-sectional)	One adult from each household in area.	% White Intervention 79% Control 83%	All put 2 areas in 2nd highest quintile, all areas had IMD2004 scores in the highest quintile.	Local deprivation matched comparator, high, medium, low deprivation comparator	MHI5 (Intervention and NDC comparator) GHQ12 (HSE)		Baseline (2002), 2-year, 4 year and 6 year follow up.
U	Timmermans et al. 2020	Dutch District approach, Holland	Controlled pre-post	random sample of older men and women (55–85 years),	Not reported	40 most deprived districts	The districts that were unaffected by the Dutch District Approach	MHI-5		Baseline (2001) and 2008 follow up

ID	Author/ Intervention type	Intervention name/ Country	Design	Population	Largest Ethnic group	Definition of deprivation	Comparison group	Outcome measure	Measure of Engagement	Times taken
V	Walthery et al. 2014	New Deal for Communities, UK	Controlled pre-post	Residents (16+) living in area	White Intervention 70.6% Control 45.9%	39 of the most deprived areas of England between 1998 and 2011	Comparator non-intervention areas	MHI5		Baseline, 2 year, 4 year, 6 year follow up
W	White et al. 2016	Communities First, UK	Controlled pre-post	Adult residents of Caerphilly County Borough, Wales	Not reported	Compared to Welsh average -unemployment (8.5% vs 5.4%) -Public housing (17% vs 13%) it ranked fourth out of 22 local authorities in Wales in the	Control neighbourhoods	MH-5		Baseline and 7 year follow-up

ID	Author/ Intervention type	Intervention name/ Country	Design	Population	Largest Ethnic group	Definition of deprivation	Comparison group	Outcome measure	Measure of Engagement	Times taken
						proportion of LSOAs that were in the 10% most deprived (27).				
X	Mercer 2019	The Glasgow Deep End Links Worker Programme, UK	CRCT	Adult patients who were registered with an intervention practice	Not reported	Practices with a high percentage of registered patients in practices living in the 15% most-deprived postcodes in Scotland	8 practises in deprived areas who did not implement intervention	HADS		Baseline and 9 month follow up
Y	Wiggins et al. 2004	Social Support and Family Health Study, UK	RCT	Women living in in selected London boroughs who	57% non-ethnic minority groups	Average Jarman underprivileged area scores for the two boroughs were 40	Usual care	EPDS GHQ12	18% of assigned women engaged	Baseline, 12 and **18 months follow up post** GHQ12 18

ID	Author/ Intervention type	Intervention name/ Country	Design	Population	Largest Ethnic group	Definition of deprivation	Comparison group	Outcome measure	Measure of Engagement	Times taken
				gave birth between 1 January and 30 September 1999.		and 49, considerably greater than the national average of zero.			with the organisations	month follow up only
Z	**Training**									
	Baruch et al. 2021	Parenting With Love and Limits (PLL), UK	Pre-post	Parents of 10-17year olds with behavioural problems, attended training	Non ethnic minorities 73.2%	About 83% of participants lived in the London Boroughs which are among the 20% most deprived boroughs in the country (IMD)	Pre-post only	Child Behaviour Check List (CBC)- internalising problems		Baseline and 3 to 6 weeks after final session

ID	Author/ Intervention type	Intervention name/ Country	Design	Population	Largest Ethnic group	Definition of deprivation	Comparison group	Outcome measure	Measure of Engagement	Times taken
				between January 2005 and May 2008						

Abbreviations: IMD= English Indices of deprivation, LSOAS = Lower layer Super Output Areas (areas comprising of between 400 and 1,200 households), SIMD= Scottish Indices of deprivation, NIMD= Northern Ireland Multiple Deprivation Measure, WHO-5 = The World Health Organisation- Five Well-Being Index, GHQ12 = General Health Questionnaire, MHI5= Mental Health Inventory, EPDS = Edinburgh Postnatal Depression Scale, SWEMBS = Short Warwick-Edinburgh Mental Well-being scale, CBC= Child Behaviour Checklist, HADS= Hospital Anxiety and depression scale, K10 = Kessler Psychological Distress Scale.

2.4.2 Definitions of deprived area

Studies defined deprivation differently, highlighting the lack of consensus around this term (Table 2). Most frequently interventions used established classification tools like the English Indices of Multiple Deprivation (IMD) (Noble et al., 2019), Scottish Indices of Multiple Deprivation (SIMD) (Fraser, 2020), Northern Ireland Multiple Deprivation Measure (NIMDM) (Ijpelaar et al., 2019) and Jarman Index (Main and Main, 1991). Most papers only recruited participants from the area they defined as deprived, with 20% of papers including a percentage of individuals outside of these areas. Studies using the IMD used this tool differently. Some reported deprivation using a percentage (with a range of 10-30% most deprived in England) and others reported quintiles, typically focusing on the two most deprived quintiles. Two interventions defined deprived area by comparing the characteristics of this area to the entire country or a less deprived area. One study used this method in combination with a validated measure. Four interventions quantified deprivation, without making it clear what validated measure they used (e.g., “40 most deprived areas in the Netherlands”).

2.4.2 Intervention and outcomes

Seven categories of intervention were identified: Community engagement, Food interventions, Green Space interventions, Peer mentoring, Signposting, Regeneration, and Training. These categories were loosely based on a mapping exercise by Duncan et al. (2021). Table 3 shows the characteristics of the different interventions, with blank squares indicating where a category was not applicable.

2.4.3 Measures of mental health

Across studies, 11 self-report measures of mental health and well-being were used. Measures of general mental health (GHQ-12 (Williams & Goldberg, 1988), SF-36 (Ware John Ware et al., 1996), MHI5 (Berwick et al., 1991)) were used in 14 studies. Well-being measures were used in six studies (SWEMBS (Stewart-Brown et al., 2009) and WHO-5 (Topp et al., 2015)). EPD was used to measure post-natal depression in three studies (Cox et al., 1987). Anxiety/depression measures were used in three studies (CESD (Radloff, 1977), HADS (Zigmond & Snaith, 1983)). Two papers used measures of emotional problems in children (CBC (Achenbach, 1992), SDQ (Goodman, 1997)) and one measure of distress (K10 (Kessler et al., 2002)). Zero studies used measures designed for serious mental illnesses like psychosis (SMI)

2.4.4 Quality appraisal

Quality varied between papers with eight studies receiving a weak rating, seven moderate and 11 strong as indicated in Table 4. All papers used validated and reliable measures of mental health, except Froswick et al., (2017) where reliability of the SDQ was difficult to determine. Limitations were generally due to selection bias, (whereby under 60% of the population agreed to take part) or high levels of withdrawal. In the quasi-experimental controlled pre-post studies, it was difficult for the research team to be blinded to who was in the intervention and control group. Several papers used different participants (from the same community) at each time point, making these papers non-applicable for withdrawal. =

Table 3

Intervention characteristics

	Community Engagement		Exercise		Green interventions			Food	Peer mentoring			Regeneration							Signposting		Training
	Salford Health Improvement Service	WellLondon	PAM-PeRS	Exercise intervention	Residential garden	DDA Green intervention	WIAT	Large scale food retailing	peARS	MOMENTS study	Being a Parent Course	urban renewal- Sydney	Hamilton’s NAS	Dutch District Approach	Healthy Districts Approach	New Deal for Communities	Neighbourhood renewal	Communities First	Link worker programme	community group support	Parenting With Love
Target	🏘	🏘	🧍	🧍	🧍	🏘	🏘	🏘	🧍	🧍	🧍	🧍	🏘	🏘	🏘	🏘	🏘	🏘	🧍	🧍	🧍
Facilitator	☻		☺	☺	☺	☺	☺		☻	☻	☻								☺	☺	☺
Delivery	🏢	🏢	☎ 🏠	☎ 🏠	🏠					☎ 🏠	🏢								🏥	☎ 🏠 🏢	🏢
Measured engagement?	X	X	√	√	√	X	√	√	√	√	√	X	X	X	X	X	X	X	√	√	X
Measured intensity												X	X	√	X	X	X	X			
Length (M)	1.84	42.03	6	2.76	3	24	21	10	11	16	1.84	12	72	48	48	144	108	84	9	12	1.38

Key:

🏘 = Whole community 🧍 = Individual in community

🧍 = Peer facilitator 🧍 = Non-peer facilitator

🏢 = Community building. 📞 = Telephone

🏠 = Home visit 🏥 = GP surgery

Table 4

EHPP Quality ratings

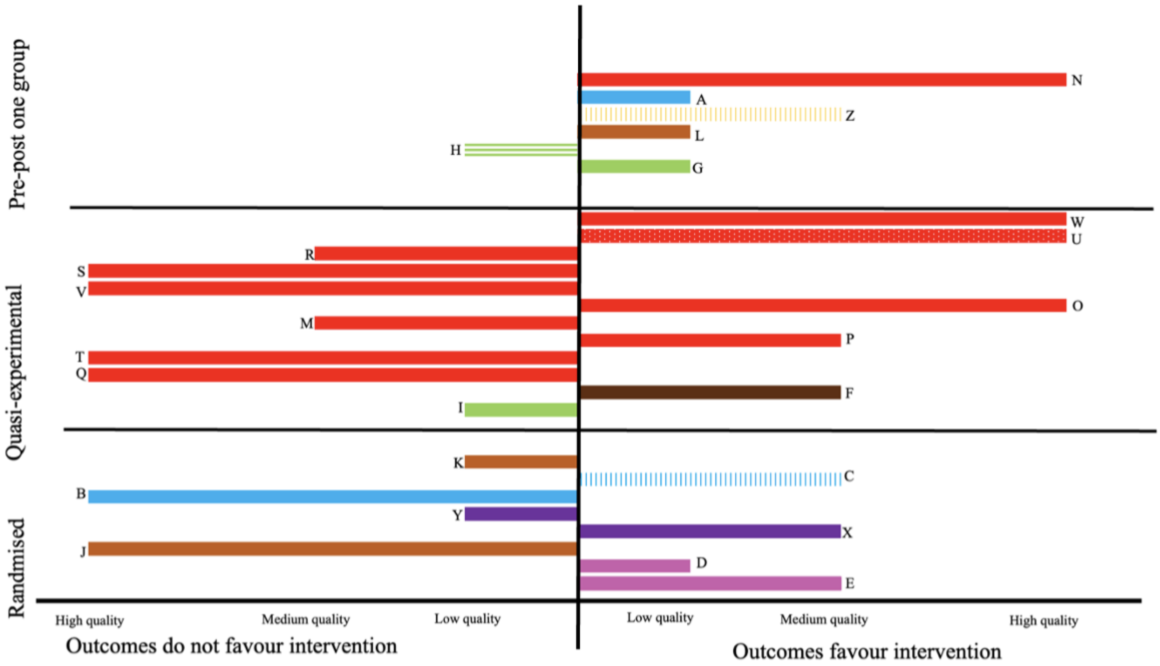
	Eden 2013	Frostick 2017	Phillips 2014A	Daley 2015	Daley 2008	Cummings 2005	Chalmin-Pui 2021	Gubbles 2016	Thompson 2019	Cupples 2010	Slade 2021	Day 2022	Jalaudin 2012	Dunn 2023	Jongeneel-Grimen 2016	Mohan 2017	Ruijsbroek 2022	Ruijsbroek 2017	Stafford 2008	Timmermans 2020	Stafford 2014	Walthery 2014	White 2016	Baruch 2011	Wiggins 2004	Mercer 2019
Selection Bias	W	W	M	W	W	W	W	W	W	M	W	W	M	M	M	S	M	M	M	M	M	M	M	S	W	W
Study design	M	S	S	S	S	M	M	M	M	S	S	M	M	M	M	M	M	M	M	M	M	M	M	M	S	M
Confounders	S	S	S	S	W	S	S	M	S	S	S	S	S	M	S	S	M	S	M	S	S	S	S	M	S	S
Blinding	W	M	M	S	S	M	W	M	M	M	M	W	M	M	M	M	M	M	M	M	M	M	M	M	W	M
Data collection methods	S	M	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Withdrawal	W			S	S	M	M	W	W	S	W	M		W		W		S						W	S	M
Total rating	**W**	**M**	**S**	**M**	**W**	**M**	**W**	**W**	**W**	**S**	**W**	**W**	**S**	**M**	**S**	**M**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**M**	**W**	**M**

W=Weak, M=Moderate, S=Strong

2.4.6 Narrative synthesis

Figure 2 shows a harvest plot of community-based interventions on mental health outcomes. Papers to the right reported outcomes in favour of the intervention, while papers to the left favoured the control group or reported no between group or pre–post differences. This was based on the direction of change, rather than statistical significance. The length of the bar depicts study quality, with longer bars being higher quality. Intervention category is shown by the colour of the bar. Study ID is indicated by the letter.

Figure 2: *Harvest plot of all papers*



Key: 🟥 = regeneration, 🟫 = food, 🟩 = green space, 🟪 = exercise,

🟨 = training, 🟧 = peer mentoring, 🟦= Community engagement

🟪 =signposting/info, dots= children and adults strips= children

Alphabet = Study ID (matching up to study ID in Table 2).

2.4.7 Community engagement

Two community engagement interventions focused on developing community capacity through the creation of community groups and resources (e.g., exercise and gardening groups). The WellLondon RCT was reported in two papers focusing on different age groups. In adults, the intervention group had lower well-being scores at follow-up (Phillips et al., 2014), whereas in children intervention group were found to have slightly higher well-being scores compared to the control group (Frostick et al.2017). A second community engagement intervention, The Salford Health Improvement Service, used a pre-post design and found positive changes in well-being scores for adults after the intervention (Eden and Lowndes, 2013). Comparing withdrawal across the two interventions is difficult because The WellLondon intervention used different participants (from the same community) at each time point, whereas the Salford Health Improvement Service suffered from high withdrawal rates in the same participants contributing to its overall weak quality rating. The two interventions differed in terms of length, with WellLondon taking significantly longer to deliver.

2.4.8 Exercise

An RCT (Daley et al., 2015) and a feasibility RCT (Daley et al., 2008) measured the impact of interventions promoting physical activity in new mothers with post-natal depression. These were the only studies in this review to include participants with existing mental illness. Both interventions included telephone and home visit consultations delivered by a professional to promote exercise uptake. Being a feasibility trial Daley et al. 2008 had a weaker quality rating, compared to the later full RCT, largely due to controlling for fewer cofounders. The studies differed in terms of intervention length (six months vs 12 weeks) and follow-up periods (six and 12 months vs 12 weeks). Both papers found the mean difference between the intervention and control group differed, favouring the intervention, but this was only significant in the RCT study at six months follow-up.

2.4. 9 Food intervention

Only one study of moderate quality measured the impact of large-scale food retailing on changes in mental health outcomes of residents who lived near the supermarket, compared to those who lived 5km away (Cummins et al., 2005).

Psychological health improved in the intervention area at 10-month follow-up, though this change was only significantly different to the control area in individuals who switched to the new supermarket. While it was difficult to understand the potential for selection bias as the paper did not report what percentage of eligible participants agreed to take part in the study, withdrawal throughout the study was only moderate.

2.4.10 Green space

Three weak-quality studies examined the effect of green space interventions on mental health outcomes in deprived areas, with inconsistent results. One focused on improving residents' front gardens and the other two on the regeneration of green areas in the community. The residential gardening intervention used a pre-post design, providing residents with gardening materials and access to horticultural experts to improve their front gardens (Chalmin-Pui et al. 2021). This study found a non-significant small mean increase in well-being scores after the intervention. This study had the shortest follow-up period in this category (three months). The two studies focusing on larger green-area regeneration found a detrimental intervention impact with green space interventions being associated with non-significant increases in depression (Gubbels et al., 2016) and a significant reduction in well-being (Thompson et al., 2019). They differed from Chalmin-Pui et al. (2021) as they used a controlled pre-post design to measure the impact of regeneration to larger community areas like woodlands (Thompson et al. 2019) and across district areas (Gubbles et al. 2016). These interventions focused on physical regeneration as well as community engagement activities such as photography walking groups and sporting events, whereas the first paper did not. These interventions took longer to implement (21 versus three months) and had longer follow-up periods (two years versus three months). All three studies suffered from high levels of selection bias, meaning findings are likely to be less generalisable.

2.4.11 Peer mentoring

The impact of peer mentoring interventions on changes in mental health was measured in 3 papers of varying quality. Two papers focused on individual mentoring for new mothers at risk of poor mental health (Cupples et al., 2011; Slade et al., 2021) and one paper on a peer-led group parenting course on parental well-being (Day et al., 2022). The number of interactions with the peer was similar across studies (average 8.5, 4 and 8 contacts), however, these interactions were delivered over a longer period in the two individual mentoring interventions compared to the group intervention (12 months and 8 months versus 8 weeks, respectively). Outcomes of the group intervention only favoured the interventions' ability to have a positive change on mental health (Day et al., 2022), however, this study suffered from higher withdrawal rates compared to the other two studies.

2.4.12 Regeneration

All regeneration studies involved varying degrees of physical regeneration (to buildings and green spaces), community events and engagement, which naturally made these some of the longest interventions in this review. No papers in this category measured individual engagement with regeneration elements. All interventions briefly mentioned an element of community- consultation or involvement in intervention planning, but none quantified this, meaning we cannot be sure how this may influence intervention outcomes. Focusing on specific interventions, the outcomes of two papers reporting on the DDA were found to favour the intervention in adults (Jongeneel-Grimen et al., 2016, Timmermans et al., 2020). A third found a comparable reduction in the percentage of residents with fair mental health in the intervention and control areas (Ruijsbroek et al., 2017). These studies measured the intensity of regeneration in each target district (based on the number of residents reached or the magnitude of environmental change achieved), finding positive non-significant trends in mental health in high-intensity districts, compared to low. Outcomes did not favour the intervention when comparing Health District areas which focused specifically on public health additions to other DDA areas (Ruijsbroek et al. 2022). Jongeneel-Grimen et al. (2016) paper used multilevel logistic regression models, this is a different approach to many of the other papers which typically used difference-in-difference models. Focusing on NDC interventions, all study outcomes did not favour the intervention (Stafford et al., 2014, 2008; Walthery et al., 2015). Outcomes of neighbourhood renewal projects in Wales, (White et al. 2016), Northern Ireland (Mohan et al., 2017) Australia were found to favour the intervention. (Jalaudin et al. 2012). Regeneration projects in Hamilton, Canada were found to produce a small improvement in mental health, but only in two of the six intervention neighbourhoods (Dunn et al., 2023). All papers in this category were of high quality (and were not applicable for withdrawal), *'(Frostick et al. 2017). A'* which was of moderate quality due to high levels of withdrawal.

2.4.12 Signposting

The impact of signposting interventions was measured in two RCTs of differing quality. The higher-quality paper, focused on community-link workers based in GP practises who support referrals to and ongoing contact with local community resources (Mercer et al., 2019). There was a small reduction in anxiety levels and a small increase in depression scores, with those who met with the link worker once or three times appearing to benefit most. For this reason, this paper was considered to favour the intervention. The lower-quality intervention focused on referrals to different community-based organisations for new mothers who offered advice and group activities (Wiggins et al., 2004). The intervention group had lower though not statistically significantly different depression scores at 12 months follow-ups compared to the control group, however, general mental health outcomes at 18 months and self-reported feelings of depression favoured the control group, making this paper overall not favour the intervention. This paper had a second intervention which was excluded for not meeting our criteria for community-based interventions.

2.4.14 Training

One moderate-quality pre-post study measured the impact of a group parenting training programme called Parenting with Limits delivered in community venues by a voluntary organisation for children with conduct disorder (Baruch et al., 2011). The group followed a manual, involving role plays and DVDs to teach strategies for managing challenging behaviour. Changes in internal emotional problems like anxiety in the child were measured. Post intervention there was a significant decrease in internalising problems in children.

2.5 Discussion

This systematic review is the first to our knowledge to explore the impact of community-based interventions on mental health and well-being outcomes in deprived communities. Findings were mixed across and sometimes within the seven identified intervention categories.

2.5.1 Interpretation of findings and recommendations

A harvest plot approach allowed for a broader understanding of the impact of different community-based interventions. In line with our review, skills-based interventions appear promising in targeting mental health and other public health outcomes in disadvantaged groups. (McGrath et al., 2021; O’Mara-Eves et al., 2015). Individuals facing economic hardship have identified developing agency as a feature of positive interventions (Bernard et al., 2023). Developing agency is arguably a key feature of skills-based interventions, which teach individuals the necessary skills to achieve their daily functions and make choices about their mental health (Drake et al., 2004). Services may benefit from constructing community-based interventions that promote agency through the development of skills, encouraging the individual to play an active role in their recovery. This feels particularly important when working with residents of deprived areas who typically feel their ability to exercise agency is restricted due to their social and structural context (Rikala, 2020).

Notably, skills-based interventions also had higher levels of engagement compared to less favourable interventions such as community group support for new mothers or large green space regeneration. Interventions targeting new mothers, with less favourable outcomes allowed individuals to decide how often they engaged in the intervention (Cupples et al. 2010, Slade, et al. 2021, Wiggins et al. 2004). After birth mothers can experience a period of adjustment, stress, and pressure (Asadi et al., 2020), especially mothers from deprived communities who may have limited social support to assist with this transition (Offer, 2012). Wiggins et al. (2004) found nearly a quarter of women reported not engaging in community groups due to lack of time. This highlights the need for community-based interventions to develop interventions alongside experts by experience who can provide insight into potential barriers to engagement and can think with services about how community-based interventions can be accessible to residents of deprived areas.

Engagement in larger regeneration interventions were lower in some interventions (Thompson et al. 2019). Despite this, Cummins et al. (2005) found residents who did engage by switching where they shopped benefitted most, and in the DDA residents living in more intensely regenerated areas were more likely to benefit (Jongeneel-Grimen et al. 2016, Timmermans et al. 2016). This suggests living in regeneration areas alone is not enough for change to occur. Involving residents in the design and implementation of community-level interventions has been identified as key to their potential success (Blakeley et al. 2009), however, willingness to engage in community engagement can be low due to consultation fatigue and feelings of disappointment (Attree et el. 2010). No regeneration studies quantified this in our review, meaning we were unable to ascertain if the degree of community engagement influenced study outcomes. Nonetheless, developers of regeneration interventions should prioritize encouraging sustainable engagement from communities. This should be done in a genuine, not tokenistic way that encourages a sense of agency and ownership within communities.

Similarly, to O'Mara-Eves et al., 2015 we found that more focused interventions (with fewer components or targeting specific mental health difficulties) generally had more favourable outcomes. In narrative synthesis, interventions which measured post-natal depression had a favourable impact compared to interventions targeting more broad mental health difficulties in new mothers. Moreover, other interventions where outcome measures aligned closely with aims and design (e.g. use of a Child Behaviour Checklist in a parenting course) were also found more favourable. Longer interventions such as regeneration are arguably less focused in their target as they target multiple characteristics of deprived communities, which can have unintended consequences as residents experience the implementation of multi-components as unpredictable and unsettling (Lewis, 2017). In this review, few studies measured the impact of components separately (Gubbels et al., 2016, Ruijsbroek et al., 2017). Without doing this there is a risk that conclusions are drawn about the entirety of the intervention's effectiveness when it may be one component limiting or enhancing its ability to create change. Though this poses challenges, research may benefit from attempting to measure different intervention components' impact. From a cost-effectiveness point of view, this will allow interventions to only include elements that are likely to lead to positive changes in mental health, reducing the financial cost of healthcare.

Understanding the current state of wider research in this area is important for contextualising this review's findings and recommendations. Evidence is sparse within each intervention category and research designs typically do not use randomisation, often considered unfeasible in public health interventions where it may be considered unethical to deny individuals an intervention believed to be beneficial (Bonell et al., 2011). There was a trend for pre-post (non-controlled) designs to have outcomes favouring the intervention's ability to positively change mental health outcomes, even when studies from the same intervention category using controlled designs did not. Higher-quality studies were less likely to have favourable outcomes, whereas most moderate-quality study had favourable outcomes and there was an even split in low-quality studies. This may be because almost all high-quality studies used different participants (from the same communities) at different time points meaning they were not rated on withdrawal which was something almost all the weak studies were rated down on. Ideally, more high-quality studies which used a randomised approach would be designed to contribute to future reviews enabling us to develop a fuller understanding of the potential effect of community-based interventions.

No papers were found including individuals with severe mental illness (SMI). This is surprising given deprivation is associated with a higher prevalence of SMI (Cruz et al., 2022) and previous reviews found support for the effectiveness of some community-based interventions on social outcomes in this population (Killaspy et al., 2022). The lack of papers in this area may reflect the typical treatments for SMI in high-income countries (e.g. medication and therapy) (Ride et al., 2020). More community-based interventions need to be targeted at this group to investigate whether the types of intervention found to create change in this review will have a similar effect on individuals with SMI in deprived areas.

In our review, 26% of papers did not report ethnicity data. Baskin et al., 2020 found few high-quality studies exist on community-based interventions for mental health outcomes in ethnic minorities more broadly. Individuals from ethnic minority backgrounds are more likely to live in deprived areas (Baker et al., 2013) and experience difficulties with their mental health (Proto & Quintana-Domeque, 2021), but are less likely to take part in research (Brown et al., 2014). Evaluations of community-based interventions should consider the barriers to the recruitment of ethnic minority individuals in their protocol to ensure findings are representative of the make-up of deprived communities.

2.5.2 Strengths and Limitations

This review was compressive, including 26 papers across seven intervention categories, employing narrative synthesis, however, it is important to consider the limitations of this review when considering the findings.

This review synthesised data from a range of heterogeneous studies investigating the impact of different community-based interventions, meaning caution should be applied in any conclusions drawn. This also means that only narrative synthesis (and not meta-analysis) was appropriate for synthesising all papers. The heterogeneity of interventions identified represents the wide range of interventions taking place in deprived communities, however, this posed a challenge when trying to understand which elements of interventions were accountable for the benefits observed. Interventions also used a range of outcome measures ranging from specific mental health difficulties to general mental health and well-being. While the range of measures highlights the many potential benefits of community-based interventions, it also highlights the further complexities this review faced in drawing comparisons between papers. More strict inclusion criteria could restrict future reviews to specific categories of community-based interventions, making comparisons easier.

Studies also used a range of definitions to define an area as deprived. While a global definition of deprivation is unlikely to be achieved, it may be possible for future reviews to explore the common features of how areas are defined as deprived within a single country. By identifying these common features, we may be able to work towards a shared understanding of how deprivation is conceptualised within a single country, making it easier to then make comparisons between interventions undertaken in deprived communities.

This review focused on high-income countries only. While this to done to limit the likely differences between countries in terms of factors such as expenditure on mental health, this approach limits our understanding of community-based interventions in deprived areas of middle or low-income countries. Further reviews should focus on deprived areas in middle or low-income countries to establish how effective community-based interventions are in these communities. If future reviews identify a scarcity of research in these countries, researchers may wish to consider adapting effective community-based interventions from high-income countries and evaluating their effectiveness in this context. Even between high-income countries, there are likely cultural differences which may impact the effectiveness of community-based interventions; therefore, researchers may wish to evaluate the effectiveness of the interventions this review found to be effective in their own contexts.

While using a harvest plot approach was well suited to synthesising data from clinically heterogenous studies, the plot itself does not consider effect size, significance, or the relative size of studies, only the direction of impact.

This review could have benefited from a blind second assessor of study outcomes. While a consensus discussion was had when the direction of change was difficult to determine, having a second independent reviewer assess all studies would ensure the reliability of synthesis.

2.4.3 Conclusion

Findings on the impact of community-based interventions were mixed, with a need for more high-quality randomised control trials to improve our confidence in any potential impact they may have. Currently, it appears that skills-based and more focused (in their delivery and target audience) interventions hold the most promise for impacting the mental health of deprived communities. There is an indication that those who can engage in community-based interventions benefit the most, however, services need to consider how to make interventions accessible to residents of deprived areas as they may experience greater barriers to engagement.

Highlights

- Findings on the impact of Community-based interventions are mixed, with a need for higher-quality studies.
- Skills-based training has the potential to have a positive impact on the mental health of deprived communities.
- Interventions more focused on their delivery and their target audience were also more promising.

Author contributions

Charlotte Humphreys: Investigation, Formal analysis, Writing - original draft, Visualization, Project Administration. **Charlotte Humphreys and Sheri Oduola:** Conceptualization, Methodology. **Sheri Oduola and Joanna Hodgekins:** Writing - review & editing, Supervision.

Systematic review registration

PROSPERO, the International Prospective Register of Systematic Reviews ID: registration number: CRD42023385472

Declaration of interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

2.6 References

Achenbach, T. 1992. Manual for the child behavior checklist. University Of Vermont, United States

Alegría, M., NeMoyer, A., Falgàs Bagué, I., Wang, Y., Alvarez, K., 2018. Social Determinants of Mental Health: Where We Are and Where We Need to Go. Current Psychiatry Reports 20. https://doi.org/10.1007/s11920-018-0969-9

Algren, M.H., Bak, C.K., Berg-Beckhoff, G., Andersen, P.T., 2015. Health-Risk Behaviour in Deprived Neighbourhoods Compared with Non-Deprived Neighbourhoods: A Systematic Literature Review of Quantitative Observational Studies. PLOS ONE 10, e0139297. https://doi.org/10.1371/journal.pone.0139297

Anderson, Paul Sorlie, Eric Backlund, Norman Johnson, George A. Kaplan, 1997. Mortality Effects of Community Socioeconomic Status. Epidemiology 8.

Asadi, M., Noroozi, M., Alavi, M., 2020. Factors affecting women’s adjustment to postpartum changes: A narrative review. Iran J Nurs Midwifery Res. https://doi.org/10.4103/ijnmr.IJNMR_54_20

Attree, P., French, B., Milton, B., Povall, S., Whitehead, M. and Popay, J., 2011. The experience of community engagement for individuals: a rapid review of evidence. Health & social care in the community 19, 250-260. https://doi.org/10.1111/j.1365-2524.2010.00976.x

Baker, J., Mitchell, R., Pell, J., 2013. Cross-sectional study of ethnic differences in the utility of area deprivation measures to target socioeconomically deprived individuals. Social Science & Medicine 85, 27–31. https://doi.org/10.1016/j.socscimed.2013.02.025

Baruch, G., Vrouva, I., Wells, C., 2011. Outcome Findings from a Parent Training Programme for Young People with Conduct Problems. Child and Adolescent Mental Health 16, 47–54. https://doi.org/10.1111/j.1475-3588.2010.00574.x

Baruch, G., Vrouva, I., Wells, C., 2011. Outcome Findings from a Parent Training Programme for Young People with Conduct Problems. Child Adolesc Ment Health 16, 47–54. https://doi.org/10.1111/j.1475-3588.2010.00574.x

Baskin, C., Duncan, F., Adams, E.A., Oliver, E.J., Samuel, G., Gnani, S., 2023. How co-locating public mental health interventions in community settings impacts mental health and health inequalities: a multi-site realist evaluation. BMC Public Health 23, 2445. https://doi.org/10.1186/s12889-023-17404-x

Baskin, C., Zijlstra, G., McGrath, M., Lee, C., Duncan, F., Oliver, E., Osborn, D., Dykxhoorn, J., Kaner, E., Gnani, S., 2020. Community interventions improving mental health in minority ethnic adults in the UK: a scoping review. Eur J Public Health 30. https://doi.org/10.1093/eurpub/ckaa166.1046

Benton, J.S., Cotterill, S., Anderson, J., Macintyre, V.G., Gittins, M., Dennis, M., Lindley, S.J., French, D.P., 2021. Impact of a low-cost urban green space intervention on wellbeing behaviours in older adults: A natural experimental study. Wellbeing, Space and Society 2. https://doi.org/10.1016/j.wss.2021.100029

Bernard, K., Wildman, J.M., Tanner, L.M., Stoniute, A., Still, M., Green, R., Eastaugh, C., Sowden, S., Thomson, K.H., 2023. Experiences of Non-Pharmaceutical Primary Care Interventions for Common Mental Health Disorders in Socioeconomically Disadvantaged Groups: A Systematic Review of Qualitative Studies. Int J Environ Res Public Health 20. https://doi.org/10.3390/ijerph20075237

Berwick, D.M., Murphy, J.M., Goldman, P.A., Ware, J.E.Jr., Barsky, A.J., Weinstein, M.C., 1991. Performance of a Five-Item Mental Health Screening Test. Med Care 29. https://doi.org/10.1097/00005650-199102000-00008

Bezzo, F.B., Silva, L., van Ham, M., 2021. The combined effect of Covid-19 and neighbourhood deprivation on two dimensions of subjective well-being: Empirical evidence from England. PLoS One 16. https://doi.org/10.1371/journal.pone.0255156

Blakeley, G. and Evans, B., 2009. Who participates, how and why in urban regeneration projects? The case of the new ‘city’of East Manchester. Social policy & administration, 43, 15-32. https://doi.org/10.1111/j.1467-9515.2008.00643.x

Bonell, C.P., Hargreaves, J., Cousens, S., Ross, D., Hayes, R., Petticrew, M., Kirkwood, B.R., 2011. Alternatives to randomisation in the evaluation of public health interventions: Design challenges and solutions. J Epidemiol Community Health 65, 582–587. https://doi.org/10.1136/jech.2008.082602

Brown, G., Marshall, M., Bower, P., Woodham, A., Waheed, W., 2014. Barriers to recruiting ethnic minorities to mental health research: A systematic review. Int J Methods Psychiatr Res 23, 36–48. https://doi.org/10.1002/mpr.1434

Castillo, E.G., Ijadi-Maghsoodi, R., Shadravan, S., Moore, E., Mensah, M.O., Docherty, M., Aguilera Nunez, M.G., Barcelo, N., Goodsmith, N., Halpin, L.E., Morton, I., Mango, J., Montero, A.E., Rahmanian Koushkaki, S., Bromley, E., Chung, B., Jones, F., Gabrielian, S., Gelberg, L., Greenberg, J.M., Kalofonos, I., Kataoka, S.H., Miranda, J., Pincus, H.A., Zima, B.T., Wells, K.B., 2019. Community Interventions to Promote Mental Health and Social Equity. Curr Psychiatry Rep. https://doi.org/10.1007/s11920-019-1017-0

Chalmin-Pui, L.S., Roe, J., Griffiths, A., Smyth, N., Heaton, T., Clayden, A. and Cameron, R. 2021. ‘It made me feel brighter in myself’- The health and well-being impacts of a residential front garden horticultural intervention. Landscape and Urban Planning 205. https://doi.org/10.1016/j.landurbplan.2020.103958

Cox, J.L., Holden, J.M., Sagovsky, R., 1987. Detection of Postnatal Depression: Development of the 10-item Edinburgh Postnatal Depression scale. British Journal of Psychiatry 150, 782–786. https://doi.org/10.1192/bjp.150.6.782

Cruz, J., Li, G., Aragon, M.J., Coventry, P.A., Jacobs, R., Prady, S.L., White, P.C.L., 2022. Association of environmental and socioeconomic indicators with serious mental illness diagnoses identified from general practitioner practice data in England: A spatial Bayesian modelling study. PLoS Med 19. https://doi.org/10.1371/journal.pmed.1004043

Cummins, S., Petticrew, M., Higgins, C., Findlay, A., Sparks, L., 2005. Large scale food retailing as an intervention for diet and health: Quasi-experimental evaluation of a natural experiment. J Epidemiol Community Health 59, 1035–1040. https://doi.org/10.1136/jech.2004.029843

Cupples, M.E., Stewart, M.C., Percy, A., Hepper, P., Murphy, C., Halliday, H.L., 2011. A RCT of peer-mentoring for first-time mothers in socially disadvantaged areas (the moments study). Arch Dis Child 96, 252–258. https://doi.org/10.1136/adc.2009.167387

Daley, A.J., Blamey, R. V., Jolly, K., Roalfe, A.K., Turner, K.M., Coleman, S., McGuinness, M., Jones, I., Sharp, D.J., Macarthur, C., 2015. A pragmatic randomized controlled trial to evaluate the effectiveness of a facilitated exercise intervention as a treatment for postnatal depression: The PAM-PeRS trial. Psychol Med 45, 2413–2425. https://doi.org/10.1017/S0033291715000409

Daley, A.J., Winter, H., Grimmett, C., McGuinness, M., McManus, R., MacArthur, C., 2008. Feasibility of an exercise intervention for women with postnatal depression: A pilot randomised controlled trial. British Journal of General Practice 58, 178–183. https://doi.org/10.3399/bjgp08X277195

Day, C., Harwood, J., Kendall, N., Nicoll, J., 2022. Impact of a peer-led, community-based parenting programme delivered at a national scale: an uncontrolled cohort design with benchmarking. BMC Public Health 22. https://doi.org/10.1186/s12889-022-13691-y

Deeks JJ, Higgins JPT, Altman DG (editors). Chapter 10: Analysing data and undertaking meta-analyses. In: Higgins JPT, Thomas J, Chandler J, Cumpston M, Li T, Page MJ, Welch VA (editors). Cochrane Handbook for Systematic Reviews of version 6.4 (updated August 2023). Cochrane, 2023. www.training.cochrane.org/handbook.

Delgadillo, J., Asaria, M., Ali, S., Gilbody, S., 2016. On poverty, politics and psychology: The socioeconomic gradient of mental healthcare utilisation and outcomes. British Journal of Psychiatry 209, 429–430. https://doi.org/10.1192/bjp.bp.115.171017

Dettori, J.R., Norvell, D.C., Chapman, J.R., 2022. Fixed-Effect vs Random-Effects Models for Meta-Analysis: 3 Points to Consider. Global Spine J.

https://doi.org/10.1177/21925682221110527

Drake, R.E., Mueser, K.T., Brunette, M.F., McHugo, G.J., 2004. A Review of Treatments for People with Severe Mental Illnesses and Co-Occurring Substance Use Disorders. Psychiatr Rehabil J 27, 360–374. https://doi.org/10.2975/27.2004.360.374

Duncan, F., Baskin, C., McGrath, M., Coker, J.F., Lee, C., Dykxhoorn, J., Adams, E.A., Gnani, S., Lafortune, L., Kirkbride, J.B., Kaner, E., Jones, O., Samuel, G., Walters, K., Osborn, D., Oliver, E.J., 2021. Community interventions for improving adult mental health: mapping local policy and practice in England. BMC Public Health 21. https://doi.org/10.1186/s12889-021-11741-5

Dunn, J.R., Halapy, E., Moineddin, R., Young, M., 2023. Short-term impact of a neighbourhood-based intervention on mental health and self-rated health in Hamilton, Ontario, Canada. Health Place 83. https://doi.org/10.1016/j.healthplace.2023.103052

Eden, A., Lowndes, J., 2013. Improving well-being through community health improvement: A service evaluation. Perspect Public Health. https://doi.org/10.1177/1757913913480292

Farahmand, F., Duffy, S., Tailor, M., Dubois, D., Lyon, A., Grant, K., Zarlinski, J., Masini, O., Zander, K., Nathanson, A., 2012. Community-Based Mental Health and Behavioral Programs for Low-Income Urban Youth: A Meta-Analytic Review. Clinical Psychology Science and Practice 19, 195–215. https://doi.org/10.1111/j.1468-2850.2012.01283.x

Frazer, E. (2020). Introducing the Scottish Index of Multiple Deprivation 20120. [online] National Statistics. https://www.gov.scot/binaries/content/documents/govscot/publications/statistics/2020/01/scottish-index-multiple-deprivation-2020/documents/scottish-index-multiple-deprivation-2020/scottish-index-multiple-deprivation-2020/govscot%3Adocument/scottish-index-multiple-deprivation-2020.pdf.

Frostick, C., Watts, P., Netuveli, G., Renton, A., Moore, D., 2017. Well London: Results of a Community Engagement Approach to Improving Health Among Adolescents from

Areas of Deprivation in London. J Community Pract 25, 235–252. https://doi.org/10.1080/10705422.2017.1309611

Gask, L., Bower, P., Lamb, J., Burroughs, H., Chew-Graham, C., Edwards, S., Hibbert, D., Kovandzic, M., Lovell, K., Rogers, A., Waheed, W., Dowrick, C., Group, A.M.P.R., 2012. Improving access to psychosocial interventions for common mental health problems in the United Kingdom: Narrative review and development of a conceptual model for complex interventions. BMC Health Serv Res. https://doi.org/10.1186/1472-6963-12-249

Goodman, R. (1997). The Strengths and Difficulties Questionnaire: A Research Note. Journal of Child Psychology and Psychiatry 38, 581–586. doi:https://doi.org/10.1111/j.1469-7610.1997.tb01545.x.

Gubbels, J.S., Kremers, S.P.J., Droomers, M., Hoefnagels, C., Stronks, K., Hosman, C., de Vries, S., 2016. The impact of greenery on physical activity and mental health of adolescent and adult residents of deprived neighborhoods: A longitudinal study. Health Place 40, 153–160. https://doi.org/10.1016/j.healthplace.2016.06.002

Johnson, J.G., Cohen, P., Dohrenwend, B.P., Link, B.G., Brook, J.S., 1999. A Longitudinal Investigation of Social Causation and Social Selection Processes Involved in the Association Between Socioeconomic Status and Psychiatric Disorders, Journal of Abnormal Psychology.

Jongeneel-Grimen, B., Droomers, M., Kramer, D., Bruggink, J.-W., Van Oers, H., Kunst, A.E. and Stronks, K., 2016. Impact of a Dutch urban regeneration programme on mental health trends: a quasi-experimental study. Journal of Epidemiology and Community Health, 70967–973. https://doi.org/10.1136/jech-2015-207016.

Jos IJpelaar, Power, T. and Green, B., 2019. Northern Ireland Multiple Deprivation Measures 2017. Journal of Statistical and Social Inquiry Society of Ireland, 48, 163-174.

Kessler, R.C., Andrews, G., Colpe, L.J., Hiripi, E., Mroczek, D.K., Normand, S.-L.

.T., Walters, E.E. And Zaslavsky, A.M. (2002). Short screening scales to monitor population prevalences and trends in non-specific psychological distress. Psychological Medicine, 32, 959–976. doi:https://doi.org/10.1017/s0033291702006074.

Killaspy, H., Harvey, C., Brasier, C., Brophy, L., Ennals, P., Fletcher, J., Hamilton, B., 2022. Community-based social interventions for people with severe mental illness: a systematic review and narrative synthesis of recent evidence. World Psychiatry. https://doi.org/10.1002/wps.20940

Lee, C., Kuhn, I., McGrath, M., Remes, O., Cowan, A., Duncan, F., Baskin, C., Oliver, E.J., Osborn, D.P.J., Dykxhoorn, J., Kaner, E., Walters, K., Kirkbride, J., Gnani, S., Lafortune, L., 2022. A systematic scoping review of community-based interventions for the prevention of mental ill-health and the promotion of mental health in older adults in the UK. Health Soc Care Community. https://doi.org/10.1111/hsc.13413

Lewis, C., 2017. Turning houses into homes: Living through urban regeneration in East Manchester. Environ Plan A 49, 1324–1340. https://doi.org/10.1177/0308518X17694360

Lin, L., Aloe, A.M., 2021. Evaluation of various estimators for standardized mean difference in meta-analysis. Stat Med 40, 403–426. https://doi.org/10.1002/sim.8781

Main, J.A., Main, P.G.N., 1991. Jarman index. BMJ 302, 850–851. https://doi.org/10.1136/bmj.302.6780.850-b

Marmot, M., 2010. Fair society, healthy lives : the Marmot Review : strategic review of health inequalities in England post-2010. ISBN 9780956487001

Marzolini, S., Jensen, B., Melville, P., 2009. Feasibility and effects of a group-based resistance and aerobic exercise program for individuals with severe schizophrenia: A multidisciplinary approach. Ment Health Phys Act 2, 29–36. https://doi.org/10.1016/j.mhpa.2008.11.001

McGrath, M., Duncan, F., Dotsikas, K., Baskin, C., Crosby, L., Gnani, S., Hunter, R.M., Kaner, E., Kirkbride, J.B., Lafortune, L., Lee, C., Oliver, E., Osborn, D.P., Walters, K.R., Dykxhoorn, J., 2021. Effectiveness of community interventions for protecting and promoting the mental health of working-age adults experiencing financial uncertainty: A systematic review. J Epidemiol Community Health. https://doi.org/10.1136/jech- 2020-215574

McKenzie JE, Brennan SE. Chapter 12: Synthesizing and presenting findings using other methods. In: Higgins JPT, Thomas J, Chandler J, Cumpston M, Li T, Page MJ, Welch VA (editors). *Cochrane Handbook for Systematic Reviews of Interventions* version 6.4 (updated August 2023). Cochrane, 2023. Available from www.training.cochrane.org/handbook.

McLeroy, K.R., Norton, B.L., Kegler, M.C., Burdine, J.N., Sumaya, C. V., 2003. Community-based interventions. Am J Public Health. https://doi.org/10.2105/AJPH.93.4.529

Mercer, S.W., Fitzpatrick, B., Grant, L., Chng, N.R., McConnachie, A., Bakhshi, A., James-Rae, G., O'donnell, C.A., Wyke, S., 2019. Effectiveness of community-links practitioners in areas of high socioeconomic deprivation. Ann Fam Med 17, 518–525. https://doi.org/10.1370/afm.2429

Metelli, S., Chaimani, A., 2020. Challenges in meta-analyses with observational studies. Evidence Based Mental Health 23, 83–87. https://doi.org/10.1136/ebmental-2019-300129

Minkler, M., Mildred Thompson, D., Judith Bell, M., Kalima Rose, M., 2001. Contributions of Community Involvement to Organizational-Level Empowerment: The Federal Healthy Start Experience, Health Education & Behavior. 28, 783-807. https://doi.org/10.1177/109019810102800609

Mohan, G., Longo, A., Kee, F., 2017. Evaluation of the health impact of an urban regeneration policy: Neighbourhood Renewal in Northern Ireland. J Epidemiol Community Health 71, 919–927. https://doi.org/10.1136/jech-2017-209087

Noble, S., McLennan, D., Noble, M., Plunkett, E., Gutacker, N. and Wright, M., 2019. Statistical Release: The English indices of deprivation 2019. https://assets.publishing.service.gov.uk/media/5d8e26f6ed915d5570c6cc55/IoD2019_Statistical_Release.pdf. Ministry of Housing, Communities & Local Government.

O'Mara-Eves, A., Brunton, G., McDaid, D., Oliver, S., Kavanagh, J., Jamal, F., Matosevic, T., Harden, A., Thomas, J., 2013. Community engagement to reduce inequalities in health: a systematic review, meta-analysis and economic analysis. Public Health Res 1. https://doi.org/10.3310/phr01040

Offer, S., 2012. Barriers to social support among low-income mothers. International Journal of Sociology and Social Policy 32, 120–133. https://doi.org/10.1108/01443331211214712

Ogilvie, D., Fayter, D., Petticrew, M., Sowden, A., Thomas, S., Whitehead, M., Worthy, G., 2008. The harvest plot: A method for synthesising evidence about the differential effects of interventions. BMC Med Res Methodol 8. https://doi.org/10.1186/1471-2288-8-8

Ouzzani, M., Hammady, H., Fedorowicz, Z., Elmagarmid, A., 2016. Rayyan—a Web and Mobile App for Systematic Reviews. Systematic Reviews 5. https://doi.org/10.1186/s13643-016-0384-4

Pevalin, D.J., Reeves, A., Baker, E., Bentley, R., 2017. The impact of persistent poor housing conditions on mental health: A longitudinal population-based study. Preventive medicine 105, 304–310. https://doi.org/10.1016/j.ypmed.2017.09.020

Phillips, G., Bottomley, C., Schmidt, E., Tobi, P., Lais, S., Yu, G., Lynch, R., Lock, K., Draper, A., Moore, D., Clow, A., Petticrew, M., Hayes, R., Renton, A., 2014. Well London Phase-1: results among adults of a cluster-randomised trial of a community engagement approach to improving health behaviours and mental well-being in deprived inner-city neighbourhoods. Community Health. https://doi.org/10.1136/jech

Popay, J., Roberts, H., Sowden, A., Petticrew, M., Arai, L., Rodgers, M., Britten, N., Roen, K., Duffy, S., 2006. Guidance on the Conduct of Narrative Synthesis in Systematic

Reviews A Product from the ESRC Methods Programme Peninsula Medical School, Universities of Exeter and Plymouth.

Proto, E., Quintana-Domeque, C., 2021. COVID-19 and mental health deterioration by ethnicity and gender in the UK. PLoS One 16. https://doi.org/10.1371/journal.pone.0244419

Radloff, L.S., 1977. The CES-D Scale: A self-report depression scale for research in the general population. Appl Psychol Meas 1, 385–401. https://doi.org/10.1177/014662167700100306

Remes, O., Lafortune, L., Wainwright, N., Surtees, P., Khaw, K.T., Brayne, C., 2019. Association between area deprivation and major depressive disorder in British men and women: A cohort study. BMJ Open 9. https://doi.org/10.1136/bmjopen-2018-027530

Richards, D.A., Hilli, A., Pentecost, C., Goodwin, V.A., Frost, J., 2018. Fundamental nursing care: A systematic review of the evidence on the effect of nursing care interventions for nutrition, elimination, mobility and hygiene. J Clin Nurs. https://doi.org/10.1111/jocn.14150

Ride, J., Kasteridis, P., Gutacker, N., Aragon Aragon, M.J., Jacobs, R., 2020. Healthcare Costs for People with Serious Mental Illness in England: An Analysis of Costs Across Primary Care, Hospital Care, and Specialist Mental Healthcare. Appl Health Econ Health Policy 18, 177–188. https://doi.org/10.1007/s40258-019-00530-2

Rikala, S., 2020. Agency among young people in marginalised positions: towards a better understanding of mental health problems. J Youth Stud 23, 1022–1038. https://doi.org/10.1080/13676261.2019.1651929

Rose-Clarke, K., Bentley, A., Marston, C., Prost, A., 2019. Peer-facilitated community-based interventions for adolescent health in low- and middle-income countries: A systematic review. PLOS ONE 14, e0210468. https://doi.org/10.1371/journal.pone.0210468

Ruggeri, K., Garcia-Garzon, E., Maguire, Á., Matz, S., Huppert, F.A., 2020. Well-being is more than happiness and life satisfaction: A multidimensional analysis of 21 countries.

Health Qual Life Outcomes 18. https://doi.org/10.1186/s12955-020-01423-y

Ruijsbroek, A., Mohnen, S.M., Droomers, M., Kruize, H., Gidlow, C., Gražulevičienė, R., Andrušaitytė, S., Maas, J., Nieuwenhuijsen, M., Triguero-Mas, M., Masterson, D., Ellis, N., Van Kempen, E., Hardyns, W., Stronks, K. and Groenewegen, P., 2017. Neighbourhood green space, social environment and mental health: an examination in four European cities. International Journal of Public Health, 62, 657–667. https://doi.org/10.1007/s00038-017-0963-8.

Ruijsbroek, A., Wong, A., den Hertog, F., Droomers, M., van den Brink, C., Kunst, A.E., van Oers, H.A.M., Stronks, K., 2022. Do inhabitants profit from integrating a public health focus in urban renewal programmes? A Dutch case study. PLoS One 17. https://doi.org/10.1371/journal.pone.0270367

Siddiq, H., Elhaija, A., Wells, K., 2023. An Integrative Review of Community-Based Mental Health Interventions Among Resettled Refugees from Muslim-Majority Countries. Community Ment Health J 59, 160–174. https://doi.org/10.1007/s10597-022-00994-y

Slade, P., Dembinsky, M., Bristow, K., Garthwaite, K., Mahdi, A., James, A., Rahman, A., Downe, S., 2021. Facilitating Perinatal Access to Resources and Support (PeARS): a feasibility study with external pilot of a novel intervention. BMC Pregnancy Childbirth 21. https://doi.org/10.1186/s12884-021-04112-w

Stafford, M., Badland, H., Nazroo, J., Halliday, E., Walthery, P., Povall, S., Dibben, C., Whitehead, M., Popay, J., 2014. Evaluating the health inequalities impact of area-based initiatives across the socioeconomic spectrum: a controlled intervention study of the New Deal for Communities, 2002–2008. Journal of Epidemiology and Community Health 68, 979–986. https://doi.org/10.1136/jech-2014-203902

Stafford, M., Chandola, T., Marmot, M., 2007. RESEARCH AND PRACTICE. Association Between Fear of Crime and Mental Health and Physical Functioning. Am J Public Health 97, 2076–2081. https://doi.org/10.2105/AJPH

Stafford, M., Nazroo, J., Popay, J.M., Whitehead, M., 2008. Tackling inequalities in health: Evaluating the New Deal for Communities initiative. J Epidemiol Community Health 62, 298–304. https://doi.org/10.1136/jech.2006.058628

Stewart-Brown, S., Tennant, A., Tennant, R., Platt, S., Parkinson, J., Weich, S., 2009. Internal construct validity of the Warwick-Edinburgh Mental Well-Being Scale (WEMWBS): A Rasch analysis using data from the Scottish Health Education Population Survey. Health Qual Life Outcomes 7. https://doi.org/10.1186/1477-7525-7-15

Suurmond, R., van Rhee, H., Hak, T., 2017. Introduction, comparison, and validation of Meta-Essentials: A free and simple tool for meta-analysis. Res Synth Methods. https://doi.org/10.1002/jrsm.1260

Tanner, L.M., Wildman, J.M., Stoniute, A., Still, M., Bernard, K., Green, R., Eastaugh, C.H., Thomson, K.H., Sowden, S., 2023. Non-pharmaceutical primary care interventions to improve mental health in deprived populations: a systematic review. British Journal of General Practice 73, 242–248. https://doi.org/10.3399/BJGP.2022.0343

Tharrey, M., Sachs, A., Perignon, M., Simon, C., Mejean, C., Litt, J., Darmon, N., 2020. Improving lifestyles sustainability through community gardening: results and lessons learnt from the JArDinS quasi-experimental study. BMC Public Health 20. https://doi.org/10.1186/s12889-020-09836-6

Thomas, B.H., Ciliska, D., Dobbins, M., Micucci, S., 2004. A process for systematically reviewing the literature: Providing the research evidence for public health nursing interventions. Worldviews Evid Based Nurs 1, 176–184. https://doi.org/10.1111/j.1524-475X.2004.04006.x

Thomson, D.R., Kuffer, M., Boo, G., Hati, B., Grippa, T., Elsey, H., Linard, C., Mahabir, R., Kyobutungi, C., Maviti, J., Mwaniki, D., Ndugwa, R., Makau, J., Sliuzas, R., Cheruiyot, S., Nyambuga, K., Mboga, N., Kimani, N.W., de Albuquerque, J.P., Kabaria, C., 2020.

Need for an integrated deprived area “slum” mapping system (IDEAMAPS) in low-and middle-income countries (LMICS). Soc Sci 9. https://doi.org/10.3390/SOCSCI9050080

Timmermans, E.J., Reinhard, E., Ruijsbroek, A., Huisman, M., Avendano, M., 2020. Regeneration of deprived neighbourhoods and indicators of functioning in older adults: A quasi-experimental evaluation of the Dutch District Approach. Health Place 64. https://doi.org/10.1016/j.healthplace.2020.102359

Topp, C.W., Østergaard, S.D., Søndergaard, S., Bech, P., 2015. The WHO-5 well-being index: A systematic review of the literature. Psychother Psychosom 84, 167–176. https://doi.org/10.1159/000376585

Visser, K., Bolt, G., Finkenauer, C., Jonker, M., Weinberg, D., Stevens, G.W.J.M., 2021. Neighbourhood deprivation effects on young people’s mental health and well-being: A systematic review of the literature. Social Science & Medicine 270, 113542. https://doi.org/10.1016/j.socscimed.2020.113542

Vos, A.A., Posthumus, A.G., Bonsel, G.J., Steegers, E.A.P., Denktaş, S., 2014. Deprived neighborhoods and adverse perinatal outcome: a systematic review and meta-analysis. Acta Obstetricia Et Gynecologica Scandinavica 93, 727–740. https://doi.org/10.1111/aogs.12430

Walthery, P., Stafford, M., Nazroo, J., Whitehead, M., Dibben, C., Halliday, E., Povall, S., Popay, J., 2015. Health trajectories in regeneration areas in England: The impact of the New Deal for Communities intervention. J Epidemiol Community Health 69, 762–768. https://doi.org/10.1136/jech-2014-204362

Ward Thompson, C., Silveirinha de Oliveira, E., Tilley, S., Elizalde, A., Botha, W., Briggs, A., Cummins, S., Leyland, A.H., Roe, J.J., Aspinall, P., Brookfield, K. and Mitchell, R., 2019). Health impacts of environmental and social interventions designed to increase deprived communities’ access to urban woodlands: a mixed-methods study. Public Health Research 7, 1–172. https://doi.org/10.3310/phr07020.

Ware John Ware, J.E., Article WARE, O., Jr, J.E., Ware, J.E., 1996. A 12-Item Short-Form

Health Survey: Construction of Scales and Preliminary Tests of Reliability and Validity. WARE: Med Care 34, 220–233. https://doi.org/10.2307/3766749

White, J., Gutacker, N., Jacobs, R., Mason, A., 2014. Hospital admissions for severe mental illness in England: Changes in equity of utilisation at the small area level between 2006 and 2010. Soc Sci Med 120, 243–251. https://doi.org/10.1016/j.socscimed.2014.09.03

Wiggins, M., Oakley, A., Roberts, I., Turner, H., Rajan, L., Austerberry, H., Mujica, R., Mugford, M., 2004. The Social Support and Family Health Study: a randomised controlled trial and economic evaluation of two alternative forms of postnatal support for mothers living in disadvantaged inner-city areas HTA Health Technology Assessment NHS R&D HTA Programme, Health Technology Assessment.

Williams, P. and Goldberg, D.P., 1988. A user’s guide to the General Health Questionnaire. Berkshire: NFER, Nelson, 1988.

Zigmond, A.S., Snaith, R.P., 1983. The Hospital Anxiety and Depression Scale. Acta Psychiatr Scand 67, 361–370. https://doi.org/10.1111/j.1600-0447.1983.tb09716.x

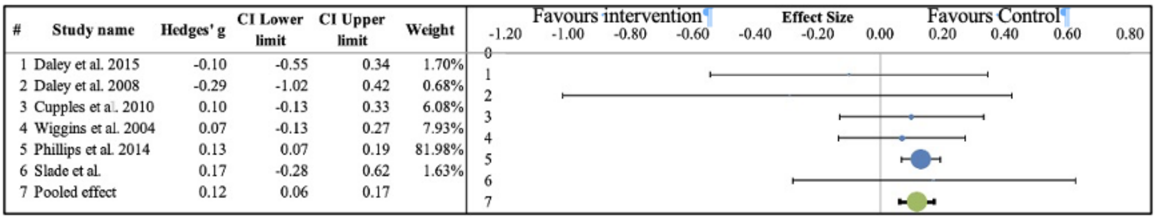
Chapter three- Extended results

Using Meta-Essentials (Suurmond et al., 2017), meta-analysis was undertaken on 6 papers with a randomised design and had available data on mental health outcomes for adults. Where information was available standardised mean difference scores (SMD) (between intervention and control group at last or only follow-up) were calculated, using Hedges G which corrects for small or inconsistent sample sizes (Lin and Aloe, 2021). SMD is a summary statistic that represents the size of the intervention effect in a study relative to the variability observed. For scales where a higher score indicates higher mental well-being or lower mental illness symptomatology, mean scores were inverted (multiplied by -1) before calculating the SMD (Deeks et al., 2023). Given some studies used multiple mental health outcomes, the following order: depression, anxiety, general mental health then well-being was used to decide which outcome measure (with the necessary data to calculate SMD) from each paper was included. Two meta-analyses were conducted: (1) all outcomes at last or only follow-up, (2) synthesising only papers which used the Edinburgh Postnatal Depression Scale (EPDS) (Cox et al., 1987), which was the most frequently used measure in randomised studies. A fixed-effects model was chosen as is this a convincing model for meta-analysis with too few studies to acquire accurate estimates of between-study variance and when studies share common effects (Dettori et al., 2022).

Six studies were eligible for meta-analysis: two exercise interventions, two peer mentoring, one training and one community engagement. The remaining studies were excluded for the following reasons: (1) the design and methodology were not compatible with the meta-analytic methodology, (2) the published article did not include sufficient information to calculate SMD and (3) contacted authors did not provide additional data.

A fixed-effect meta-analysis was run on six studies (total sample size=4778). This was done at the last (or only) follow-up time provided in the study using mental health outcomes highlighted in bold in Table 2. Our analysis showed a significant, yet negligible difference in mental health outcomes at the end of the community-based intervention, favouring the control group (Hedge's g = 0.12, 95% CI 0.06 to 0.17, p <.005). Heterogeneity between studies was low (Q =2.73, P =0.74, I^2=0.00). A sensitivity analysis was completed including only studies which included multiple follow-ups. Analysis suggested no significant difference in mental health outcomes at last follow-up, though the difference did favour the control group (Hedge’s *g* = 0.07 95% CI -0.15 to 0.30, *p* <0.15). Publication bias was found to be low through visual inspection of funnel plots (Appendix B) and Egger’s Regression (*p* = 0.08).

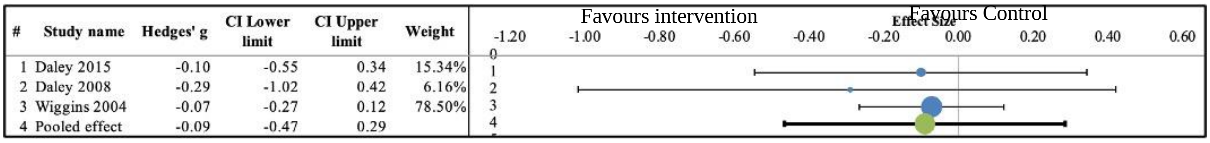
Figure 3: *Meta-analysis of all 6 randomised studies at last or only follow up*



#	Study name	Hedges' g	CI Lower limit	CI Upper limit	Weight
1	Daley et al. 2015	-0.10	-0.55	0.34	1.70%
2	Daley et al. 2008	-0.29	-1.02	0.42	0.68%
3	Cupples et al. 2010	0.10	-0.13	0.33	6.08%
4	Wiggins et al. 2004	0.07	-0.13	0.27	7.93%
5	Phillips et al. 2014	0.13	0.07	0.19	81.98%
6	Slade et al.	0.17	-0.28	0.62	1.63%
7	Pooled effect	0.12	0.06	0.17	

A separate analysis focused only on studies (total sample size = 110) which used the EPDS as an outcome measure, as this was the most frequently used measure across the eligible randomised studies. It should be noted that for Wiggins et al. 2004, EPDS was only used at 12-month follow-up and not 18 months, thus in the first meta-analysis GHQ-12 scores were used at 18 months as this analysis used the latest follow-up. Analysis suggested no significant difference in EPDS scores, though the difference did favour the intervention group (Hedge’s *g* = -0.09, 95 CI% -0.47 to 0.29). Heterogeneity between studies was low (Q=0.36, P=0.84, I^2= 0.00). Publication bias was found to be low through visual inspection of funnel plots (Appendix C) and Egger’s Regression (*p* = 0.31). Running a sensitive analysis including only the two papers by Daley which included only women who met the threshold for postnatal depression did not change these results (Hedge’s *g* = -0.15, 95 CI% -2.55 to 2.45).

Figure 4: *Meta-analysis for papers only using EPDS*



#	Study name	Hedges' g	CI Lower limit	CI Upper limit	Weight
1	Daley 2015	-0.10	-0.55	0.34	15.34%
2	Daley 2008	-0.29	-1.02	0.42	6.16%
3	Wiggins 2004	-0.07	-0.27	0.12	78.50%
4	Pooled effect	-0.09	-0.47	0.29	

Chapter four- Bridging chapter

This chapter aims to summarise the systematic review and provides a background for the empirical paper.

In the previous chapter, we sought to synthesise the available literature on the impact of community-based interventions on mental health outcomes, specifically in deprived areas. This systematic review found promise for certain community-based interventions such as those with a skills-based focus (e.g. parenting courses), interventions which were more focused in their delivery (e.g. had fewer components) and had more targeted audiences (e.g. targeting individuals with post-natal depression versus individuals at-risk of poor mental health generally). Moreover, there was a trend for residents to benefit from community-based interventions most when they could engage in them, emphasising the need for services to make interventions accessible to these communities. This review highlighted the importance of targeting social stressors in deprived areas via community-based interventions to improve residents' mental health.

Our review only identified papers which used measures of well-being and common mental illness, however, based on our findings, it is plausible that addressing stressors in the social environment of individuals with psychotic disorders, could also improve their mental health. There is a wealth of research highlighting the social determinants of psychosis including adverse childhood experiences (e.g. bullying and child abuse), experiences of migration, discrimination, and characteristics of deprived areas such as poverty and food insecurity (Jester et al. 2023). Exposure to these individual-level and ecological-level social factors may place individuals with an inherited vulnerability at greater risk of developing psychotic disorders (Shah et al. 2011). They are also at greater risk of experiencing worse outcomes such as relapse and increased negative symptoms (Jester et al. 2023). Therefore, it could be hypothesised that using community-based interventions to address the social stressors present in deprived communities has the potential to also protect residents more vulnerable to psychotic disorders from reaching crisis point which requires more restrictive interventions such as psychiatric inpatient admission.

The paucity of research on community-based interventions for psychosis in deprived areas is surprising given deprivation is associated with a higher prevalence of psychotic disorders (Cruz et al., 2022). One possible explanation for this is the beliefs held about the causes of psychosis and how these causal beliefs impact the type of treatment individuals with psychotic disorders are offered, and the likelihood of adherence to different treatments by the individual themselves (Carter et al. 2017). A scoping review by Rosenthal et al. (2021) found that most papers suggested that mental health professionals endorsed more biogenetic beliefs about the causes of psychotic disorders compared to psychosocial causes. Clinicians who hold biogenetic causal beliefs may be more likely to endorse biological interventions like medication as a treatment option compared to psychosocial-based interventions such as talking therapies (Carter et al. 2017b). This suggests that individuals with psychotic disorders may be less likely to be offered community-based interventions if clinicians favour organic causes for psychosis and fail to recognise the role social stressors play in increasing residents of deprived communities’ vulnerability to experiencing psychotic disorders.

We know that help-seeking is also more difficult for residents of deprived communities due to structural and psycho-social barriers such as inaccessibility, concerns around confidentiality and stigma (Doornbos et al. 2013). Individuals who do not seek help in the prodromal stages of psychosis are more likely to experience severe psychopathology (Bottlender et al. 2003). Therefore, failing to offer these residents community-based interventions could be seen as counterproductive as it could be hypothesised that residents of deprived areas with psychotic disorders may be more likely to seek help via community-based interventions which take place in non-clinical settings compared to traditional mental health services. This is because the interventions take place in settings familiar and accessible to the individual (Baskin et al., 2023) and are often delivered by peer or lay workers who may have experienced psychosis themselves, which has been shown to decrease stigma (Evans et al. 2021).

Without addressing the social stressors residents of deprived areas experience there is a risk those with a genetic vulnerability to psychosis will go on to experience severe psychotic symptomatology which requires treatment in psychiatric inpatient hospital wards. Therefore, it is hoped that chapter four will develop a better understanding of the current treatment experiences of patients from deprived communities with psychosis, focusing on inpatient admission-related outcomes including compulsory admission, length of stay and admission to a Psychiatric Intensive Care Unit. This will allow us to develop a better understanding of the potential consequences of failing to offer residents of deprived communities with psychotic disorders community-based interventions in terms of an increased use of inpatient admission, which is considered a more restrictive intervention.

Most studies focused on a singular element of residents’ identity (that they lived in deprived communities) in their design and analysis. Just over a quarter of all papers failed to report ethnicity data for their samples, limiting our understanding of whether individuals from different ethnic groups experience similar or different outcomes in deprived areas. Most research focusing on inpatient-related factors such as use of compulsory admission, length of stay or admission to a PICU have also typically focused on singular socio-demographic factors such as deprivation (Croudace et al., 2000, Hodgson et al. 2000), gender (Rieke et al. 2015) or ethnicity (Bruce and Smith, 2020, Freitas et al. 2023).

However, we know that unpicking health inequalities is complex, involving the interplay of different parts of our identity (DeLuca et al., 2022). Despite ethnic minority groups being more likely to reside in the most deprived areas of the UK (Tinsley & Jacobs, 2006), and at greater risk of debilitating mental health difficulties (Baily et al., 2019), in our systematic review just over a quarter of papers failed to report ethnicity data for their samples. This limited our understanding of whether individuals from different ethnic groups experience the same outcomes from community-based interventions in deprived areas. In a similar vein to those from deprived communities, it has also been found that individuals from ethnic minority groups are at increased risk of receiving a diagnosis of a psychotic disorder (Oduola et al., 2021), and experiencing inpatient admission (Gajwani et al., 2016). This has been associated with reduced help-seeking linked to fear of punitive treatments (Keating and Robertson, 2004), cultural and spiritual interpretations of illness (Jacobs & Pentaris, 2021) and experiences of exclusion (Morgan et al., 2008). Therefore, it is important to consider the additional stressors that ethnic minority residents of deprived areas may experience which can increase their vulnerability to experiencing psychotic disorders. This highlights how we cannot simply focus on singular elements of individuals' identities when trying to understand mental health outcomes for interventions, such as inpatient use or community-based interventions.

Healthcare providers generate and store vast amounts of clinical data in electronic health records (Cooervits et al., 2013). The use of anonymised electronic clinical records has been used previously to explore the association between area-level socio-environmental factors and inpatient use (Heslin et al., 2018) and in research exploring the intersectionality concerning cancer diagnosis (Mkuu et al. 2023), and *Without incentives for clinicians to improve the recording of other sociodemographic factors,*. This is because the secondary data captured in these records can drastically increase the breadth and depth of information available about a defined population with little cost to the researcher (Werbeloff et al. 2018). This allows researchers to develop samples large enough to answer questions regarding intersectionality quantitatively which typically requires stratification of data (Guan et al. 2021). A large sample is required to ensure the number of groups investigated are large enough to achieve power, whilst not making them so reductionist that findings tell us little meaningful information (e.g. comparing people from white groups to non-white groups). This is because collapsing smaller socio-demographic groups (e.g. deprivation levels or ethnic groups) into larger ones can have implications on the perceptions of the group under study and influence resource allocation and policy implementation based on research findings (Gennaro et al. 2013). Achieving a sufficiently large sample without the use of electronic health records would be time- consuming and costly to follow up, particularly as recruitment in epidemiological studies has dropped significantly in recent years (Toledano et al. 2015). This also prevents disruptions to services as information is automatically extracted reducing the need for researchers to use services as gatekeepers for recruitment.

While electronic health records can be seen as an asset when investigating intersectionality quantitatively, they have some limitations which must be considered. As clinical health records are completed by health care professionals, researchers are reliant on them to ask and accurately record socio-demographic data. A systematic review by Cook et al. 2022 highlighted that problems with the quality of socio-demographic data are rarely random, with certain ethnic minority groups being more likely to be misclassified. Misclassification can lead to certain groups being excluded from clinical research. Linked to this Harari and Lee (2021) found that most studies exploring intersectionality quantitatively focused on three social characteristics (ethnicity, gender, and socio-economic status), neglecting other characteristics such as religion, sexual orientation, and disability. This may reflect the availability of information recorded in electronic health records. Jain et al. (2017) found deprivation and ethnicity data were the most complete in records, particularly following the introduction of incentives for clinicians to ask and record patient's ethnicity in 2006. In comparison, they found immigration status and religion were only recorded in around 2% of records. Without incentives for clinicians to improve the recording of other sociodemographic factors, the use of electronic health records may be more useful when exploring the intersection of certain sociodemographic factors over others.

In chapter four we made use of the Clinical Record Interactive Search (CRIS) system (Stewart et al. 2009) which was developed between 2007-2008. CRIS contains the fully de-identified electronic health records of South London and Maudsley (SLaM) National Health Service Foundation Trust who provide mental health services to four London Boroughs. CRIS contains over 300,000 patient records, with an average of 20,000 new cases added each year (Perera et al. 2016). The inclusion of anonymised structured and unstructured data (free text) makes CRIS unique compared to other some case registries, which may focus more on data in structured fields (Tayefi et al. 2021). The inclusion of unstructured data allows researchers to manually search clinical notes for variables of interest, which can be coded into numeric form for analysis.

Using CRIS, the following chapter aims to first better understand the relationship between area-level deprivation and inpatient use in people with psychotic disorders and then the relationship between ethnicity and inpatient use in people with psychotic disorders. However, the main aim of this paper is to explore the intersection between area-level deprivation, ethnicity and how patients with psychotic disorders use inpatient psychiatric services. This has to the potential to inform our understanding of the social determinants that make individuals more vulnerable to severe psychotic symptomatology leaving them at risk of inpatient admission.

Chapter four

Understanding the intersections between ethnicity, area-level deprivation, and psychiatric inpatient use amongst patients with psychotic disorders: a mental health electronic records analysis.

Charlotte Humphreys[a,b*], Dr Joanne Hodgekins[a], Dr Sheri Oduola[c]

Submission to Psychiatry Research

Word count to journal guidelines: 5,793

Author affiliations

a Department of Clinical Psychology and Psychological Therapies, Norwich Medical School, University of East Anglia NR4 7TJ

b Cambridge and Peterborough NHS Foundation Trust, Elizabeth House, Fulbourn, Cambridgeshire, CB21 54F

c School of Health Sciences, University of East Anglia, Norwich Research Park, Norwich, NR4 7TJ, UK

*Corresponding author: Charlotte Humphreys, charlotte.humphreys@uea.ac.uk

Key words: Deprivation, Ethnicity, Health inequalities, Intersectionality, Psychiatric inpatient admission, Serious mental illness

Abstract

Ethnic and area-level deprivation disparities in psychiatric inpatient outcomes amongst patients with psychotic disorders have been reported. However, how these two variables intersect to produce health inequalities is unclear. Using data of inpatient services at South London and Maudsley NHS trust linked to the Clinical Record Interactive search a large sample of patients with psychotic disorders who were admitted between 2016-2019 (n=6767) was identified. Separate logistic and negative binomial regressions were used to examine the relationships between ethnicity (and then deprivation) with inpatient-related outcomes (compulsory admission, psychiatric intensive unit admission, length of stay and number of admissions). The sample was then stratified by area-level deprivation to understand the intersection of ethnicity, and inpatient outcomes. Patients from all areas except the least deprived were at greater risk of compulsory admission, admission to Psychiatric Intensive Care Units and more frequent admissions. All ethnic minority groups were more likely to be compulsorily admitted compared to white British patients. Living in the least deprived areas appeared to offer protection against increased risk of compulsory admission for some ethic minority groups, but not black British or Asian patients. This study highlights the importance of addressing stressors present in social environment of deprived areas and ethnic minority patients which could in turn reduce the need for inpatient admissions.

Key words: Psychotic Disorder, Deprivation, Ethnicity, Inpatient, Compulsory Admission, Intersectionality

5.1 Introduction

Psychotic disorders refer to mental health diagnoses including schizophrenia and delusional disorder which significantly impact a person's ability to engage in functional and occupational activities (Drake and Whitley, 2014). Around 1% of the UK population receives a diagnosis of a psychotic disorder each year (Bebbington and McManus, 2020), however, the burden of these diagnoses extends beyond the individual to their families and wider society (Drake and Whitley, 2014; Fekadu et al., 2019; Ride et al., 2020).

Individuals living in deprived communities are at greater risk of Psychotic disorder diagnosis (et al., 2007). Anderson et al. (1997) defines area-level deprivation as the ecological concentration of poverty, unemployment, economic disinvestment, and social disorganisation. The social causation hypothesis suggests that residents of deprived communities experience conditions of poverty and increased exposure to crime resulting in increased stress, reduced social capital and social exclusion, linked with an increased risk of paranoia and later psychosis (Bebbington et al., 2004, Newbury et al., 2018). Black African, black Caribbean and other ethnic minority groups are also at an elevated risk of psychosis (Oduola et al., 2021). The social defeat hypothesis suggests ethnic minority groups are more likely to experience exclusionary experiences (Selten and Cantor-Graae, 2005) such as pervasive experiences of discrimination (Pearce et al., 2019), a personal or family history of migration (Cantor-Graae and Selten, 2005) and trauma (Berg et al., 2015). These experiences increase an individual's risk of psychosis by influencing changes in the sensitivity of the mesolimbic dopamine system (Selten et al., 2013). Traumatic events can also negatively alter schemas, influencing how individuals interpret intrusions in their environment, partially accounting for the relationship between these experiences and paranoia (Hardy 2016).

Psychiatric inpatient admissions have frequently been used as a treatment approach for psychotic disorders (White et al., 2014). Admission is used to stabilise those with debilitating symptom severity, marked functional impairment and who pose significant risks to the safety of themselves or others (Nuernberg at el., 2016, Rozalski & McKeegan, 2019). Patients with particularly difficult-to-treat symptoms may be moved to psychiatric intensive care units (PICU) (Cullen et al., 2018). Inpatient admissions can therefore crudely resemble a measure of symptom severity in this population. Hospital admissions aim to comprehensively assess patient's mental health difficulties and provide treatment, including medication and safety management (Bowers et al., 2009).

In the UK patients can be admitted on a voluntary or involuntary basis. The Mental Health Act (Department of Health, 1983) is used to compulsorily admit individuals when there are significant concerns about risk or functioning. Approved Mental Health Professionals consider this when alternative less restrictive options in the community have been discounted (Stone et al 2019). Individuals can be admitted under Section 2 for up to 28 days of assessment, Section 4 for an emergency 72-hour assessment, or under Section 3 for treatment (initially for 6 months, but renewable) (Laing, 2021). Compulsory admission has been linked with the increased use of seclusion and mechanical restraint, and greater lack of independence compared to voluntary admissions (Maina et al. 2021). These admissions can be traumatic, harming patients’ relationships with healthcare professionals, and engagement with treatment, and delaying recovery (Akther et al., 2019).

The MHA has been disproportionately applied to black Caribbean and black African people who are more vulnerable to psychotic disorders (Freitas et al. 2022, Gajwani et al., 2016; Oduola et al., 2019). The use of secondary data analysis of patients' records has facilitated access to rich data on clinical samples, allowing exploration of other factors associated with the inpatient experience of different ethnic groups. Individuals from black ethnic groups are more likely to have a longer length of stay (LOS) (Bruce and Smith, 2020), experience seclusion (Pedersen et al. 2022), be re-admitted (Osborn et al., 2021) and be admitted to PICUs compared to white patients (Bowers et al., 2008). This suggests that patients from these groups are more likely to experience severe psychotic symptomatology, restrictive practices during admission, and are at greater risk of relapse.

There is less consensus about the nature of the relationship between deprivation and inpatient use. Patients with psychotic disorders living in more deprived areas have higher admission rates compared patients in less deprived areas (White et al. 2014). However, in terms of LOS Abas et al. (2006) and Jacobs et al. (2015) found a longer LOS for residents of the least deprived areas and Hodgson et al. (2000) the opposite. Focusing specifically on psychotic disorders Croudace et al. (2000) found a strong non-linear relationship between deprivation and admission prevalence and Heslin et al. (2018) found no relationship. This highlights the need for further research to strengthen our understanding of the link between deprivation and LOS, and to explore the link with other inpatient-related outcomes.

The UK government had planned to reform the current MHA to address ethnic disparities in compulsory admission (Dyer, 2022). Little progress has been made towards this, therefore, developing a more nuanced of understanding which individuals with psychotic disorders are at greater risk of admission and its associated negative outcomes is crucial to ensure reforms or resources used to reduce vulnerability to admission are targeted appropriately and effectively. Research has typically focused on a single sociodemographic factor such as ethnicity, area-level deprivation or gender and inpatient use, however unpicking these health inequalities is a complex task characterised by the interplay of the different elements of our identity (DeLuca et al., 2022). Intersectionality acknowledges everyone's unique experience of discrimination and oppression, but research incorporating this in its design and analysis is limited likely due to the complex nature of this relationship and the lack of large data sets to address these questions (Bowleg, 2012). It is essential to consider how ethnicity and deprivation intersect concerning inpatient use, given ethnic minority groups are overrepresented in deprived areas (Tinsley & Jacobs, 2006) and inpatient settings (Freitas et al. 2023).

This study aims to build on Chow et al. (2003) who completed a stratified analysis concerning ethnicity and likelihood of admission in low versus high-poverty areas. Dichotomising deprivation may make data analysis easier, but arguably oversimplifies its complexity (Kyzyma, 2020). Therefore, this study aims to operationalise area-level deprivation into quintiles according to the English Indices of Deprivation (Noble et al. 2019), to give a richer description of the relationship between ethnicity, area-level deprivation, and inpatient use in individuals with psychotic disorders.

The research questions are:

1. What is the relationship between ethnicity and inpatient use in people with SMI?
2. What is the relationship between area-level deprivation and inpatient use in people with SMI?
3. How do ethnicity and area-level deprivation impact on inpatient service use among people with SMI?

5.2 Methods

5.2.1 Study design, setting and data source

Using a cross-sectional design, this study used data from the fully de-identified electronic health records of South London and Maudsley (SLaM) National Health Service Foundation Trust. SLaM is a large mental health trust, providing inpatient care for approximately 5,300 people each year across 52 inpatient wards (Care Quality Commission, 2023). SLaM covers four inner city areas of London; Croydon, Lambeth, Lewisham, and Southwark, with a substantially higher proportion of residents from ethnic minority backgrounds, compared to the average in England and varying degrees of deprivation (Perera et al., 2016) as shown in Table 1. Clinical records were accessed via the Clinical Record Interactive Search (CRIS) system (Stewart et al. 2009). Information in CRIS is documented in two forms i.e. structured fields (e.g. dates and demographics) and unstructured free-text fields (e.g. case notes and correspondence).

Table 1

Comparing ethnicity and deprivation in SLaM areas with England. Data taken from English Census 2011.

	Lambeth	Lewisham	Croydon	Southwark	England
Ethnicity					
White	55%	51.5%	48.4%	51.4%	81.0%
Mixed	8.1%	8.1%	7.6%	7.2%	3.0%
Asian	7.3%	9.0%	17.5%	9.9%	9.6%
Black	24%	26.8%	22.6%	25.1%	4.2%
Other	5.7%	4.7%	3.9%	6.3%	2.2%
Deprivation					
Unemployed	4.6%	4.9%	4.1%	4.6%	2.9%
Social renting	33.6%	29.2%	17.9%	39.7%	17.1%
No qualifications	13.1%	14.6%	16.1%	13.9%	18.1%

5.2.2 Ethical issues

CRIS was granted ethical approval for secondary research by the South Central-Oxford C Research Ethics Committee (23/SC/257). Approval was also obtained from the service-user-led Oversight committee (CRIS Reference: 22-033). Patients are provided with information about the CRIS dataset, emphasising their right to withdraw. Access to and analysis of our data set was available remotely within the SLaM firewall using a secure virtual private network, with no unaggregated data exported outside of this.

5.2.3 Case Identification and inclusion criteria

Information from structured fields was used to identify patients who met the following inclusion criteria: (a) aged 18-64 (inclusive), (b) had a recorded primary or secondary diagnosis of a psychotic disorder (ICD-10: F20-29) and (c) had a hospital admission to any adult inpatient services in SLaM during 2016-2019. This duration is in line with previous research using CRIS to investigate inpatient use and sociodemographic factors (Heslin et al. 2018), allowing for the identification of a sufficient sample size. This period was chosen as the most recent timeframe avoiding the COVID-19 pandemic, where there were changes in the use of admission (overall admissions declining and involuntary admissions increasing (Davies & Hogarth, 2021).

5.2.4 Data extraction and collection

5.2.5 Sociodemographic data

Socio-demographic data i.e., age, gender and ethnicity were initially extracted from CRIS structured fields, supplemented by a bespoke natural language-processing application using General Architecture for Text Engineering software (Cunningham, 2002). Data extraction was guided by an adapted Medical Research Council Socio-demographic schedule (MRC-SDS) (Mallet 1997).

5.2.6 Deprivation

Deprivation was extracted from structured fields showing participants' first recorded postcode in the study period. Within CRIS individual patient residential postcodes are linked with area-level deprivation data using the 2019 English Indices of Deprivation (IMD) (Noble et al. 2019). This study utilised IMD decile scores as a measure of deprivation, collapsed into quintiles from one (most deprived) to five (least deprived) in line with Reichert and Jacobs (20118).

5.2.7 Ethnicity

Ethnicity was self-ascribed by patients and recorded in structured fields. Where this was missing (n=343), the researcher manually ascribed ethnicity through the unstructured fields. This was done using a structured language query to identify and extract ethnicity-related data. Search terms were “Black”, “White”, “Mixed” and “Asian” to highlight where clinicians documented patients’ ethnicity in case notes. Ten per cent of cases where ethnicity was assigned from free text searches were checked by independently by SO, with an agreement rate of 91.43% (K=0.90). Ethnicity was coded according to the UK census ethnic classifications. These categories were collapsed into seven larger ethnic groups: white British, white non-British (white Irish, white Gypsy, white Other), black Caribbean, black African, black British, Asian (Indian, Pakistani, Bangladeshi), Mixed (all mixed ethnic groups) and Other (Arab, Chinese, any Other Ethnic group). This process considered guidelines by Ross (2020) and followed methods used by Oduola et al. (2021), determining the number and composition of ethnic groups based on sample size and descriptive statistics.

5.2.8 Inpatient use

Longer length of stay (LOS) (Colasanti et al., 2010), compulsory admission (Gannon et al. 2023), PICU admission (Cullen et al. 2016), and use of seclusion (Chieze et al. 2021) were used as indicators of symptom severity. Length of stay (LOS) was extracted as the number of days taken from the date of admission to the date of discharge, cumulative across all admissions in the period. Compulsory admission was coded as a binary variable. Yes, indicated any admission over the study period had involved the use of the MHA. PICU admission was a binary variable. Yes, indicated any admission over the study period was to a PICU. Use of seclusion was a binary variable. Yes, indicated seclusion occurred in any admission during the period. The number of admissions was totalled over the study period to give a single value and was chosen as a crude measure of relapse (Bhattacharyya et al., 2023). Admission to the Forensic Ward was coded as binary with Yes indicating any admission over the period was in a Forensic Ward. This was chosen as the needs of patients on Forensic wards differs from those on non-forensic wards. (Rogerson et al. 2021).

5.2.9 Statistical analysis

Data were analysed using STATA version 15.1 (StataCorp, 2017). Descriptive statistics and regression analysis were used. The assumption of multi-collinearity was confirmed using VIF (1.03). Negative binomial regression models were used to overcome the over-dispersion of zero (Pearson goodness-of-fit X^2 = 1418377, $p <$ 0.0001). Given only 12.43% of the sample had experienced a PICU admission (see Appendix_) we omitted this outcome variable from the stratified analysis to reduce the risk of type one errors. Benjamini and Hochberg’s (1995) correction for False Discovery Rate was applied to control for multiple comparisons, however, as all *p*-values were still significant after this correction unadjusted p-values are reported.

5.2.9.1 What is the relationship between ethnicity and inpatient use in people with psychotic disorders?

Separate regressions with ethnicity and each inpatient outcome, and repeated including a priori confounders (age, gender, and deprivation IMD). For categorical outcomes (compulsory admission and PICU admission) Logistic regression was used and Negative bionomical regressions for count variables (LOS and number of admissions).

5.2.9.2 What is the relationship between area-level deprivation and inpatient use in people with psychotic disorders?

Separate regressions were then run for deprivation and each inpatient outcome, and repeated including a priori confounders (age, gender, and ethnicity), with logistic regressions for compulsory admission and PICU admission and Negative Binomial regressions for LOS and number of admissions[1].

5.2.9.2 How do ethnicity and area-level deprivation impact on inpatient service use among people with psychotic disorders?

Data was stratified by area-level deprivation, with associations between ethnicity and compulsory admissions estimated within each stratum, with white British patients living in the same quintile as the comparison group. Separate regressions were run for ethnicity and each inpatient outcome and repeated adjusting for age and gender, with logistic regressions used for compulsory admission and PICU admission and Negative Binomial regressions for LOS and number of admissions.

5.3 Results

5.3.1 Descriptive statistics

In total 6767 eligible participants were identified, of these, 6,095 patients had complete data and were included in all analyses after demographic descriptive statistics. Table 2 shows the sample demographic and clinical characteristics stratified by IMD quintile. Appendix F shows these characterises stratified by ethnicity and Appendix G

---

[1]

for the whole sample. In summary, the mean age was similar across IMD quintiles, however older patients [Mean 38 (SD = 12.04) years] resided in the second most deprived area and younger [Mean 35 (SD = 12.61) years] patients were mostly represented in the least deprived areas. Across all IMD quintiles, the largest ethnic group was white British and made up the highest proportion in the least deprived quintile (*n* = 137 (71.35%)). Black Caribbean and black British patients mostly resided in the two most deprived areas. Men were mostly represented in the three most deprived quintiles, whereas in the two least deprived quintiles most patients were female. Across all deprivation levels, a diagnosis of schizophrenia was common. There was a trend for the percentage of participants admitted to the PICU ward to decrease as deprivation decreased. This was similar but not as strong for admission to forensic wards and the use of seclusion. Use of the MHA appeared higher in quintiles one, two and five.

Table 2

Demographic variables, stratified by deprivation.

N(%)	1 Most deprived *n*=1,565	2 *n*=2,796	3 *n*=1,204	4 *n*=393	5 Least deprived *n*=196
Ethnicity^1					
White British	502 (32.24)	868(31.27)	512(43.17)	231(59.84)	137(71.35)
White non-British	146(9.38)	311(11.20)	113(9.53)	37(9.59)	8(4.17*)*
Mixed	55(3.53)	134(4.84)	47(3.93)	17(4.40)	5(2.60)
Asian	114(7.32)	184(6.63)	80(6.75)	28(7.25)	18(9.38)
Black African	150 (9.63)	260(9.37)	95(8.01)	14(3.63)	2(1.04)
Black Caribbean	232 (14.90)	412(14.84)	120(10.12)	24(6.22)	8(4.17)
Black British	304(19.52)	522(18.80)	185(15.60)	32(8.29)	11(5.73)
Other	54(3.47)	85(3.06)	34(2.87)	3(0.78)	3(1.56)
Gender^2					

Female	718 (45.88)	1,241 (44.40)	580 (48.21)	207 (52.67)	110 (56.12)
Male	847 (54.12)	1,554 (55.60)	623 (51.79)	186 (47.33)	86 (43.88)
Age M(SD)	37 (12.08)	38 (12.04)	37 (12.26)	36 (12.38)	35 (12.61)
Primary Diagnosis					
Substance-induced psychosis	2 (0.13)	10 (0.36)	4 (0.33)	1 (0.25)	8 (4.08)
Schizophrenia	398 (25.43)	677 (24.21)	266 (22.09)	49 (12.47)	1 (0.51)
Delusional disorder	26 (1.66)	43 (1.54)	14 (1.16)	4 (1.02)	6 (3.06)
Acute psychosis	52 (3.32)	138 (4.94)	50 (4.15)	14 (3.56)	6 (3.06)
Schizo-affective	148 (9.46)	236 (8.44)	88 (7.31)	21 (5.34)	8 (4.08)
Unspecified psychosis	204 (13.04)	339 (12.12)	140 (11.63)	36 (9.16)	11 (5.61)
other	15 (0.96)	18 (0.64)	11 (0.91)	6 (1.53)	2 (1.02)
Psychosis as secondary diagnosis	720 (46.01)	1,335 (47.75)	631 (52.41)	262 (66.67)	160 (81.63)
Admission to PICU					
No	1,361(86.96)	2,403(85.94)	1,065(88.460)	370(94.15)	191(97.45)
Yes	204(13.04)	393(14.06)	139(11.54)	23(5.85)	5(2.55)
Admission to Forensic					
No	1,529(97.70)	2,718(97.21)	1,171(97.26)	387 (98.47)	193(98.47)
Yes	36(2.30)	78(2.79)	33(2.74)	6 (1.530)	3(1.53)
Use of MHA					
No	446(28.50)	797(28.51)	425(35.30)	178(45.29)	168(27.45)
Yes	1,119(71.50)	1,999(71.49)	779(64.70)	215(54.71)	444(72.55)
Number of Sections Mdn(IQR)	1 (0-3)	1(0-3)	1(0-2)	1(0-2)	0(0-1)
Experienced Seclusion					

No	1,524(97.38)	2,711(96.96)	1,181(98.09)	389(98.98)	194(98.98)
Yes	41(2.62)	85(3.04)	23(1.91)	4(1.02)	2(1.02)
LOS Mdn(IQR)	38 (14-103)	40 (15-105)	40(13.5-105.5)	48(15-119)	66.5(24-129.5)
No. admissions Mdn(IQR)	2(1-3)	2(1-3)	1(1-2.5)	1(1-2)	1(1-2)

Missing records: ^{1} 69 participants, ^{2} 3 participants, IMD 613 participants

5.3.2 Association between deprivation and inpatient use

Focusing on deprivation, we estimated the unadjusted and adjusted odds ratios for compulsory admission and then admission to a PICU ward (Table 3). Second, we estimated the unadjusted and adjusted incidence rate ratios for the LOS and number of admissions (Table 4). Quintile five was the comparator group.

5.3.2.1. Compulsory admission

We found strong evidence that patients living in all other deprivation quintiles were at increased risk of compulsory admissions, however, this association was not maintained for patients living in deprivation quintile four after controlling for confounders (ethnicity, age and gender) as shown in Table 3.

5.3.2.2 PICU admission

In both the unadjusted and adjusted model there was strong evidence that patients living in quintiles one, two and three were more likely to be admitted to a PICU as shown in Table 3.

5.3.2.3 LOS

Patients living in all deprivation quintiles were more likely to have shorter LOS as shown in Table 4

5.4.2.4 Number of admissions

There was strong evidence that patients living in the first four quintiles were more likely to have a higher number of admissions, even after controlling for cofounders as shown in Table 4.

Table 3

Unadjusted and adjusted odds ratios of associations between deprivation and compulsory admission and admission to PICU.

	Detained under MHA		PICU	
Deprivation quintile	Unadjusted ORR Model 1	Adjusted OR Model 2	Unadjusted OR Model 1	Adjusted OR Model 2
1 Most deprived	3.12(2.30-4.23) ***	1.20(1.45-2.75) ***	5.64(2.30-13.87) ***	3.78(1.52-9.45) **
2	3.15(2.34-4.23) ***	1.20(1.47-2.72) ***	6.13(2.51-15.01) ***	4.20(1.69-10.43) **
3	2.35(1.72-3.20) ***	1.72(1.25-2.37) **	4.92(1.99-12.19) **	3.73(1.49-9.36) **
4	1.47(1.05-2.10) *	1.32(.92-1.89)	2.37(.89-6.33)	2.17(.80-5.89)

*<0.05, **<0.01, ***<0.001 Comparison group = quintile 5 Model 2: adjusted for age, gender, ethnicity

Table 4

Unadjusted and adjusted Incidence Rate Ratios of associations between deprivation and length of stay and number of admissions.

	LOS		Number of admissions	
Deprivation quintile	Unadjusted IRR	Adjusted IRR	Unadjusted IRR	x
	Model 1	Model 2	Model 1	
1Most deprived	.75(.62-.90) **	.64(.53-.78) ***	1.59(1.38-1.83) ***	1.45(1.26-1.67) ***
2	.74(.62-.89) **	.62(.52-.74) ***	1.59(1.39-1.83) ***	1.46(1.27-1.67) ***
3	.70(.58-.85) ****	.62(.51-.75) ***	1.50 (1.30-1.73) ***	1.41(1.22-1.63) ***
4	.78(.63-.96) *	.75(.61-93)**	1.21(1.03-1.43) *	1.19(1.01-1.39) *

*<0.05, **<0.01, ***<0.001 Comparison group = quintile 5. Model 2: adjusted for age, gender, ethnicity

5.3.3 Association between ethnicity and inpatient use

First, we estimated the unadjusted and adjusted odds ratios for compulsory admission and then admission to a PICU ward (Table 5). Second, we estimated the incidence rate ratios for the LOS and the number of admissions (Table 6).White British ethnicity was the comparator group.

5.3.3.1Compulsory admission

We found strong evidence that all minoritized ethnic groups were at increased risk of compulsory admissions, independent of co-founders as shown in Table 5.

5.3.3.2 PICU admission

In the unadjusted odds ratio, all ethnic minority groups except ‘other’ ethnic group patients were more likely to be admitted to PICU. However, after controlling for cofounders, the strength of this association remained for black African, black Caribbean, black British and Mixed ethnic group patients only as shown in Table 6.

5.3.3.3 LOS

In both the unadjusted and adjusted odds ratio black African, black Caribbean and black British patients were more likely to have a longer LOS. White non-British and patients from other ethnic groups had a shorter LOS.

5.3.3.4 Number of admissions

Mixed ethnicity, black African, black Caribbean and black British patients were more likely to experience multiple admissions. However, we found evidence that patients from ‘Other’ ethnic groups were admitted less frequently.

Table 5

Unadjusted and adjusted odds ratios of associations between ethnicity and compulsory admission and admission to PICU.

	Detained under MHA		Admission to PICU	
Ethnicity	Unadjusted OR Model 1	Adjusted OR Model 2	Unadjusted OR Model 1	Adjusted OR Model 2
White non-British	1.92(1.59-2.32) ***	1.85(1.53-2.34) ***	1.51(1.08-2.01) *	1.32(.94-1.84)
Mixed	1.90(1.45-2.51) ***	1.90(1.44-2.51) ***	2.96(2.03-4.31) ***	2.48(1.69-3.65) ***
Asian	2.31(1.84-2.91) ***	2.29(1.82-2.89) ***	1.54(1.06-2.24) *	1.36(.93-2.00)
Black African	4.07(3.20-5.43) ***	3.61(2.83-4.60) ***	3.18(2.36-4.24) ***	3.18(2.37-4.29) ***
Black Caribbean	4.43(3.61-5.43) * **	4.18(3.40-5.15) ***	3.94(3.01-5.03) ***	3.53(2.75-4.5) ***
Black British	3.99(3.34-4.77) ***	3.78(3.15-4.53) ***	4.49(3.58-5.63) ***	3.68(2.92-4.64) ***
Other	1.61(1.17-2.21) **	1.54(1.17-2.12) **	.93(.48-1.79)	.74(.38-1.44)

*<0.05, **<0.01, ***<0.001. Comparison group = white British Model 2: adjusted for age, gender, deprivation IMD

Table 6

Unadjusted and adjusted Incidence Rate Ratios of associations between ethnicity and length of stay and number of admissions.

	LOS		Number of admissions	
Ethnicity	Unadjusted IRR Model 1	Adjusted IRR Model 2	Unadjusted IRR Model 1	Adjusted IRR Model 2
White non-British	.813(.73-.91)***	.86(.77-96)**	1.01(9.30-1.84)	.97(.90-1.05)
Mixed	1.11(.95-1.30)	.1.15(.98-1.35)	1.223(1.11-1.37) ***	1.18(1.07-1.32) *
Asian	1.00(.88-1.14)	1.03(.91-1.17)	1.0(.92-1.09)	.98(.90-1.07)
Black African	1.61(1.43-1.81) ***	1.59(1.41-1.78) ***	1.30(1.21-1.41) ***	1.27(1.18-1.37) ***
Black Caribbean	1.27(1.12-1.39) ***	1.31(1.88-1.45) ***	1.35(1.27-1.45) ***	1.30(1.22-1.39) ***
Black British	1.329(1.21-1.45) ***	1.38(1.26-1.51) ***	1.44(1.36-1.53) ***	1.38(1.30-1.47) ***
Other	.579.47-.69) ***	.62(.52-.75) ***	.89(.78-1.02)	.85(.74-.98) *

*<0.05, **<0.01, ***<0.001. Comparison group = white British. Model 2: adjusted for age, gender, deprivation IMD

5.3.4 Intersection between ethnicity, deprivation, and inpatient use

Comparator group for all analyses was white British patients in the same quintile.

5.3.4.1 Compulsory admission

In quintile one white non-British Asian, and black (African, Caribbean, and British) patients were around 2-4 times more likely to be compulsorily admitted as shown in Figure 1 and Appendix H. In quintile two white non-British, Asians, patients with Other and Mixed ethnicities were around 1.5 more likely to experience compulsory admission, while black (African, Caribbean, and British) patients were 4 times. In quintile three white non-British, Asian, black (African, Caribbean, and British) and patients with Mixed ethnicity were between 2.6-3.7 times more likely to be compulsorily admitted. In quintile four white non- British, Asian, and black (African, Caribbean, and British) patients were between 3-5 times more likely. In quintile five black British and Asian patients were 3 to 6 more likely to be compulsory admitted.

5.3.4.2 LOS

In quintile one LOS was around 1.5 times higher in black (African, Caribbean, and British) patients as shown in Figure 2. In quintile two LOS was between 1.3-1.5 times higher in black (African, Caribbean, and British) patients and was shorter in patients with Other ethnicities. In quintile three LOS for black (African, Caribbean, and British) patients was between 1.3-1.7 higher, with patients from Other ethnicities having a shorter LOS. No associations between ethnicity and LOS was found in deprivation quintiles four and five.

5.3.4.3 Number of admissions

In quintile one Black (African, Caribbean, and British) were between 1.2-1.4 times more likely to experience multiple admissions as shown in Figure 3. In quintile two Black (African, Caribbean, and British) and patients with Mixed ethnicity were between around 1.2 times more likely, with patients with Other ethnicities being admitted less frequently. In quintile three black (African, Caribbean, and British) patients were around 1.3 times more likely to have multiple admissions. In quintile four black (African, Caribbean, and British) patients were between 1.5-1.8 times more likely. In quintile five black British patients were 2 times more likely to be admitted frequently, expect for shorter Los for Other ethnic group in quintile 4.

Figure 1

Adjusted Odds ratio (OR) and their corresponding 95% confidence intervals (CI) from logistic regressions looking at the association between ethnicity and compulsory admission, stratified by deprivation.

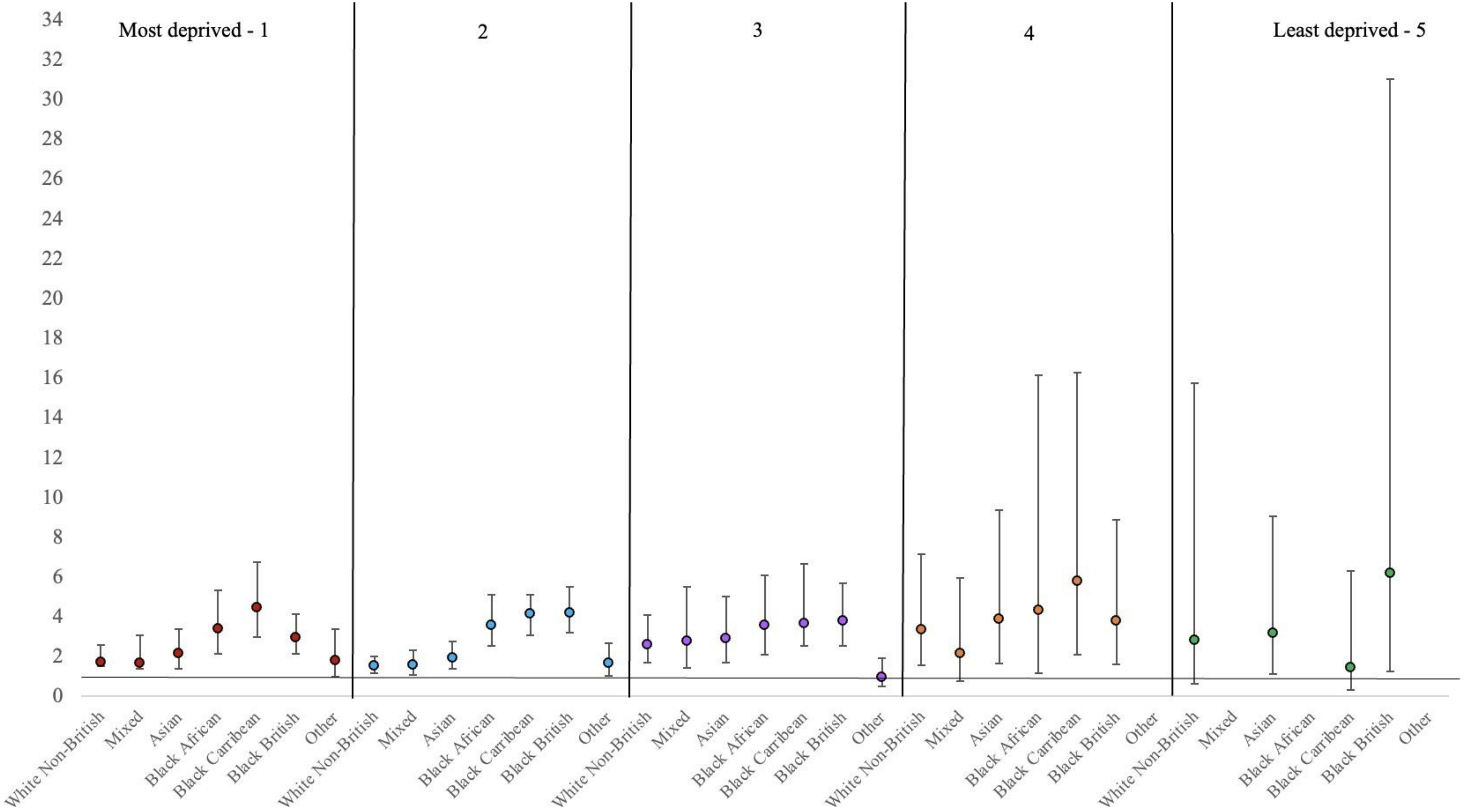


Figure 2

Adjusted incidence rate ratios (IRR) and their corresponding 95% confidence intervals (CI) from negative binomial regressions looking at the association between ethnicity and LOS, stratified by deprivation.

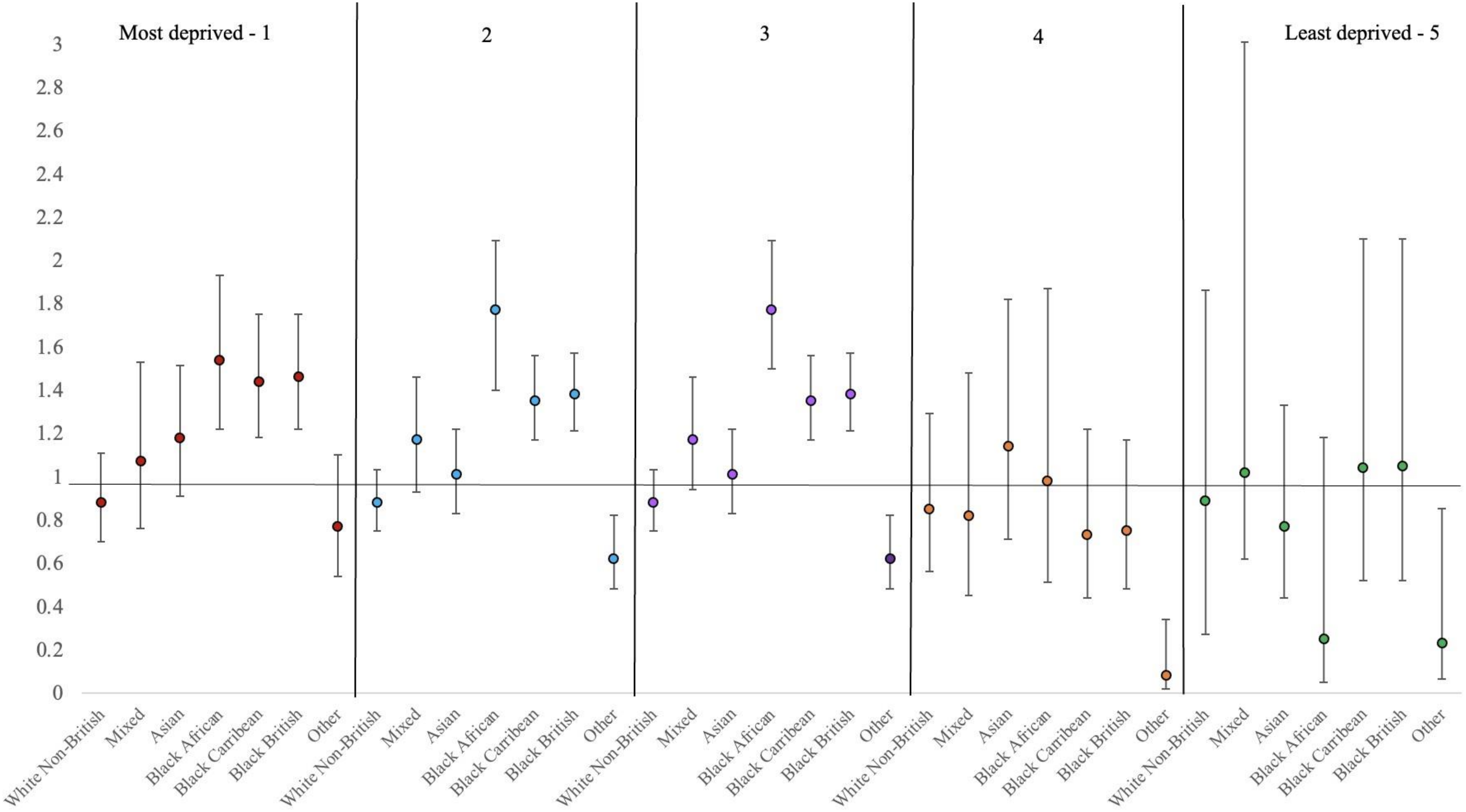
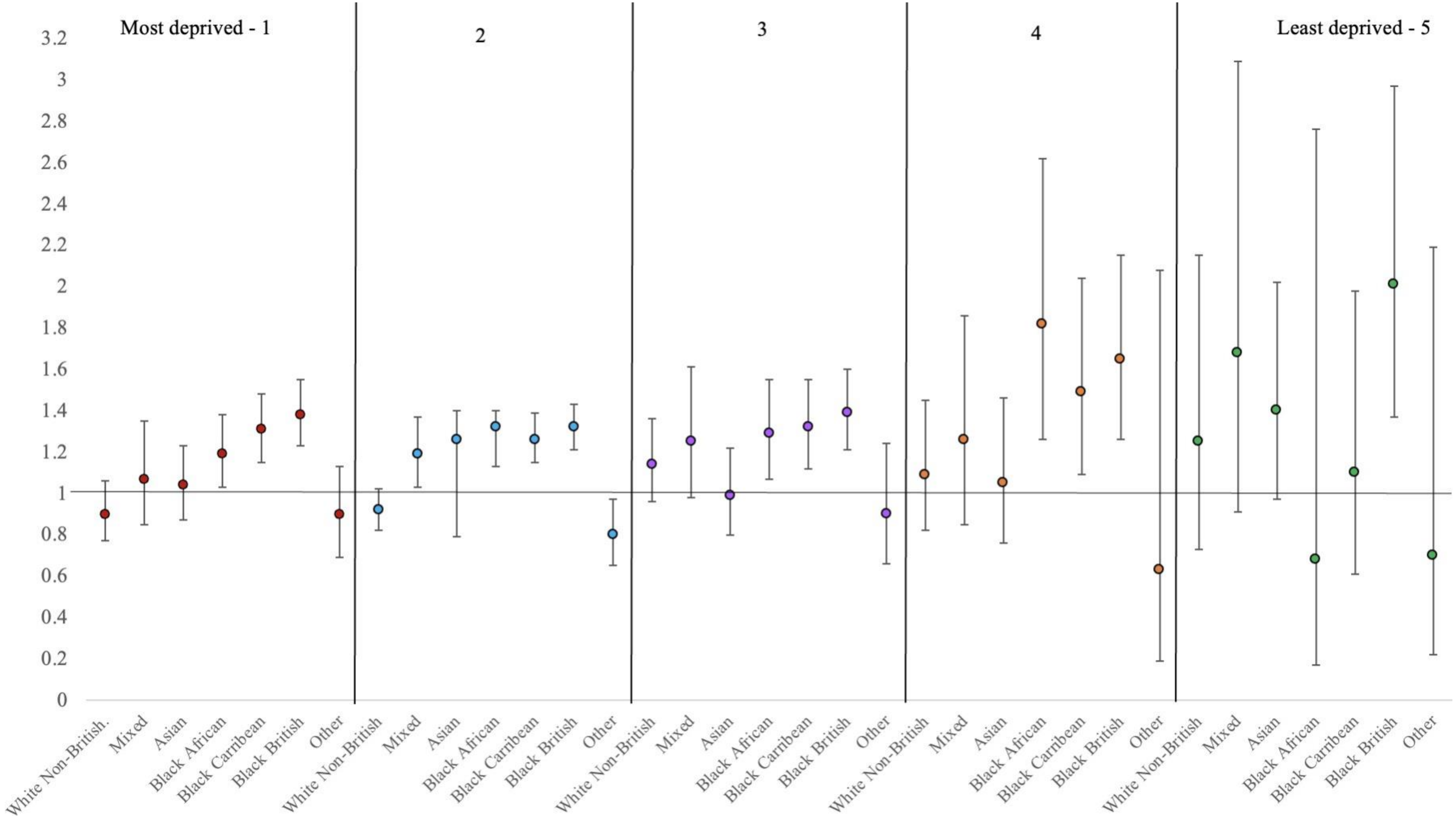


Figure 3

Adjusted incidence rate ratios (IRR) and their corresponding 95% confidence intervals (CI) from negative binomial regressions looking at the association between ethnicity and number of admissions, stratified by deprivation.



5.4.1 Main findings

This study aimed to understand the relationship between ethnicity, deprivation, and inpatient use in adults with psychotic disorders. Patients living in more deprived areas (quintiles one, two and three) were more likely to experience all outcomes, except longer LOS, compared to patients living in quintile 5. Living in a less deprived area (quintile 4) reduced the risk of compulsory admission and admission to PICU. All ethnic minority groups were more likely to be compulsorily admitted. Black ethnic patients (African, Caribbean, and British) were also at increased risk of all other outcomes (PICU admission, longer LOS, and a higher number of admissions).

Living in the least deprived areas (quintile 5) did reduce the risk of compulsory admission for some ethnic minority groups, but not Asian or black British patients. However, the small sample and wide confidence intervals within this quintile limits the conclusions we can draw. Ethnic minority patients, except black British patients, from quintile five were no more likely to experience frequent readmission compared to white British patients. All ethnic minority patients from quintiles four and five had no longer LOS compared to white British patients.

5.3.3 Explaining the findings.

Our findings highlight the protective nature of living in the least deprived areas for all outcomes except longer LOS. Our findings echo those of Hodgson et al. (2009), whereby patients living in less deprived areas were more likely to experience a longer LOS. This finding was surprising given the social causation hypothesis would assume residents of more deprived areas experience greater social stressors contributing to severe symptomatology requiring longer inpatient treatment (Colasanti et al. 2010). This finding could be associated with multiple reasons which require further investigation. Research in U.S has found patients with psychotic disorders who live in areas with the lowest household income have shorter admissions compared to patients from higher-income areas (Bessaha et al. 2017). Within the NHS it has been found that patients from the three most deprived quintiles are more likely to self-discharge against medical advice, thus having a shorter LOS (Alagappan et al. 2023). While there are not treatment costs in the UK, residents from more deprived areas where household income is likely lower may worry about the indirect costs of inpatient care such as a reduction in earnings due to statutory sick pay, however this has yet to be investigated specially for patients with psychotic disorders in psychiatric wards. In our stratified analysis, we also found that the association between ethnicity and LOS was only evident in quintiles 1-3, however as it is likely at least some of the stratified analysis in these quintiles are likely underpowered future studies may wish to attempt to identify an even larger sample to increase our confidence in this finding.

We also found all ethnic minority groups were more likely to be compulsorily admitted versus white British patients. Interestingly, studies focusing on first-episode psychosis only did not find this in black Caribbean patients (Oduola et al., 2019, Mann et al. 2014). This difference may be because first-episode psychosis patients are unlikely to have been admitted before, whereas we found black Caribbean patients were at risk of frequent admissions. Our findings show compulsory admission is ubiquitous for all ethnic minority groups, suggesting these individuals are very unwell or are perceived to be a higher risk. The nature of compulsory admissions means individuals are treated against their will, sometimes requiring physical restraint (Paye-Gill et al. 2021). We found that patients from black (African, Caribbean, and British) and mixed ethnic groups were at increased risk of PICU admission, typically associated with symptom severity and greater use of manual restraint and seclusion (Bowers et al. 2012). These restrictions on freedom fuel the inherent power differences between service users and the mental health system (Lawerence et al. 2021). As such, patients who have had negative inpatient experiences may be less likely to engage with mental health services (either in the community or hospital) increasing their risk of relapse and possibly compulsory admission, hence a vicious cycle emerges (Chakraborty et al. 2010).

A previous stratified analysis by Chow et al. (2003) found ethnic minority patients in living low-poverty areas of New York only, were more likely to be admitted compared to white patients. This contradicts our finding that the likelihood of compulsory admission was raised for some ethnic minority groups across all deprivation quintiles. This discrepancy could be explained by differences between American and UK healthcare systems in terms of cost of treatment. In America, ethnic minority patients and patients living in deprived areas are more likely to rely on Medicaid public health insurance, leaving them vulnerable to co- payments when admission is required (Magge et al. 2013). Patients are less likely to seek mental health treatment (such as inpatient admission) if their Medicare plan requires them to share more of the treatment cost (Trivedi et al. 2008). This could explain the contrasting findings as UK patients in deprived areas may not experience finical worries associated with admission to the same extent as treatment is free.

Strikingly, we found there were still disparities in compulsory admission for black British and Asian patients living in the least deprived areas (quintile five), though there is a need to interpret these findings cautiously. In our sample ethnic minority groups were less concentrated in quintile five, reflecting previous research (Tinsley & Jacobs, 2006). Ethnic density can be protective against compulsory admission for some ethnic minority groups (McBride et al., 2023), with experiences of racism lower in areas with high ethnic density (Astell-Burt et al. 2012). Racism can shape the schemas individuals have about themselves, the world, and others (Hardy, 2016). Individuals may develop a tendency to experience their physical and sociocultural environment as hostile, fuelling persecutory paranoid delusions (Lazaridou et al. 2023). Black ethnic groups can find access to treatment as discriminatory and stigmatising, perhaps making them reluctant to voluntary admission when experiencing psychotic symptomatology (Henderson et al. 2013). This suggests that the protection living in the least deprived areas offers against compulsory admission fails to buffer the increased experiences of racism black British and Asian patients are likely to experience in these areas.

We did not find disparities in compulsory admission for white non-British patients in quintile five. The varying levels of racism different ethnic minority groups report experiencing could partially explain this. Individuals from black ‘Other’ ethnic groups have more frequently reported experiences of racism compared to most white non-British individuals (Finney et al., 2023). This links to a specific type of discrimination called Colourism, whereby those with lighter skin are privileged (Hunter, 2007). Colourism has been found to contribute to individuals with lighter skin having greater opportunities in areas like employment (Stockstill & Carson et al. 2021) and in the rental market (Brangian et al., 2023). This suggests that white non-British patients face fewer barriers in accessing the beneficial characteristics of least deprived areas, like increased employment opportunities, compared to black British patients. Therefore, white British residents could benefit more from the buffering effects living in the least deprived areas offers as they appear to experience less (though likely still some) social stressors relating to their skin colour.

5.4.3 Strengths and limitations

There are several methodological strengths in this study. First, the data source (CRIS) allowed access to a large diverse sample representative of the population of Southeast London which would have been inaccessible otherwise. This allowed us to disaggregate ethnicity according to the census categories. This also enabled us to stratify by more groups than in previous studies and maintaining statistical power in most analyses (Chow et al.

2003). Second, the use of text mining algorithms to capture ethnicity-related data from free- text fields allowed us to identity ethnicity for an additional 343 patients, who would have been excluded otherwise.

Despite our large sample size, fewer ethnic minority patients were living in the least deprived quintile. This could explain why in quintile five no patients in certain ethnic minority groups experienced compulsory admission or admission to a PICU and why there were larger confidence intervals in groups that did. It should be noted that data on CRIS is recorded by clinicians for clinical, not research purposes, therefore the availability and accuracy of information will depend on the questions asked by clinicians and the quality of their documentation. Given the cross-sectional nature of this study, we did not account for changes in address. Our study used patients' first address in the study period to calculate IMD, though it is likely some patients moved during this time possibly to other deprivation quintiles. This limits our ability to infer causality. Future studies will benefit from taking a longitudinal approach to provide temporal insight into when patients experience admission- related outcomes.

5.4.4 Directions of future research

This study can be considered London-centric, with a patient sample likely to be more diverse compared to other areas of the UK. Researchers should therefore seek anonymised datasets from NHS trusts in different parts of the country to see if findings would differ in less diverse areas. This may be particularly important given this study found disparities in compulsory admission for black British and Asian patients living in the least deprived areas (quintile five), with are also likely to have fewer ethnic minority residents (Tinsley & Jacobs, 2006).

This study also used operationalised area-level deprivation using the IMD (Noble et al. 2019), which is a measure of relative deprivation at a small local area level. While small-area measures are typically used in research, these can be subject to ecological fallacy. For example, one might assume that if an area is deprived, all residents living in that area will be deprived or ‘poor’ themselves. It is likely that residents living in deprived areas who identify as deprived themselves may be affected more by the characteristics of their community compared with to residents who identify as less deprived. For example, research has found that there can be differences between an individual’s actual financial resources and an individual’s concern about their relative deprivation (Kim et al. 2017). Residents who identify as less deprived may feel they have better access to resources which allows them to mitigate some of the characteristics of their community, such as having resources to travel to areas with more green space. Future research should therefore consider additional individual-level co-founders such as education level or employment status. Considering these may give a better understanding of the intricacies of the data.

5.4.5 Implications of findings

Our findings highlight the potential consequences of not addressing inequalities in the social determinants of health, leaving individuals from deprived areas and ethnic minoritized groups with psychotic disorders more vulnerable to compulsory inpatient admission. The introduction of Integrated Care Systems holds promise for greater collaboration between health services, local authorities, and voluntary third-sector partners (van der Feltz-Cornelis, et al. 2023). This study has implications for how these systems could target their attempts to reduce the inequalities we found. This approach will require policymakers and service providers to shift the focus away from individual-focused to evidence-based community-level interventions. Evidence suggests that community-based interventions, such as community support for parents (Day et al. 2022, Gray, 2003) and improved access to exercise facilities (Garner-Purkis et al. 2020, Rabiee et al. 2015), benefit common mental health outcomes in deprived areas and among ethnic minority groups. However, more evidence for these interventions is needed for individuals with psychotic disorders from these communities.

We found that in the least deprived areas, some ethnic minority residents are still at greater risk of admission. This supports recommendations by the Fair Society, Healthy Lives Review (Marmot, 2010) which emphasised that focusing solely on the most disadvantaged areas will not reduce health inequalities sufficiently. Instead, resources should be targeted with a scale and intensity proportionate to the level of disadvantage residents face (Marmot, 2010). For example, resources aimed at enhancing community cohesion and addressing experiences of racism may be most effectively targeted across the spectrum of deprivation. Additional resources aimed at addressing the characteristics of deprived areas, such as poor living conditions, may be best targeted at more deprived areas. It is hoped this approach will begin to reduce the increased risk of compulsory admission some ethnic minority patients with psychotic disorders face across the deprivation spectrum.

5.4.6 Conclusion

Pervasive inequalities in compulsory admission for psychosis exist for almost all minoritized ethnic groups and in the most deprived areas, though less frequently in the least deprived areas. However, black British patients in the least deprived areas were not protected from compulsory admission, or higher admission rates. Evidence-based community-level interventions to tackle health inequalities should be a priority for future research, policy makers and service providers.

Acknowledgements: This paper represents independent research funded by the National Institute for Health Research (NIHR) Biomedical Research Centre at South London and Maudsley NHS Foundation Trust and King’s College London. The views expressed are those of the author(s) and not necessarily those of the NHS, the NIHR or the Department of Health and Social Care.

Conflict of interests: SO is supported by the National Institute for Health Research (Ref: NIHR HS&DR 131871).

5.5 References

Abas, M.A., Vanderpyl, J., Robinson, E., Prou, T.L., Crampton, P., 2006. Socio-economic deprivation and duration of hospital stay in severe mental disorder. British Journal of Psychiatry 188, 581–582. doi:10.1192/bjp.bp.104.007476

Akther, S.F., Molyneaux, E., Stuart, R., Johnson, S., Simpson, A., Oram, S., 2019. Patients' experiences of assessment and detention under Mental Health Legislation: Systematic review and qualitative meta-synthesis. BJPsych Open 5. doi:10.1192/bjo.2019.19

Alagappan, A., Chambers, T.J.G., Brown, E.T., Grecian, S., Lockman, K.A., 2023. How does discharge against medical advice affect risk of mortality and unplanned readmission? A retrospective cohort study set in a large UK medical admissions unit. BMJ Open 13. https://doi.org/10.1136/bmjopen-2022-068801

Anderson, R.T., Sorlie, P., Backlund, E., Johnson, N., Kaplan, G.A., 1997. Mortality effects of community socioeconomic status. Epidemiology 8, 42–47. doi:10.1097/00001648 199701000-00007

Astell-Burt, T., Maynard, M.J., Lenguerrand, E., Harding, S., 2012. Racism, ethnic density and psychological well-being through adolescence: Evidence from the determinants of adolescent social well-being and Health Longitudinal Study. Ethnicity & Health 17, 71–87. doi:10.1080/13557858.2011.645153

Bebbington, P.E., Bhugra, D., Brugha, T., Singleton, N., Farrell, M., Jenkins, R., Lewis, G., Meltzer, H., 2004. Psychosis, victimisation and childhood disadvantage. British Journal of Psychiatry 185, 220–226. doi:10.1192/bjp.185.3.220

Bebbington, P.E., McManus, S., 2019. Revisiting the one in four: The prevalence of psychiatric disorder in the population of England 2000–2014. The British Journal of Psychiatry 216, 55–57. doi:10.1192/bjp.2019.196

Benjamini, Y., Hochberg, Y., 1995. Controlling the false discovery rate: A practical and powerful approach to multiple testing. Journal of the Royal Statistical Society: Series B (Methodological) 57, 289–300. doi:10.1111/j.2517-6161.1995.tb02031.x

Berg, A.O., Aas, M., Larsson, S., Nerhus, M., Hauff, E., Andreassen, O.A., Melle, I., 2014. Childhood trauma mediates the association between ethnic minority status and more severe hallucinations in psychotic disorder. Psychological Medicine 45, 133–142. doi:10.1017/s0033291714001135

Bessaha, M.L., Shumway, M., Smith, M.E., Bright, C.L., Unick, G.J., 2017. Predictors of Hospital Length and Cost of Stay in a National Sample of Adult Patients with Psychotic Disorders. Psychiatric Services 68, 559–565. https://doi.org/10.1176/appi.ps.201600312

Bhattacharyya, S., Schoeler, T., Di Forti, M., Murray, R., Cullen, A.E., Colizzi, M., 2023. Stressful life events and relapse of psychosis: Analysis of Causal Association in a 2 year prospective observational cohort of individuals with first-episode psychosis in the UK. The Lancet Psychiatry 10, 414–425. doi:10.1016/s2215-0366(23)00110-4 Bowers, L., Hammond, N., James, K., Quirk, A., Robson, D., Stewart, D., 2009. Characteristics of acute wards associated with the presence of a psychiatric intensive care unit, and transfers of patients to it. Journal of Psychiatric Intensive Care 8, 6677. doi:10.1017/s174264641200012x

Bowers, L., Simpson, A., Nizam, H., Hall, C., 2008. Patient ethnicity and three psychiatric intensive care units compared: The Tompkins Acute Ward Study. Journal of Psychiatric and Mental Health Nursing 15, 195–202. doi:10.1111/j.1365 2850.2007.01211.x

Bowleg, L., 2012. The problem with the phrase *women and minorities:* intersectionality—an important theoretical framework for Public Health. American Journal of Public Health 102, 1267–1273. doi:10.2105/ajph.2012.300750

Branigan, A.R., Hall, M., 2023. Colorism in the rental housing market: Field experimental evidence of discrimination by Skin Color. Social Psychology Quarterly 86, 275–297. doi:10.1177/01902725221129624

Bruce, M., Smith, J., 2020. Length of stay among multi-ethnic psychiatric inpatients in the

United Kingdom. Comprehensive Psychiatry 102, 152201. doi:10.1016/j.comppsych.2020.152201

Cantor-Graae, E., Selten, J.-P., 2005. Schizophrenia and migration: A meta-analysis and Review. American Journal of Psychiatry 162, 12–24. doi:10.1176/appi.ajp.162.1.12

Chakraborty, A.T., McKenzie, K.J., Hajat, S., Stansfeld, S.A., 2010. Racism, mental illness and social support in the UK. Social Psychiatry and Psychiatric Epidemiology 45, 1115–1124. doi:10.1007/s00127-009-0156-8

Chieze, M., Courvoisier, D., Kaiser, S., Wullschleger, A., Hurst, S., Bardet-Blochet, A., Ourahmoune, A., Sentissi, O., 2021. Prevalence and risk factors for seclusion and restraint at Geneva's Adult Psychiatric Hospital in 2017. The European Journal of Psychiatry 35, 24–32. doi:10.1016/j.ejpsy.2020.06.006

Chow, J.C.-C., Jaffee, K., Snowden, L., 2003. Racial/ethnic disparities in the use of mental health services in Poverty Areas. American Journal of Public Health 93, 792–797. doi:10.2105/ajph.93.5.792

Colasanti, A., Paletta, S., Moliterno, D., Mazzocchi, A., Mauri, M.C., Altamura, A.C., 2010. Symptom dimensions as predictors of clinical outcome, duration of hospitalization, and aggressive behaviours in acutely hospitalized patients with psychotic exacerbation. Clinical Practice & Epidemiology in Mental Health 1, 72–78. doi:10.2174/17450179010060100072

Croudace, T.J., Kayne, R., Jones, P.B., Harrison, G.L., 2000. Non-linear relationship between an index of social deprivation, psychiatric admission prevalence and the incidence of psychosis. Psychological Medicine 30, 177–185. doi:10.1017/s0033291799001464

Cullen, A.E., Bowers, L., Khondoker, M., Pettit, S., Achilla, E., Koeser, L., Moylan, L., Baker, J., Quirk, A., Sethi, F., Stewart, D., McCrone, P., Tulloch, A.D., 2018. Factors associated with use of psychiatric intensive care and seclusion in adult inpatient mental health services. Epidemiology and Psychiatric Sciences 27, 51-61. doi:10.1017/s2045796016000731

Cullen, A.E., Bowers, L., Khondoker, M., Pettit, S., Achilla, E., Koeser, L., Moylan, L., Baker, J., Quirk, A., Sethi, F., Stewart, D., McCrone, P., Tulloch, A.D., 2016. Factors associated with use of psychiatric intensive care and seclusion in adult inpatient mental health services. Epidemiology and Psychiatric Sciences 27, 51–61. doi:10.1017/s2045796016000731

Cunningham, H., 2002. GATE, a General Architecture for Text Engineering. Computers and the Humanities 36, 223–254. doi:10.1023/a:1014348124664

Davies, M., Hogarth, L., 2021. The effect of covid-19 lockdown on psychiatric admissions: Role of gender. BJPsych Open 7. doi:10.1192/bjo.2021.927

Day, C., Harwood, J., Kendall, N., Nicoll, J., 2022. . Impact of a peer-led, community-based parenting programme delivered at a national scale: An uncontrolled cohort design with benchmarking. doi:10.21203/rs.3.rs-1180221/v1

DeLuca, J.S., Novacek, D.M., Adery, L.H., Herrera, S.N., Landa, Y., Corcoran, C.M., Walker, E.F., 2022. Equity in mental health services for youth at Clinical High Risk for psychosis: Considering marginalized identities and stressors. Evidence-Based Practice in Child and Adolescent Mental Health 7, 176–197. doi:10.1080/23794925.2022.2042874

Department of Health. 1983. Mental Health Act (1983) . London.

Drake, R.E., Whitley, R., 2014. Recovery and severe mental illness: Description and analysis. The Canadian Journal of Psychiatry 59, 236–242.doi:10.1177/070674371405900502

Dyer, C., 2022. Reforms to mental health laws will prioritise care and patient choice. BMJ. doi:10.1136/bmj.o1194

E. Hodgson, Martyn Lewis, Jed Board, R., 2000. The prediction of in-patient length of stay for acute psychiatric admissions. Journal of Mental Health 9, 145–153. doi:10.1080/09638230050009140

Fekadu, W., Mihiretu, A., Craig, T.K., Fekadu, A., 2019. Multidimensional impact of severe mental illness on family members: Systematic Review. BMJ Open 9.

doi:10.1136/bmjopen-2019-032391

Finney, N., Nazroo, J.Y., Bécares, L., Kapadia, D., Shlomo, N., 2023. Racism and ethnic inequality in a time of crisis: Findings from the evidence for Equality National Survey. Policy Press, Bristol, Uk.

Fone, D.L., Dunstan, F., 2006. Mental health, places and people: A multilevel analysis of economic inactivity and social deprivation. Health & Place 12, 332–344. doi:10.1016/j.healthplace.2005.02.002

Freitas, D.F., Walker, S., Nyikavaranda, P., Downs, J., Patel, R., Khondoker, M., Bhui, K., Hayes, R.D., 2022. Ethnic inequalities in involuntary admission under the Mental Health Act: An exploration of mediation effects of clinical care prior to the first admission. The British Journal of Psychiatry 222, 27–36. doi:10.1192/bjp.2022.141

Freitas, Daniela Fonseca, Susan Walker, Patrick Nyikavaranda, Johnny Downs, Rashmi Patel, Mizanur Khondoker, Kamaldeep Bhui, and Richard D Hayes. 2023. “Ethnic Inequalities in Involuntary Admission under the Mental Health Act: An Exploration of Mediation Effects of Clinical Care Prior to the First Admission.” The British Journal of Psychiatry 222, 27–36.

Gajwani, R., Parsons, H., Birchwood, M., Singh, S.P., 2016. Ethnicity and detention: Are Black and Minority ethnic (BME) groups disproportionately detained under the mental health act 2007? Social Psychiatry and Psychiatric Epidemiology 51, 703–711. doi:10.1007/s00127-016-1181-z

Gannon, L., Mullen, E., McGorry, P., O’Donoghue, B., 2023. Prevalence and predictors of admission at the time of presentation in first episode psychosis. Social Psychiatry and Psychiatric Epidemiology. doi:10.1007/s00127-023-02552-7

Gray, B., 2003. Social Exclusion, poverty, health and social care in Tower Hamlets: The perspectives of families on the impact of the Family Support Service. British Journal of Social Work 33, 361–380. doi:10.1093/bjsw/33.3.361

Garner-Purkis, A., Alageel, S., Burgess, C., Gulliford, M., 2020. A community-based, sport led programme to increase physical activity in an area of deprivation: A qualitative case study. BMC Public Health 20. doi:10.1186/s12889-020-08661-1

Rabiee, F., Robbins, A., Khan, M., 2014. Gym for free: The short-term impact of an innovative public health policy on the health and wellbeing of residents in a deprived constituency in Birmingham, UK. Health Education Journal 74, 691–704. doi:10.1177/0017896914553957

Hardy, A., Emsley, R., Freeman, D., Bebbington, P., Garety, P.A., Kuipers, E.E., Dunn, G., Fowler, D., 2016. Psychological mechanisms mediating effects between trauma and psychotic symptoms: The role of affect regulation, intrusive trauma memory, beliefs, and depression. Schizophrenia Bulletin 42. doi:10.1093/schbul/sbv175

Henderson, C., Evans-Lacko, S., Thornicroft, G., 2013. Mental illness stigma, help seeking, and public health programs. American Journal of Public Health 103, 777–780. doi:10.2105/ajph.2012.301056

Heslin, M., Khondoker, M., Shetty, H., Pritchard, M., Jones, P.B., Osborn, D., Kirkbride, J.B., Roberts, A., Stewart, R., 2018. Inpatient use and area-level socio-environmental factors in people with psychosis. Social Psychiatry and Psychiatric Epidemiology 53, 1133–1140. doi:10.1007/s00127-018-1534-x

Hunter, M., 2007. The persistent problem of colorism: Skin tone, status, and inequality. Sociology Compass 1, 237–254. doi:10.1111/j.1751-9020.2007.00006.x

Kim, H., Callan, M.J., Gheorghiu, A.I., Matthews, W.J., 2016. Social comparison, personal relative deprivation, and materialism. British Journal of Social Psychology 56, 373–392. https://doi.org/10.1111/bjso.12176

Kyzyma, Iryna. 2020. “How Poor Are the Poor? Looking beyond the Binary Measure of Income Poverty.” Journal of Economic Inequality 18, 525–49. https://doi.org/10.1007/s10888-020-09453-8.

Laing, J., 2021. Reforming the mental health act: Will more rights lead to fewer wrongs?

Medical Law Review 30, 158–176. doi:10.1093/medlaw/fwab04

Lazaridou, F.B., Schubert, S.J., Ringeisen, T., Kaminski, J., Heinz, A., Kluge, U., 2022. Racism and psychosis: An umbrella review and qualitative analysis of the mental health consequences of racism. European Archives of Psychiatry and Clinical Neuroscience 273, 1009–1022. doi:10.1007/s00406-022-01468-8

Magge, H., Cabral, H.J., Kazis, L.E., Sommers, B.D., 2013. Prevalence and predictors of underinsurance among low-income adults. Journal of General Internal Medicine 28, 1136–1142. doi:10.1007/s11606-013-2354-z

Maina, G., Rosso, G., Carezana, C., Mehanović, E., Risso, F., Villari, V., Gariglio, L., Cardano, M., 2021. Factors associated with involuntary admissions: A register based cross-sectional multicenter study. Annals of General Psychiatry 20. doi:10.1186/s12991-020-00323-1

Mallett, R., 1997. “Sociodemographic Schedule.” Section of Social Psychiatry, Institute of Psychiatry 183, 35.

Mann, F., Fisher, H.L., Major, B., Lawrence, J., Tapfumaneyi, A., Joyce, J., Hinton, M.F., Johnson, S., 2014. Ethnic variations in compulsory detention and hospital admission for psychosis across four UK early intervention services. BMC Psychiatry 14. doi:10.1186/s12888-014-0256-1

Marmot, M.G., 2010. Fair Society, healthy lives: The marmot review ; Strategic Review of Health Inequalities in England post-2010. Marmot Review, London. McBride, O., Duncan, C., Twigg, L., Keown, P., Bhui, K., Scott, J., Parsons, H., Crepaz Keay, D., Cyhlarova, E., Weich, S., 2021. Effects of ethnic density on the risk of compulsory psychiatric admission for individuals attending secondary care mental health services: Evidence from a large-scale study in England. Psychological Medicine 1–10. doi:10.1017/s0033291721001768

Newbury, J., Arseneault, L., Caspi, A., Moffitt, T.E., Odgers, C.L., Fisher, H.L., 2017. Cumulative effects of neighborhood social adversity and personal crime victimization on adolescent psychotic experiences. Schizophrenia Bulletin 44, 348–358. doi:10.1093/schbul/sbx060

Noble, S., Silk, M., D. McLennan, M Noble, E Plunkett, N Gutacker, and G Wright. 2019. The English Indices of Deprivation 2019.

Nuernberg, G.L., Baeza, F.L., Fleck, M.P., Rocha, N.S., 2016. Outcomes of inpatients with severe mental illness: a naturalistic descriptive study. Revista Brasileira de Psiquiatria 38, 141–147. https://doi.org/10.1590/1516-4446-2014-1643

Oduola, S., Craig, T.K., Das-Munshi, J., Bourque, F., Gayer-Anderson, C., Morgan, C., 2019. Compulsory admission at first presentation to services for psychosis: Does ethnicity still matter? findings from two population-based studies of first episode psychosis. Social Psychiatry and Psychiatric Epidemiology 54, 871–881. doi:10.1007/s00127-019-01685-y

Oduola, S., Das-Munshi, J., Bourque, F., Gayer-Anderson, C., Tsang, J., Murray, R.M., Craig, T.K., Morgan, C., 2021. Change in incidence rates for psychosis in different ethnic groups in South London: Findings from the Clinical Record Interactive Search-first episode psychosis (Cris-FEP) study. Psychological Medicine 51, 300–309. doi:10.1017/s0033291719003234Osborn, D.P., Favarato, G., Lamb, D., Harper, T., Johnson, S., Lloyd-Evans, B., Marston, L., Pinfold, V., Smith, D., Kirkbride, J.B., Weich, S., 2021. Readmission after discharge from acute mental healthcare among 231 988 people in England: Cohort study exploring predictors of readmission including availability of Acute Day units in local areas. BJPsych Open 7. doi:10.1192/bjo.2021.961

Jacobs, R., Gutacker, N., Mason, A., Goddard, M., Gravelle, H., Kendrick, T., Gilbody, S., 2015. Determinants of hospital length of stay for people with serious mental illness in England and implications for payment systems: A regression analysis. BMC Health Services Research 15. doi:10.1186/s12913-015-1107-6

Payne-Gill, J., Whitfield, C., Beck, A., 2021. The relationship between ethnic background and the use of restrictive practices to manage incidents of violence or aggression in psychiatric inpatient settings. International Journal of Mental Health Nursing 30, 1221–1233. doi:10.1111/inm.12873

Pearce, J., Rafiq, S., Simpson, J., Varese, F., 2019. Perceived discrimination and psychosis: A systematic review of the literature. Social Psychiatry and Psychiatric Epidemiology 54, 1023–1044. doi:10.1007/s00127-019-01729-3

Pedersen, M.L., Gildberg, F., Baker, J., Damsgaard, J.B., Tingleff, E.B., 2022. Ethnic disparities in the use of restrictive practices in adult mental health inpatient settings: scoping review. Social Psychiatry and Psychiatric Epidemiology 58, 505–522. doi:10.1007/s00127-022-02387-8

Perera, G., Broadbent, M., Callard, F., Chang, C.-K., Downs, J., Dutta, R., Fernandes, A., Hayes, R.D., Henderson, M., Jackson, R., Jewell, A., Kadra, G., Little, R., Pritchard, M., Shetty, H., Tulloch, A., Stewart, R., 2016. Cohort profile of the south london and Maudsley NHS Foundation Trust Biomedical Research Centre (SLAM BRC) caseregister: Current status and recent enhancement of an electronic mental health record derived Data Resource. BMJ Open 6. doi:10.1136/bmjopen-2015-008721

Ride, J., Kasteridis, P., Gutacker, N., Aragon Aragon, M.J., Jacobs, R., 2019. Healthcare costs for people with serious mental illness in England: An analysis of costs across primary care, hospital care, and Specialist Mental Healthcare. Applied Health Economics and Health Policy 18, 177–188. doi:10.1007/s40258-019-00530-2

Rozalski, V., McKeegan, G.M., 2019. Insight and symptom severity in an inpatient psychiatric sample. Psychiatric Quarterly 90, 339–350. doi:10.1007/s11126-019 09631-6

Rogerson, M., Haines-Delmont, A., McCabe, R., Brown, A., Whittington, R., 2021. The relationship between Inpatient Mental Health Ward Design and aggression. Journal of Environmental Psychology 77, 101670. doi:10.1016/j.jenvp.2021.101670

Ross, P.T., Hart-Johnson, T., Santen, S.A., Zaidi, N.L.B., 2020. Considerations for using race and ethnicity as quantitative variables in medical education research. Perspectives on Medical Education 9, 318–323. https://doi.org/10.1007/s40037-020-00602-3

Stockstill, C., Carson, G., 2021. Are lighter-skinned tanisha and Jamal worth more pay? White People’s gendered colorism toward black job applicants with racialized names. Ethnic and Racial Studies 45, 896–917. doi:10.1080/01419870.2021.1900584

van der Feltz-Cornelis, C., Attree, E., Heightman, M., Gabbay, M., Allsopp, G., 2023. Integrated Care Pathways: A new approach for Integrated Care Systems. British Journal of General Practice 73, 422–422. doi:10.3399/bjgp23x734925

Selten, J.-P., Cantor-Graae, E., 2005. Social defeat: Risk factor for schizophrenia? British Journal of Psychiatry 187, 101–102. doi:10.1192/bjp.187.2.101

Selten, J.-P., van der Ven, E., Rutten, B.P., Cantor-Graae, E., 2013. The social defeat hypothesis of schizophrenia: An update. Schizophrenia Bulletin 39, 1180–1186. doi:10.1093/schbul/sbt134

StataCorp, L P., 2017. Mata Reference Manual.College Station, TX, StataCorp LLC.

Stewart, R., Soremekun, M., Perera, G., Broadbent, M., Callard, F., Denis, M., Hotopf, M., Thornicroft, G., Lovestone, S., 2009. The south london and Maudsley NHS Foundation Trust Biomedical Research Centre (SLAM BRC) case register: Development and descriptive data. BMC Psychiatry 9. doi:10.1186/1471-244x-9-51

Stone, K., 2019. Approved mental health professionals and detention: An exploration of professional differences and similarities. Practice 31, 83–96. doi:10.1080/09503153.2018.1445709

Tinsley, Jonathan, and Michael Jacobs. 2006. “Deprivation and Ethnicity in England: A Regional Perspective.” Regional Trends 39 (6).

White, J., Gutacker, N., Jacobs, R., Mason, A., 2014. Hospital admissions for severe mental illness in england: Changes in equity of utilisation at the small area level between 2006 and 2010. Social Science & Medicine 120, 243–251. doi:10.1016/j.socscimed.2014.09.036

with severe mental illness: A naturalistic descriptive study. Brazilian Journal of Psychiatry 38, 141–147. doi:10.1590/1516-4446-2014-1643

Chapter six- Discussion and Critical Evaluation

This chapter provides a summary of both the systematic review and the empirical paper. It considers how these both contribute to our understanding of mental health outcomes across the continuum of reduced well-being and mental health difficulties (MHD), both common MHD and psychotic disorders, with a focus on community-based interventions and inpatient admissions in residents of deprived areas. Implications for clinical practice, research and theory are considered such as the responsibility services, researchers and policy makers have to address these health inequalities by working at the community-level to target the stressors residents of deprived areas face. A review of the overall research's strengths and limitations are also provided.

6.1 Summary of findings

The systematic review of the impact of community-based interventions on mental health outcomes in residents of deprived communities found 26 papers meeting the inclusion criteria, Interventions used measures of well-being, general mental health and common MHD, with none focusing on outcomes in residents with severe mental illnesses like psychotic disorders. Findings on the impact of community-based interventions were mixed

However narrative synthesis (taking a harvest plot approach) found promise for interventions which were skill-focused, were more focused in their delivery (e.g. has fewer components or where their components mapped more directly onto their outcome measures) and target (e.g. focusing on post-natal depression versus general mental health). There was a trend for residents to benefit most from these interventions when they were able to engage.

The empirical paper used anonymised electronic patient records from the South London and Maudsley NHS Foundation Trust (SLaM) Biomedical Research Centre (BRC) Clinical Records Interactive Search (CRIS) (Stewart et al., 2009) to explore the relationship between ethnicity, deprivation, and inpatient-related outcomes. We identified a cohort of 6767 patients (6,095 with complete data) with a diagnosis of a psychotic disorder who were admitted to a psychiatric inpatient ward between the years 2016-2019 in South London. The results indicated that ethnic minority patients were largely over-represented in less deprived areas. Patients residing in more deprived areas (quantiles 1-3) had a higher likelihood of experiencing all negative outcomes, in comparison to those residing in the least deprived areas (quintile 5), except for longer length of stay (LOS). Living in a less deprived area (quintile 4) offers protection against the increased likelihood of compulsory admission and admission to PICU only. Patients from all ethnic minority groups were more likely to experience compulsory admission compared to white British patients, with patients from black ethnic (African, Caribbean, British) and mixed ethnicity groups also being more likely to be admitted to a Psychiatric Intensive Unit (PICU) and experience more frequent admissions. Black patients (African, Caribbean, British) were also more likely to experience a longer length of stay (LOS). Stratified analysis highlighted that living in the least deprived quintile (five) may offer protection against the increased likelihood of compulsory admission for some ethnic minority groups, but not for Asian or black British patients. Patients from all ethnic minority groups, except black British patients, who reside in the least deprived areas (quintile five) seem to be protected against increased risk of frequent readmissions compared to white British patients. However small sample sizes and large confidence intervals in this quintile limit the strength of conclusions we can draw. Also, ethnic minority patients living in less deprived areas (quintiles four and five) may have a lower likelihood of experiencing LOS.

Together, the findings of these studies provide evidence for the social determinants of mental health inequalities and highlight the importance of addressing the social stressors present in deprived areas. These social stressors can leave residents more vulnerable to experiencing poor well-being (Bezzo et al. 2021), common MHD, (Remes et al. 2019) and psychotic disorders (O'Dononoghue et al. 2016). The systematic review provided evidence for the benefit of addressing these social stressors through community-based interventions targeting general mental health or common MHD in deprived communities. In comparison the findings of the empirical paper highlight the potential consequences of not addressing these social stressors, leaving residents of deprived areas with psychotic disorders at increased risk of severe symptomatology and thus possible compulsory admission. Both chapters therefore provide further evidence of the social determinants of MHD. The systematic review also highlighted that some papers reporting on outcomes for community- based interventions in deprived areas fail to report other sociodemographic characteristics for these residents that may place them at greater risk of MHD, with around a quarter of papers failing to report ethnicity data. The empirical paper found that some ethnic minority patients seem to benefit from living in the least deprived areas, while others continue to face a higher risk of being compulsorily admitted for severe psychotic symptoms. This highlights that various aspects of an individual's identity can intersect playing a role in their increased vulnerability to severe psychotic symptoms that require inpatient treatment. This has implication for clinical practise, research and theory.

6.2 Implications

6.2.1 Clinical implications

Findings from both the systematic review and empirical paper have implications for how the Integrated Care Systems could target their resources to improve mental health outcomes at the population level. Our systematic review highlights the types of community-based interventions which are likely to benefit residents of deprived areas. The systematic review found some promise for community-based interventions which focused on skills development, such as exercise consultations (Daley et al. 2008, 2015) or parenting groups (Baruch et al. 2021, Day et al. 2022), which could be seen to develop a resident's sense of agency (Bernard et al., 2023). This may be particularly important for these residents who feel restricted in the amount of agency they have other elements of their lives (such as their living conditions) due to economic situations (Rikala, 2020). By providing residents with the necessary skills, these interventions could empower them to perform daily tasks and make decisions about their mental well-being (Drake et al., 2004).

However, our empirical paper shows that focusing solely on the most disadvantaged areas will not reduce health inequalities sufficiently. We found some ethnic minority patients (black British and Asian) living in the least deprived areas did not appear to benefit from the buffering effects of these areas, possibly due to the social stressors they experience relating to their ethnicity or skin-colour such as experiences of racism. This could provide support for a proportionate universalism approach, whereby resources are targeted with a scale and intensity proportionate to the level of disadvantage residents face to reduce inequalities in mental health (Marmot, 2020). For example, resources for improving community cohesion and addressing racism should be targeted across different levels of deprivation, with additional resources for tackling social stressors in deprived areas like poor living conditions, should be focused on the most deprived areas.

This portfolio also highlights the importance of services addressing barriers to engagement in community-based interventions for residents of deprived areas and ethnic minority patients. In our empirical paper, residents of all deprivation quintiles (except the least deprived) and ethnic minority patients were more likely to be compulsorily admitted, suggesting they are perhaps more reluctant to voluntary admission or even other offers of interventions in the community. This could be due to several reasons including ethnic minority groups finding access to treatment as discriminatory and stigmatising (Henderson et al. 2015) or residents of deprived areas feeling like they do not have enough time to engage in these interventions (Wiggin et al., 2004). The systematic review found a trend for residents of deprived areas to benefit most when they could engage in the community-based intervention offered such as when individuals swapped their shopping to the newly built large food store (Cummins et al, 2005). Based on this finding services should consider working with individuals from these communities to further understand the barriers to treatment engagement and to think about how they can make community-based interventions more accessible to residents of deprived areas. They may also benefit from including the communities they are targeting in the design and implementation of any intervention as previous research has highlighted that this is key to their success (Blakeley et al. 2008).

Services wishing to implement this should be aware of the potential reasons why deprived neighbourhoods may be reluctant to join community-engagement projects such as the drain this can place on resident's time and finances and disappointment with outcomes from previous engagement projects (Atree et al. 2010). Therefore community-engagement should be done in a genuine way that values the views of the community to develop their sense of agency and ownership.

Within the healthcare sector, the findings indicate a need to implement incentives for clinicians to ask and accurately record socio-demographic information for patients, particularly characteristics identified as placing individuals at greater risk of MHD. Following the introduction of incentives for recording patients' ethnicity in 2006 there was an increase in the number of records with this documented, however many other sociodemographic characteristics such as religion or immigration status are still poorly recorded today (Jain et al., 2017). Ethnic minority patients are likely to be immigrants themselves or have experiences of migration in their family history (Wiley et al. 2008). First and second- generation immigrant status have been associated with an increased risk of psychotic disorders like schizophrenia (Tarricone et al. 2021). Having accurate records of patients' ethnicity, addresses (to determine the deprivation level of the area they live in), and other potential socio-demographic characteristics will help services identify who may be at more risk of developing severe psychotic symptoms which may require inpatient treatment.

Services may then be able to link these patients with voluntary or third sector organisations that may support the patient to navigate some of the potential social stressors they face that could be impacting on their mental health, perhaps alongside the services own offer.

Incentives for clinicians may include making it easier for this information to be documented using structured fields, the use of reminders for completion, setting targets for completion rates with financial incentives and providing additional funding to educate clinicians about the social determinants of health to highlight the importance of recording this data.

6.2.2 Research

The systematic review highlighted the variety of definitions used to define a deprived area in the current literature. We chose to focus on high-income countries in the hope to reduce the variability in definitions of deprived areas, as deprived areas in low- or middle-income countries are likely to see very different. In the review, some studies used classification tools such as the English Indices of Multiple Deprivation (IMD) (Noble et al. 2019) and others compared characteristics of the area to the entire country or a less deprived area. Moreover, 15 papers in this review were excluded for not providing details of how they operationalised the deprived area their sample was from. The empirical paper used IMD quintiles to classify deprivation, with quintile one representing the 20% most deprived areas in England and quintile five the 20% least deprived. In the systematic review, papers which used IMD to define deprived areas used different cut-offs, with some reporting findings in the 10% most deprived areas and others the 20 or 30% most deprived. This highlights the importance of researchers clearly describing how they operationalise an area as deprived so researchers can better understand the potential external validity of the research they are reading. While achieving a global consensus on how to define a deprived area would be unexpected, within single countries future research may wish to focus on understanding the common features used to define a deprived area by other research, services and government. Without a clearer consensus on how to define or identify deprived areas in research, it can be difficult to make comparisons across studies. Moreover, if services conceptualise deprivation differently from the evidence base then interventions or policy may be ineffective as they are then based on research completed in groups that differ from those the service wishes to target.

In line with the current evidence base both the systematic review and empirical paper operationalised deprivation at the small area-level. For example, the empirical paper used the IMD measure (Noble 2029). This approach can be praised for considering multiple domains of deprivation beyond income and for not reducing deprivation to a binary (e.g. deprived or not deprived). However, there is a risk that conclusions drawn at the area level will be generalised to all residents living in that area, including those who do not identify as deprived themsleves. While ecological fallacy is difficult to overcome, it is important future research attempts to address this. Research may benefit from trying suggested methods like supplementing ecological data with a sample of individual-level case-control data (Haneuse & Wakefield, 2008) to reduce this bias.

Qualitative approaches to research may provide us with a rich understanding of the social stressors which can make residents of deprived areas and ethnic minority patients more likely to experience MHD. For example, previous qualitative studies found that while black African and Caribbean patients with psychotic disorders are less likely to ascribe perceived discrimination to their MHD, compared to white non-British patients (Chakraborty et al.

2009). Qualitative approaches may also help us to understand residents of deprived areas experience of community-based interventions. For example, in depth semi-structured interviews have found residents of deprived areas may disengage from community- engagement projects due to distrust of those running the projects (Romeo-Velilla et al. 2018). This could provide greater insight into the potential barriers to engagement and what elements of these interventions contribute to their possible success.

6.2.3 Theory

This portfolio has theoretical implications for our understanding of MHD aetiology, providing evidence for social determinant models of MHD. In this thesis, we conceptualised residents' vulnerability to MHD and inpatient admission through the Social Causation hypothesis (Johnson et al., 1999). Our findings support this highlighting that residents of all deprivation quintiles are more vulnerable to compulsory admission and admission to PICU

compared to residents of the least deprived quintiles, which we used as a measure of symptom severity. Several potential mechanisms have been identified in the causal pathway between characteristics of deprived communities and MHD (both common MHD and psychotic). Living in deprived areas can shape the schemas residents have about themselves (as a failure), others (as being better than them) and the world (as being unfair) which can make residents more vulnerable to common MHD like depression (Remes et al. 2019).

Residents of deprived areas experience exposure to crime (Bebbington et al. 2004), long-term unemployment (Cotter et al. 2017) and poor living conditions such as overcrowded housing (Sideli et al. 2020) which have all been associated with psychotic symptoms. The systematic review highlighted the benefit of addressing the social stressors present in deprived communities through community-based interventions in terms of mental health outcomes in deprived communities. This can be seen to provide further support for the Social Causation theory.

Another theory which considers the social determinants of health is the Social Stress Theory (Aneshensel, 1992). The Social Stress Theory argues that an individual's social location, such as their ethnicity and their neighbourhood's deprivation level affects how they perceive, experience, and respond to stress. Ethnic minority group patients living in more deprived areas are thought to experience a combination of stressors relating to the different parts of their identity such as discrimination (Pearce et al. 2019) and poor living conditions (Karlsen et al. 2002). This theory may suggest that ethnic minority patients residing in less deprived areas are less likely to experience severe MHD, as the benefits of living in these areas could help mitigate the effects of social stressors related to ethnicity. Our findings partially support this theory for some ethnic minority groups. We found white non-British patients living in the least deprived quintile were no more likely to be compulsorily admitted compared to white British patients living in the same quintile, however black British patients in the least deprived areas were more likely to be compulsorily admitted. We made sense of these findings by considering the impact of ethnic density and colourism, whereby black British patients may face greater barriers in accessing the greater opportunities less deprived areas provide due to the colour of their skin.

6.3 Strengths and limitations

A key strength of this portfolio is its contributions to the current evidence base on the social determinants of MHD, by advancing our understanding of mental health outcomes in deprived communities concerning community-based interventions and psychiatric inpatient admissions in individuals with psychotic disorders.

To the author's knowledge, the systematic review was the first to synthesise findings from a large range of community-based interventions on well-being and mental health outcomes in deprived areas. This review was comprehensive involving narrative synthesis and meta-analysis across a wide range of interventions spanning seven categories. Previous have only focused on co-location interventions situated in primary care (Tanner et al., 2023). This review included 26 papers from across high-income countries, suggesting we were able to uncover most available papers relating to our research question. However, we know that many community-based interventions are run by third-sector organisations which often have little funding or resources to evaluate their interventions and can receive time-limited funding, meaning there is uncertainty if their interventions will be funded in the long term (Duncan et al, 2021). This means despite the comprehensive nature of this review, there could be other community-based interventions being delivered in deprived communities, perhaps even those targeted at individuals from deprived areas with severe mental illnesses such as psychotic disorders.

While not the first paper to explore the intersection between deprivation, ethnicity and inpatient use the empirical paper was able to advance our understanding of this intersection by stratifying deprivation and ethnicity into more groups compared to previous research. This was enabled by using anonymised electronic health via the South London and Maudsley Clinical Record Interactive Search, whereby we were able to identify a large diverse sample of 6767 patients (6,095 with complete data with complete data). The use of structured language query allowed us to identify and extract ethnicity-related data for 343 patients from clinical notes allowing us to maintain this large sample size. Previous research categorized deprived individuals into low and high-poverty groups (Chow et al. 2003), which can be problematic as it fails to capture their complexity (Kzyma, 2020). It is hoped that by stratifying by more groups we have developed a more nuanced and richer understanding of the relationship between ethnicity, deprivation, and inpatient use while minimising the risks associated with dichotomisation. These include increased risk of type one errors

(Altman & Royston, 2006) and the risk of categorising individuals on either side of the deprivation cut- as being excessively different when they are likely to be more similar.

Despite the large overall sample size, as consistent with existing literature ethnic minority groups were less represented in the least deprived areas (quintile five) (Tinsley & Jacobs, 2006). This meant that in our stratified analysis for some outcomes, odds ratios could not be calculated due to a lack of data. This was particularly true for binary variables (compulsory admission and PICU admission). Moreover, for analysis where odds ratios were calculated larger confidence intervals were present in quintile five. Although we found strong associations between black British and Asian ethnicity and compulsory admission in this quintile, the wide confidence intervals suggest that these findings should be interpreted with caution.

6.5 Philosophical standpoint

This thesis was guided by positivist principles, aligned with the hypothetico-deductive model whereby hypotheses are generated from a theory and are then tested to see if they are correct. This assumes that a single tangible reality exists that I as the researcher can identify and measure (Park et al. 2020).

6.6 Dissemination

The findings of the systematic review are due to be presented at 2024 Congress of the Schizophrenia International Research Society. Both papers aim to be submitted for publication to journals.

6.7 Conclusions

In conclusion, this thesis contributes to our understanding of mental health outcomes across the continuum of reduced well-being and mental health difficulties (MHD), both common MHD and psychotic disorders, with a focus on community-based interventions and inpatient admissions in residents of deprived areas. It highlights the benefits of addressing social stressors for residents of deprived areas through community-based interventions, which have a focus on skill development and are more focused in their delivery and target audience. The empirical paper highlights the potential consequences of failing to address these social stressors by highlighting the inequalities residents of deprived areas and ethnic minority patients experience in relation to a range of inpatient outcomes (compulsory admission, LOS, number of admissions and PICU admission). Most importantly this thesis highlighted the importance of considering intersectionality by considering the relationship between ethnicity, deprivation, and inpatient admissions. We found that for black (African, Caribbean and British) ethnic minorities disparities relating to inpatient use were seen across most of the deprivation spectrum, except the least deprived areas, where only black British and Asian ethnic minority groups were at greater risk of compulsory admission. This thesis portfolio has implications for the design, delivery and evaluation of mental health interventions targeting residents of deprived communities, highlighting the importance of addressing the social stressors residents face at the community-level to minimise risk of increased symptom severity and thus inpatient admission.

Chapter seven - References for additional chapters

Akther, S. F., Molyneaux, E., Stuart, R., Johnson, S., Simpson, A., & Oram, S. (2019). Patients' experiences of assessment and detention under mental health legislation:systematic review and qualitative meta-synthesis. *BJPsych Open*, *5*(3). https://doi.org/10.1192/bjo.2019.19

Anderson, R. T., Sorlie, P., Backlund, E., Johnson, N., & Kaplan, G. A. (1997). Mortality effects of community socioeconomic status. *Epidemiology*, *8*(1).

Attree, P., French, B., Milton, B., Povall, S., Whitehead, M., & Popay, J. (2010). The experience of community engagement for individuals: a rapid review of evidence. *Health & Social Care in the Community*, *19*(3), 250–260. https://doi.org/10.1111/j.1365-2524.2010.00976.x

Bailey, R. K., Mokonogho, J., & Kumar, A. (2019). Racial and ethnic differences in depression: current perspectives. *Neuropsychiatric Disease and Treatment,15.*

Baruch, G., Vrouva, I., & Wells, C. (2011). Outcome Findings from a Parent Training Programme for Young People with Conduct Problems. Child and Adolescent Mental Health, 16(1), 47–54. https://doi.org/10.1111/j.1475-3588.2010.00574.x

Baskin, C., Zijlstra, G., McGrath, M., Lee, C., Duncan, F., Oliver, E., Osborn, D., Dykxhoorn, J., Kaner, E., & Gnani, S. (2020). Community interventions improving mental health in minority ethnic adults in the UK: a scoping review. European *Journal of Public Health*, *30*(Supplement_5). https://doi.org/10.1093/eurpub/ckaa166.1046

Bauer, G. R., Churchill, S. M., Mahendran, M., Walwyn, C., Lizotte, D., & Villa-Rueda, A. A. (2021). Intersectionality in quantitative research: A systematic review of its emergence and applications of theory and methods. *SSM-Population Health*, *14*. https://doi.org/10.1016/j.ssmph.2021.100798

Bebbington, P. E., Bhugra, D., Brugha, T., Singleton, N., Farrell, M., Jenkins, R., Lewis, G., & Meltzer, H. (2004a). Psychosis, victimisation and childhood disadvantage: Evidence from the second British National Survey of Psychiatric Morbidity. *British Journal of Psychiatry, 185.*https://doi.org/10.1192/bjp.185.3.220

Bebbington, P. E., Bhugra, D., Brugha, T., Singleton, N., Farrell, M., Jenkins, R., Lewis, G., & Meltzer, H. (2004b). Psychosis, victimisation and childhood disadvantage: evidence from the second British National Survey of Psychiatric Morbidity. *British Journal of Psychiatry*, *185*(3), 220–226. https://doi.org/10.1192/bjp.185.3.220

Bernard, K., Wildman, J. M., Tanner, L. M., Stoniute, A., Still, M., Green, R., Eastaugh, C., Sowden, S., & Thomson, K. H. (2023). Experiences of Non-Pharmaceutical Primary Care Interventions for Common Mental Health Disorders in Socioeconomically Disadvantaged Groups: A Systematic Review of Qualitative Studies. *International Journal of Environmental Research and Public Health. 20*(7) https://doi.org/10.3390/ijerph20075237

Bottlender, R., Sato, T., Jäger, M., Wegener, U., Wittmann, J., Strauß, A., & Möller, H.-J. (2003). The impact of the duration of untreated psychosis prior to first psychiatric admission on the 15-year outcome in schizophrenia. *Schizophrenia Research*, *62*(1 2), 37–44. https://doi.org/10.1016/s0920-9964(02)00348-1

Blakeley, G., & Evans, B. (2008). `It's like Maintaining a Hedge'. *Public Policy and Administration*, *23*(1), 100–113. https://doi.org/10.1177/0952076707083289

Bonomi Bezzo, F., Silva, L., & van Ham, M. (2021). The combined effect of Covid-19 and neighbourhood deprivation on two dimensions of subjective well-being: Empirical evidence from England. *PLOS ONE*, *16*(7), e0255156. https://doi.org/10.1371/journal.pone.0255156

Bowleg, L. (2012). The Problem With the Phrase Women and Minorities: Intersectionality-an Important Theoretical Framework for Public Health. *Public Health*, *102*. https://doi.org/10.2105/ajph.2012.300750

Bruce, M., & Smith, J. (2020). Length of stay among multi-ethnic psychiatric inpatients in the United Kingdom. *Comprehensive Psychiatry*, *102*. https://doi.org/10.1016/j.comppsych.2020.152201

Carter, L., Read, J., Pyle, M., Law, H., & Morrison, A. P. (2017). Mental health clinicians' beliefs about the causes of psychosis: Differences between professions and relationship to treatment preferences. *International Journal of Social Psychiatry*, *63*(5), 426–432. https://doi.org/10.1177/0020764017709849

Carter, L., Read, J., Pyle, M., & Morrison, A. P. (2017). The impact of causal explanations on outcome in people experiencing psychosis: A systematic review. *Clinical Psychology & Psychotherapy*, *24*(2), 332–347. https://doi.org/10.1002/cpp.2002

Chakraborty, A. T., McKenzie, K. J., Hajat, S., & Stansfeld, S. A. (2010). Racism, mental illness and social support in the UK. *Social Psychiatry and Psychiatric Epidemiology*, *45*(12), 1115–1124. https://doi.org/10.1007/s00127-009-0156-8

Chow, J. C.-C., Jaffee, K., & Snowden, L. (2003). Racial/ethnic disparities in the use of mental health services in poverty areas. *American Journal of Public Health*, *93*(5), 792–797. https://doi.org/10.2105/ajph.93.5.792

Cook, L. A., Sachs, J., & Weiskopf, N. G. (2021). The quality of social determinants data in the electronic health record: a systematic review. Journal of the American Medical Informatics Association. https://doi.org/10.1093/jamia/ocab199

Cotter, J., Lin, A., Drake, R. J., Thompson, A., Nelson, B., McGorry, P., Wood, S. J., & Yung, A. R. (2017). Long-term employment among people at ultra-high risk for psychosis. *Schizophrenia Research*, *184*, 26–31. https://doi.org/10.1016/j.schres.2016.11.033

Croudace, T. J., Kayne, R., Jones, P. B., & Harrison, G. L. (2000). Non-linear relationship between an index of social deprivation, psychiatric admission prevalence and the incidence of psychosis. *Psychological Medicine*, *30*(1), 177–185. https://doi.org/10.1017/S0033291799001464

Cruz, J., Li, G., Aragon, M. J., Coventry, P. A., Jacobs, R., Prady, S. L., & White, P. C. L. (2022). Association of environmental and socioeconomic indicators with serious mental illness diagnoses identified from general practitioner practice data in England: A spatial Bayesian modelling study. *PLoS Medicine*, *19*(6). https://doi.org/10.1371/journal.pmed.1004043

Cullen, A. E., Bowers, L., Khondoker, M., Pettit, S., Achilla, E., Koeser, L., Moylan, L., Baker, J., Quirk, A., & Sethi, F. (2018). Factors associated with use of psychiatric intensive care and seclusion in adult inpatient mental health services. *Epidemiology and Psychiatric Sciences*, *27*(1), 51–61. https://doi.org/10.1017/s2045796016000731

de Jong, M. H., Oorschot, M., Kamperman, A. M., Brussaard, P. E., Knijff, E. M., van de Sande, R., van Gool, A. R., & Mulder, C. L. (2017). Crucial factors preceding compulsory psychiatric admission: a qualitative patient-record study. *BMCPsychiatry*, *17*, 1–8. https://doi.org/10.1186/s12888-017-1512-y

Cummins, S. (2005). Large scale food retailing as an intervention for diet and health: quasi-experimental evaluation of a natural experiment. *Journal of Epidemiology & Community Health*, *59*(12), 1035–1040. https://doi.org/10.1136/jech.2004.029843

Daley, A. J., Blamey, R. V., Jolly, K., Roalfe, A. K., Turner, K. M., Coleman, S., McGuinness, M., Jones, I., Sharp, D. J., & MacArthur, C. (2015). A pragmatic randomized controlled trial to evaluate the effectiveness of a facilitated exercise intervention as a treatment for postnatal depression: the PAM-PeRS trial.

Psychological Medicine, *45*(11), 2413–2425. https://doi.org/10.1017/s0033291715000409

Daley, A. J., Winter, H., Grimmett, C., McGuinness, M., McManus, R., & MacArthur, C. (2008). Feasibility of an exercise intervention for women with postnatal depression: a pilot randomised controlled trial. *British Journal of General Practice*, *58*(548), 178–183. https://doi.org/10.3399/bjgp08x277195

Day, C., Harwood, J., Kendall, N., & Vere, A. (2022). Impact of a peer-led, community-based parenting programme delivered at a national scale: an uncontrolled cohort design with benchmarking. *BMC Public Health*, *22*(1). https://doi.org/10.1186/s12889-022-13691-y

DeLuca, J. S., Novacek, D. M., Adery, L. H., Herrera, S. N., Landa, Y., Corcoran, C. M., & Walker, E. F. (2022). Equity in Mental Health Services for Youth at Clinical High Risk for Psychosis: Considering Marginalized Identities and Stressors. *Evidence Based Practice in Child and Adolescent Mental Health*, *7*(2), 176–197. https://doi.org/10.1080/23794925.2022.2042874

Department of Health (1983). The Mental Health Act. London, HMSO.

Doornbos, M. M., Zandee, G. L., DeGroot, J., & de Maagd-Rodriguez, M. (2013). Using community-based participatory research to explore social determinants of women's mental health and barriers to help-seeking in three urban, ethnically diverse, impoverished, and underserved communities. *Archives of Psychiatric Nursing*, *27*(6), 278–284. https://doi.org/10.1016/j.apnu.2013.09.001

Douglas, L., Donohue, G., & Morrissey, J. (2022). Patient experience of physical restraint in the acute setting: A systematic review of the qualitative research evidence. *Issues in Mental Health Nursing*, *43*(5), 473–481. https://doi.org/10.1080/01612840.2021.1978597

Drake, R. E., Mueser, K. T., Brunette, M. F., & McHugo, G. J. (2004). A Review of Treatments for People with Severe Mental Illnesses and Co-Occurring Substance Use Disorders. *Psychiatric Rehabilitation Journal*, *27*(4), 360–374. https://doi.org/10.2975/27.2004.360.374

Duncan, F., Baskin, C., McGrath, M., Coker, J. F., Lee, C., Dykxhoorn, J., Adams, E. A., Gnani, S., Lafortune, L., Kirkbride, J. B., Kaner, E., Jones, O., Samuel, G., Walters, K., Osborn, D., & Oliver, E. J. (2021). Community interventions for improving adult mental health: mapping local policy and practice in England. *BMC Public Health*, *21*(1). https://doi.org/10.1186/s12889-021-11741-5

Engel, G. L. (1977). The need for a new medical model: a challenge for biomedicine. *Science*, *196*(4286), 129–136. https://doi.org/10.1126/science.847460

Evans, S., Banerjee, S., Leese, M., & Huxley, P. (2007). The impact of mental illness on quality of life: A comparison of severe mental illness, common mental disorder and healthy population samples. *Quality of Life Research*, *16*, 17–29. https://doi.org/10.1007/s11136-006-9002-6

Falcón, S. M., & Nash, J. C. (2015). Shifting analytics and linking theories: A conversation about the “meaning-making” of intersectionality and transnational feminism. *Women’s Studies International Forum*, *50*, 1–10. https://doi.org/10.1016/j.wsif.2015.02.010

Freitas, D. F., Walker, S., Nyikavaranda, P., Downs, J., Patel, R., Khondoker, M., Bhui, K., & Hayes, R. D. (2023). Ethnic inequalities in involuntary admission under the Mental Health Act: an exploration of mediation effects of clinical care prior to the first admission. *The British Journal of Psychiatry*, *222*(1), 27–36. https://doi.org/10.1192/bjp.2022.141

Gajwani, R., Parsons, H., Birchwood, M., & Singh, S. P. (2016). Ethnicity and detention: are Black and minority ethnic (BME) groups disproportionately detained under the Mental Health Act 2007?. *Social Psychiatry and Psychiatric Epidemiology*, *51*(5), 703–711. https://doi.org/10.1007/s00127-016-1181-z

Gannon, L., Mullen, E., McGorry, P., & O'Donoghue, B. (2023). Prevalence and predictors of admission at the time of presentation in first episode psychosis. *Social Psychiatry and Psychiatric Epidemiology*, 1–9. https://doi.org/10.1007/s00127-023-02552-7

Gask, L., Bower, P., Lamb, J., Burroughs, H., Chew-Graham, C., Edwards, S., Hibbert, D., Kovandzic, M., Lovell, K., Rogers, A., Waheed, W., Dowrick, C., & Group, A. M. P. R. (2012). Improving access to psychosocial interventions for common mental health problems in the United Kingdom: Narrative review and development of a conceptual model for complex interventions. *BMC Health Services Research*, *2(*1) https://doi.org/10.1186/1472-6963-12-249

Gennaro, S., Fantasia, H. C., Keshinover, T., Garry, D., Wilcox, W., & Uppal, E. (2013). Racial and ethnic identity in nursing research. *Nursing Outlook*, *61*(3), 174–180. https://doi.org/10.1016/j.outlook.2012.07.009

Gkiouleka, A., Huijts, T., Beckfield, J., & Bambra, C. (2018). Understanding the micro and macro politics of health: Inequalities, intersectionality & institutions-A research agenda. *Social Science & Medicine*, *200*, 92–98. https://doi.org/10.1016/j.socscimed.2018.01.025

Guan, A., Thomas, M., Vittinghoff, E., Bowleg, L., Mangurian, C., & Wesson, P. (2021a). An investigation of quantitative methods for assessing intersectionality in health research: A systematic review. *SSM-Population Health*, *16*, 100977. https://doi.org/10.1016/j.ssmph.2021.100977

Guan, A., Thomas, M., Vittinghoff, E., Bowleg, L., Mangurian, C., & Wesson, P. (2021b). An investigation of quantitative methods for assessing intersectionality in health research: A systematic review. *SSM-Population Health*, *16*, 100977. https://doi.org/10.1016/j.ssmph.2021.100977

Haneuse, S.J.-P. . A., Wakefield, A.J.C., 2008. The combination of ecological and case control data. Journal of the Royal Statistical Society: Series B (Statistical Methodology) 70, 73–93. https://doi.org/10.1111/j.1467-9868.2007.00628.x

Harari, L., & Lee, C. (2021). Intersectionality in quantitative health disparities research: A systematic review of challenges and limitations in empirical studies. *Social Science & Medicine*, *277*. https://doi.org/10.1016/j.socscimed.2021.113876

Henderson, R. C., Williams, P., Gabbidon, J., Farrelly, S., Schauman, O., Hatch, S., Thornicroft, G., Bhugra, D., Clement, S., & Group, M. S. (2015). Mistrust of mental health services: ethnicity, hospital admission and unfair treatment. *Epidemiology and Psychiatric Sciences*, *24*(3), 258–265. https://doi.org/10.1017/s2045796014000158

Heslin, M., Khondoker, M., Shetty, H., Pritchard, M., Jones, P. B., Osborn, D., Kirkbride, J. B., Roberts, A., & Stewart, R. (2018). Inpatient use and area-level socio environmental factors in people with psychosis. *Social Psychiatry and Psychiatric Epidemiology*, *53*, 1133–1140. https://doi.org/10.1007/s00127-018-1534-x

Hodgson, R. E., Lewis, M., & Boardman, J. (2000). The prediction of in-patient length of stay for acute psychiatric admissions. *Journal of Mental Health*, *9*(2), 145–153. https://doi.org/10.1080/0963823005000914

Jacobs, L., & Pentaris, P. (2021). Factors affecting the help-seekingbehaviour of black Asian minority ethnic (bame) groups for mental health services in the uk: a literature review. *Greenwich Social Work Review*, *2*(1), 156–170. https://doi.org/10.21100/gswr.v2i1.1251

Jain, A., van Hoek, A. J., Walker, J. L., Mathur, R., Smeeth, L., & Thomas, S. L. (2017). Identifying social factors amongst older individuals in linked electronic health records: an assessment in a population based study. *PloS One*, *12*(11), e0189038.

Jester, D. J., Thomas, M. L., Sturm, E. T., Harvey, P. D., Keshavan, M., Davis, B. J., Saxena, S., Tampi, R., Leutwyler, H., & Compton, M. T. (2023). Review of major social determinants of health in schizophrenia-spectrum psychotic disorders: I. Clinical outcomes. *Schizophrenia Bulletin*, *49*(4), 837–850. https://doi.org/10.1093/schbul/sbad023

Jin, Y., Zhu, D., & He, P. (2020). Social causation or social selection? The longitudinal interrelationship between poverty and depressive symptoms in China. *Social Science and Medicine*, *249*. https://doi.org/10.1016/j.socscimed.2020.112848

Johnson, J. G., Cohen, P., Dohrenwend, B. P., Link, B. G., & Brook, J. S. (1999). A longitudinal investigation of social causation and social selection processes involved in the association between socioeconomic status and psychiatric disorders. *Journal of Abnormal Psychology*, *108*(3), 490. https://doi.org/10.1037//0021-843x.108.3.490

Keating, F., & Robertson, D. (2004). Fear, black people and mental illness: A vicious circle?. *Health and Social Care in the Community*, *12*(5), 439–447. https://doi.org/10.1111/j.1365-2524.2004.00506.x

Kendrick, T., & Pilling, S. (2012). Common mental health disorders—identification and pathways to care: NICE clinical guideline. *British Journal of General Practice*, *62*(594), 47–49.

Klaassen, R. M. C., Heins, M., Luteijn, L. B., van der Gaag, M., van Beveren, N. J. M., Risk, G., & investigators, O. of P. (GROUP). (2013). Depressive symptoms are associated with (sub) clinical psychotic symptoms in patients with non-affective psychotic disorder, siblings and healthy controls. *Psychological Medicine*, *43*(4), 747–756. https://doi.org/10.3399/bjgp12x616481

Kraemer, H. C., Noda, A., & O’Hara, R. (2004). Categorical versus dimensional approaches to diagnosis: methodological challenges. *Journal of Psychiatric Research*, *38*(1), 17

25. https://doi.org/10.1016/s0022-3956(03)00097-9

Kyzyma, I. (2020). How Poor Are the Poor? Looking beyond the Binary Measure of Income Poverty. *Journal of Economic Inequality*, *18*(4), 525–549. https://doi.org/10.1007/s10888-020-09453-8

Lahey, B. B., Tiemeier, H., & Krueger, R. F. (2022). Seven reasons why binary diagnostic categories should be replaced with empirically sounder and less stigmatizing dimensions. *JCPP Advances*, *2*(4). https://doi.org/10.1002/jcv2.12108

Launders, N., Kirsh, L., Osborn, D. P. J., & Hayes, J. F. (2022). The temporal relationship between severe mental illness diagnosis and chronic physical comorbidity: a UK primary care cohort study of disease burden over 10 years. *The Lancet Psychiatry*, *9*(9), 725–735. https://doi.org/10.1016/s2215-0366(22)00225-5

Lehman, A. F., Goldberg, R., Dixon, L. B., McNary, S., Postrado, L., Hackman, A., & McDonnell, K. (2002). Improving employment outcomes for persons with severe mental illnesses. *Archives of General Psychiatry*, *59*(2), 165–172. https://doi.org/10.1001/archpsyc.59.2.165

Marmot, M. (2010). Fair society, healthy lives : the Marmot Review : strategic review of health inequalities in England post-2010. ISBN 9780956487001

McGrath, J. J., Saha, S., Al-Hamzawi, A., Andrade, L., Benjet, C., Bromet, E. J., Browne, M. O., Caldas de Almeida, J. M., Chiu, W. T., & Demyttenaere, K. (2016). The bidirectional associations between psychotic experiences and DSM-IV mental disorders. *American Journal of Psychiatry*, *173*(10), 997–1006. https://doi.org/10.1176/appi.ajp.2016.15101293

Mkuu, R. S., Hall, J. M., Galochkina, Z., Cho, H. D., Staras, S. A. S., Lee, J.-H., Guo, Y., Chakrabarti, C., Barrow, S. B., & Ortega, S. (2023). Does the Intersectionality of Race/Ethnicity and Type 2 Diabetes Increase the Odds of a Cervical Cancer

Diagnosis? A Nested Case–Control Study of a Florida Statewide Multisite HER Database. *Healthcare*, *11*(13), 1863. https://doi.org/10.3390/healthcare11131863

National Health Service. (2019). NHS Long Term Plan. https://www.longtermplan.nhs.uk/

Niedzwiedz, C. L., Aragón, M. J., Breedvelt, J. J. F., Smith, D. J., Prady, S. L., & Jacobs, R. (2023). Severe and common mental disorders and risk of emergency hospital admissions for ambulatory care sensitive conditions among the UK Biobank cohort. *BJPsych Open*, *9*(6), e211. https://doi.org/10.1192/bjo.2023.602

Nielsen, R. E., Banner, J., & Jensen, S. E. (2021). Cardiovascular disease in patients with severe mental illness. *Nature Reviews Cardiology*, *18*(2), 136–145. https://doi.org/10.1192/bjo.2023.602

Noble, S., McLennan, D., Noble, M., Plunkett, E., Gutacker, N., & Wright, M. (2019). Statistical Release: The English indices of deprivation 2019. In https://assets.publishing.service.gov.uk/media/5d8e26f6ed915d5570c6cc55/IoD2019 Statistical_Release.pdf. Ministry of Housing, Communities & Local Government.

O'Donoghue, B., Roche, E., & Lane, A. (2016). Neighbourhood level social deprivation and the risk of psychotic disorders: a systematic review. *Social Psychiatry and Psychiatric Epidemiology*, *51*(7), 941–950. https://doi.org/10.1007/s00127-016-1233-4

O'Donoghue, B., Roche, E., & Lane, A. (2016a). Neighbourhood level social deprivation and the risk of psychotic disorders: a systematic review. *Social Psychiatry and Psychiatric Epidemiology*, *51*, 941–950. https://doi.org/10.1007/s00127-016-1233-4

Oduola, S., Das-Munshi, J., Bourque, F., Gayer-Anderson, C., Tsang, J., Murray, R. M., Craig, T. K. J., & Morgan, C. (2021). Change in incidence rates for psychosis in different ethnic groups in south London: Findings from the Clinical Record Interactive Search-First Episode Psychosis (CRIS-FEP) study. *Psychological Medicine*, *51*(2), 300–309. https://doi.org/10.1017/S0033291719003234

Park, Y. S., Konge, L., & Artino Jr, A. R. (2020). The positivism paradigm of research. *Academic Medicine, 95*(5), 690–694.https://doi.org/10.1097/acm.0000000000003093

Parthasarathy, S., Chi, F. W., Metz, V., Kline-Simon, A., Asyyed, A., Campbell, C. I., & Sterling, S. (2023). Disparities in the receipt of alcohol brief intervention: the Intersectionality of sex, age, and race/ethnicity. *Addiction, 118*(7), 1258–1269.

Pearce, J., Rafiq, S., Simpson, J., & Varese, F. (2019). Perceived discrimination and psychosis: a systematic review of the literature. *Social Psychiatry and Psychiatric Epidemiology*, *54*, 1023–1044. https://doi.org/10.1111/add.16195

Perera, G., Broadbent, M., Callard, F., Chang, C.-K., Downs, J., Dutta, R., Fernandes, A., Hayes, R. D., Henderson, M., & Jackson, R. (2016). Cohort profile of the South London and Maudsley NHS Foundation Trust Biomedical Research Centre (SLaM BRC) case register: current status and recent enhancement of an electronic mental health record-derived data resource. *BMJ Open*, *6*(3), e008721. https://doi.org/10.1136/bmjopen-2015-008721

Perry, B. (2002). The mismatch between income measures and direct outcome measures of poverty. Social Policy Journal of New Zealand, 101–127. https://www.msd.govt.nz/documents/about-msd-and-our-work/publications resources/journals-and-magazines/social-policy-journal/spj19/19-pages-101-127.pdf

Peter, L.-J., Schindler, S., Sander, C., Schmidt, S., Muehlan, H., McLaren, T., Tomczyk, S., Speerforck, S., & Schomerus, G. (2021). Continuum beliefs and mental illness stigma: a systematic review and meta-analysis of correlation and intervention studies. *Psychological Medicine, 51*(5), 716–726.https://doi.org/10.1093/eurpub/ckab164.743

Piro, F. N., Næss, Ø., & Claussen, B. (2007). Area deprivation and its association with health in a cross-sectional study: are the results biased by recent migration?. *International Journal for Equity in Health*, *6*, 1–15. https://doi.org/10.1186/1475-9276-6-10

Reference list for additional chapters

Remes, O., Lafortune, L., Wainwright, N., Surtees, P., Bhaniani, A., Luben, R., Brayne, C., & Khaw, K. (2015). Area deprivation and generalized anxiety disorder in a British community cohort: Olivia Remes. *The European Journal of Public Health*, *25*(suppl_3). https://doi.org/10.1093/eurpub/ckv170.084

Remes, O., Lafortune, L., Wainwright, N., Surtees, P., Khaw, K.-T., & Brayne, C. (2019). Association between area deprivation and major depressive disorder in British men and women: a cohort study. *BMJ Open*, *9*(11), e027530. https://doi.org/10.1136/bmjopen-2018-027530

Rethink Mental Illness. (2022). Building communities that care A blueprint for supporting people severely affected by mental illness in their local communities by 2024. https://www.rethink.org/media/2249/building-communities-that-care-report.pdf

Rieke, K., McGeary, C., Schmid, K. K., & Watanabe-Galloway, S. (2016). *Risk factors for. Health Journal*, *52*, 675–682. https://doi.org/10.1007/s10597-015-9921-1

Rikala, S. (2020). Agency among young people in marginalised positions: towards a better understanding of mental health problems. *Journal of Youth Studies*, *23*(8), 1022 1038. https://doi.org/10.1080/13676261.2019.1651929

Romeo-Velilla, M., Ellis, N., Hurst, G., Grogan, S., & Gidlow, C. (2018). A qualitative study of disengagement in disadvantaged areas of the UK:'You come through your door and you lock that door.' *Health & Place*, (52). https://doi.org/10.1016/j.healthplace.2018.04.002

Rosenthal Oren, R., Roe, D., Hasson-Ohayon, I., Roth, S., Thomas, E. C., & Zisman-Ilani, Y. (2021). Beliefs about the causes of psychosis among persons with psychosis and mental health professionals: a scoping review. *Psychiatric Services*, *72*(10), 1178 1192. https://doi.org/10.1176/appi.ps.202000460

Rozalski, V., & McKeegan, G. M. (2019). Insight and symptom severity in an inpatient psychiatric sample. *Psychiatric Quarterly*, *90*, 339–350. https://doi.org/10.1176/appi.ps.202000460

Schultze-Lutter, F., Rahman, J., Ruhrmann, S., Michel, C., Schimmelmann, B. G., Maier, W., & Klosterkötter, J. (2015). Duration of unspecific prodromal and clinical high-risk states, and early help-seeking in first-admission psychosis patients. *Social Psychiatry and Psychiatric Epidemiology*, *50*, 1831–1841. https://doi.org/10.1007/s00127-015 1093-3

Shah, J., Mizrahi, R., & McKenzie, K. (2011). The four dimensions: a model for the social aetiology of psychosis. *The British Journal of Psychiatry*, *199*(1), 11–14. https://doi.org/10.1192/bjp.bp.110.090449

Sideli, L., D'Agostino, R., Tripoli, G., la Cascia, C., Seminerio, F., Marinaro, A. M., Sartorio, C., Mulè, A., & la Barbera, D. (2014). EPA-0874–Social disadvantage and psychosis: a case control study on italian first-episodes of psychosis. *European Psychiatry*, *29*(1), 1. https://doi.org/10.1016/S0924-9338(14)78205-7

South, J., Stansfield, J., & Fenton, K. (2015). Putting communities at the heart of public health. *Perspectives in Public Health*, *135*(6), 291–293. https://doi.org/10.1177/1757913915610495

Steel, Z., Marnane, C., Iranpour, C., Chey, T., Jackson, J. W., Patel, V., & Silove, D. (2014). The global prevalence of common mental disorders: a systematic review and meta analysis 1980–2013. *International Journal of Epidemiology*, *43*(2), 476–493. https://doi.org/10.1093/ije/dyu038

Stewart, R., Soremekun, M., Perera, G., Broadbent, M., Callard, F., Denis, M., Hotopf, M., Thornicroft, G., & Lovestone, S. (2009). The South London and Maudsley NHS foundation trust biomedical research centre (SLAM BRC) case register: development and descriptive data. BMC Psychiatry, *9*(51).

Tanner, L. M., Wildman, J. M., Stoniute, A., Still, M., Bernard, K., Green, R., Eastaugh, C. H., Thomson, K. H., & Sowden, S. (2023). Non-pharmaceutical primary care interventions to improve mental health in deprived populations: a systematic review. *British Journal of General Practice*, *73*(729). https://doi.org/10.3399/BJGP.2022.0343

Tarricone, I., Boydell, J., Kokona, A., Triolo, F., Gamberini, L., Sutti, E., Marchetta, M., Menchetti, M., Di Forti, Marta., Murray, R. M., Morgan, C., & Berardi, D. (2016). Risk of psychosis and internal migration: Results from the Bologna First Episode Psychosis study. *Schizophrenia Research*, *173*(1-2), 90–93. https://doi.org/10.1016/j.schres.2016.02.032

Tayefi, M., Ngo, P., Chomutare, T., Dalianis, H., Salvi, E., Budrionis, A., & Godtliebsen, F. (2021). Challenges and opportunities beyond structured data in analysis of electronic health records. *Wiley Interdisciplinary Reviews: Computational Statistics*, *13*(6), e1549. https://doi.org/10.1002/wics.1549

Thomson, L. J. M., & Chatterjee, H. J. (2024). Barriers and enablers of integrated care in the UK: a rapid evidence review of review articles and grey literature 2018–2022. *Frontiers in Public Health*, *11*, 1286479. https://doi.org/10.3389/fpubh.2023.1286479

Tinsley, J., & Jacobs, M. (2006). Deprivation and ethnicity in England: a regional perspective. *Regional Trends*, *39*(6).

Townsend, P. (1979). Poverty in the United Kingdom. Allen Lane and Penguin Books.

Trauer, T., Eagar, K., & Mellsop, G. (2006). Ethnicity, deprivation and mental health outcomes. *Australian Health Review*, *30*(3), 310–321. https://doi.org/10.1071/ah060310

Tseng, M.-C. M., Chang, C.-H., Liao, S.-C., & Yeh, Y.-C. (2020). Length of stay in relation to the risk of inpatient and post-discharge suicides: A national health insurance claim data study. *Journal of Affective Disorders*, *266*, 528–533. https://doi.org/10.1016/j.jad.2020.02.014

van der Feltz-Cornelis, C., Attree, E., Heightman, M., Gabbay, M., & Allsopp, G. (2023). Integrated care pathways: a new approach for integrated care systems. *British Journal of General Practice*, *73*(734), 422. https://doi.org/10.3399/bjgp23X734925

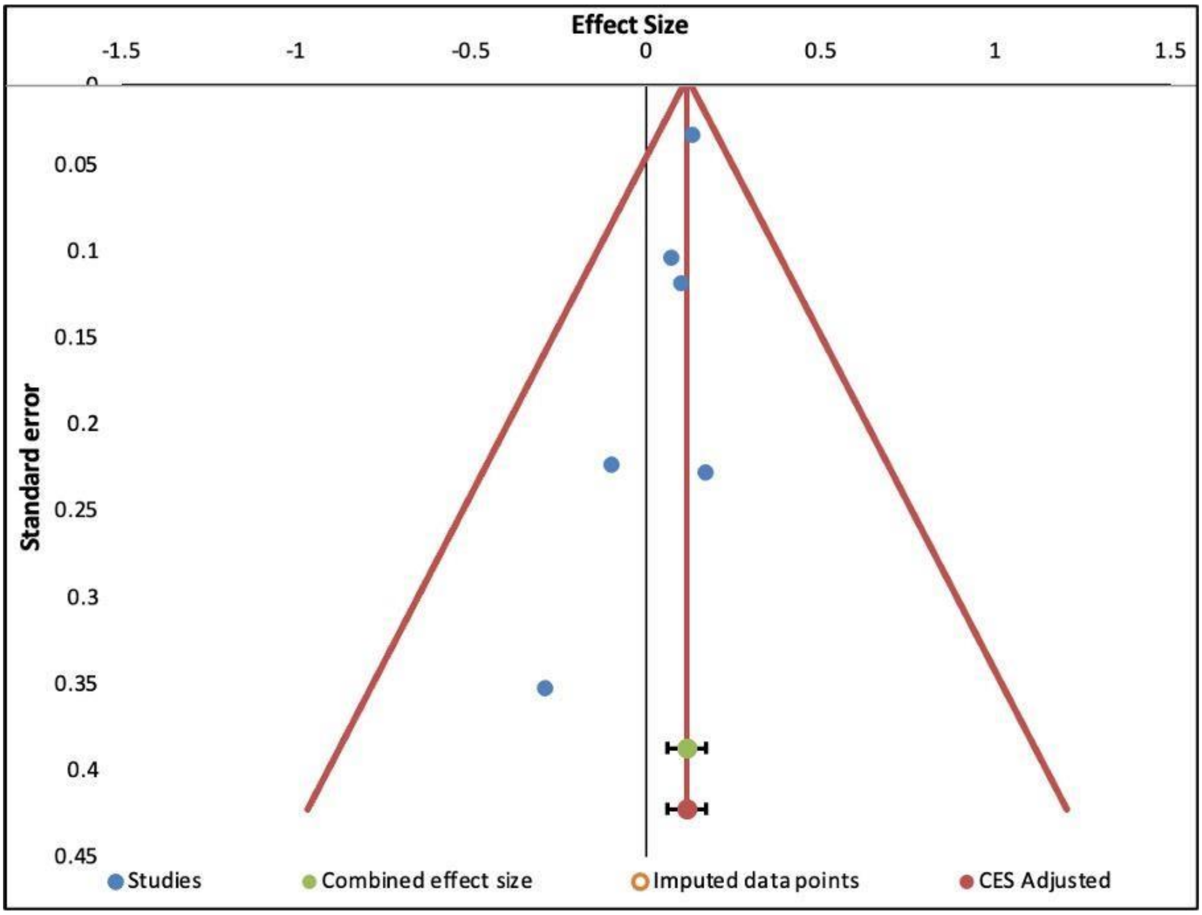
Werbeloff, N., Osborn, D. P. J., Patel, R., Taylor, M., Stewart, R., Broadbent, M., & Hayes, J. F. (2018). The Camden & Islington Research Database: Using electronic mental health records for research. *PloS One*, *13*(1), e0190703. https://doi.org/10.1371/journal.pone.0190703

Wiggins, M., Oakley, A., Roberts, I., Turner, H., Rajan, L., Austerberry, H., Mujica, R., & Mugford, M. (2004). The Social Support and Family Health Study: a randomised controlled trial and economic evaluation of two alternative forms of postnatal support for mothers living in disadvantaged inner-city areas. *Health Technology Assessment*, *8*(32). https://doi.org/10.3310/hta8320

Wiley, S., Perkins, K., & Deaux, K. (2008). Through the looking glass: Ethnic and generational patterns of immigrant identity. *International Journal of Intercultural Relations*, *32*(5), 385–398. https://doi.org/10.1016/j.ijintrel.2008.04.0

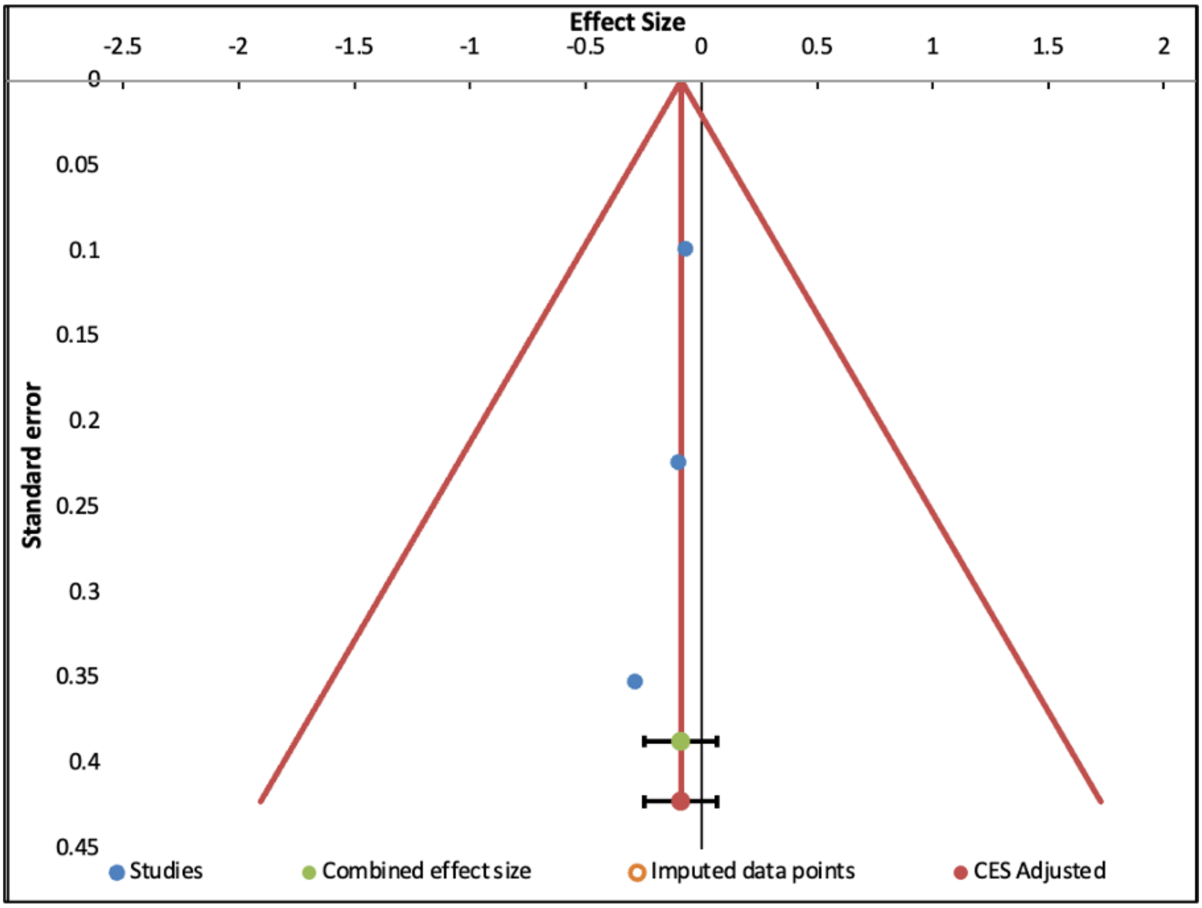
Appendix A

Funnel plot for publication bias for meta-analysis of all mental health outcomes at last or only follow-up



Appendix B

Funnel plot for publication bias for meta-analysis of studies which used EPDS.



Appendix C

Additional findings to support narrative synthesis.

	Effect on mental health	SMD (95% CI) at first or only follow up	Standardised mean (95% CI) at last follow up	Odds ratio of having poor mental health) at last or only follow-up
Green Space				
Chalmin-Pui et al. 2021	Wellbeing scores increased post-intervention, $t(27) = 0.256$, p = 0.7999. Estimated MD = 0.146.			
Thompson et al. 2019	A similar pattern of decrease in well-being scores over time in intervention and in the control. Cross-sectional intervention group, β= –0.57, 95% CI [–1.10 to –0.03], $p < 0.05$ and longitudinal intervention group, β= –1.65, 95% CI [–2.73 to –0.57], $p < 0.01$.			
Gubbles et al. 2016	Green interventions were associated with increases in depression scores in both adults, β=0.10, p>0.05, and Adolescents, β= 0.05, $p > 0.05$.			
Exercise				

Daley et al. 2015	At 6 months 46.5% of the intervention group were considered ‘recovered’ from depression compared with the 23.8% group receiving usual care, p=0.03. At 12 months, 51.2% of the intervention group had recovered, compared with 36.8% of the comparator group, $p > 0.05$. At 6 months difference in adjusted difference scores was −2.04, 95% CI [−4.11 to 0.03], p= 0.053 and at 12 months. −2.04 (−4.11 to 0.03), $p = 0.40$.	-0.41 (0.22 to -0.83) EPDS	-0.10 (-0.54 to 0.34) EPDS	0.5401 (0.23 to 1. 27)
Daley et al. 2008	EPDS scores exercise group baseline, $M = 17.7$, $SD = 5.2$, follow-up, $M = 13.1$, $SD = 5.2$. Usual care group baseline., $M = 19.2$, $SD = 4.7$, follow-up, $M = 24.3$, $SD = 5.4$. The difference at follow-up favoured the intervention group MD= 1.2, 95% CI [-5.2 to 2.8], $p > 0.05$.	-0.291.00-0.41) EPDS		
Food security				
Cummins et al. 2005	Intervention group prevalence of poor psychological health baseline was 38.6%, and at follow-up 26.5%, representing a change of -12.13%, $p = 0.017$. For poor psychological health there was a protective effect of switching to the new store after adjustment, $OR = 0.24$, 95% CI [0.09 to 0.66].			0.57 (0.29 to 1.11).
Peer mentoring				
Cupples et al. 2010	SF-36 mental health scores intervention group, $M = 70.3$, $SD = 17.7$, Control group, $M = 72.1$, $SD = 19.6$. The difference favoured control group, $MD = -1.8$, 95 CI [-6.1 to 2.6], $p = 0.43$	0.10 (0.14 to 0.33) SF-36		
Slade et al. 2021	No significant interaction between study condition and time point on wellbeing scores, $F(1.67,71.68) = 0.08$, $p = 0.89$, depression scores, $F(2,82) = 0.426$, $p = 0.655$, or anxiety scores, $F(1.67,70.06) = 0.89$, $p = 0.399$. There was no significant difference in wellbeing,	Depression 0.17 (-0.28 to 0.615) HADS		

	$F(1,43) = 2.67$, $p = 0.11$, depression, $F(1,41) =1 .54$, $p =0.221$ or anxiety scores, $F(1,42) = 3.99$, $p = 0.052$ between intervention and control group participants.	Anxiety 0.27 (-18 to 0.72) HADS Wellbeing 0.14 (0.39 to 0.59) WEMBS
Day et al. 2022	Parents' wellbeing improved following the course Time 1 $M = 20.5$, $SD =3.5$, Time 2 $M =22.8$, $SD = 3.8$, $t(347)=-11.0$, $p < 0.001$, $d=0.6$	
Signposting/ information		
Mercer 2019	Small difference between intervention and control in terms of anxiety (favouring the intervention), $MD = -0.41$ 95% CI [-0.99 to 0.18]. Small difference in terms of depression (favouring the control), $MD = 0.09$ 95% CI = 0.49 to 0.68. Patients who consulted with a Practioner 3+ times had anxiety $MD = –1.380$ 95%CI [–2.339 to -0.421], $p = .005$, and depression $MD = –1.280$, 95% CI [–2.209 to –0.352], $p = .007$.	

Wiggins et al. 2004	At 12 months the intervention group had lower depression mean compared to the control , *MD* = -0.48, 95% CI [-1.59 to 0.61]. At 18 months the intervention group had higher depression mean compared to the control, *MD* = 0.38, 95% CI [-0.87 to 1.61) .	-0.07 (-0.33 to 0.18) EPDS	0.07 (CI -0.14- 0.27) GHQ12	1.06 (0.67 to 1.51)
Training				
Baruch et al. 2021	There was a decreases post-treatment in internalising problems, *t*(122) = 6.8, *p* < .00.5. 54.5% of all young people reported a reliable improvement in internalising scores.			
Community Engagement				
Eden & Lowndes 2013	Pre-intervention well-being score, *M* = 14.85, *SD* = 5.9, with a transformed percentage of 57.5%. Post intervention well-being score *M* = 17.*7*, representing an increase of 23%. Over 65% of participants with increased well-being reported a difference in scores of 10% or more at follow up, which is considered a significant change.			
Phillips et al. 2014	Intervention group post GHQ12, *M* = 0.7, 95% CI [0.5 to 0.8]. Control group *M* =0.7, 95% CI [0.6 to 0.8]. Mean difference favoured control, adjusted MD = -.001 95% CI [-0.15 to 0.12], *p* = 0.4. No indication of differential effects in subgroups defined by age, gender, ethnicity, educational attainment, or employment status.	0.13 (-0.20 to -0.07) WEMBS		1.19 (0.9207 to 1.5423)

Frostick et al. 2017	Intervention group SDQ, *M* = 12.17, 95% CI [12.07 to 12.27]. Control group *M*=12.20, 95% CI [12.04 to 12.37]. Mean difference favoured Adjusted *MD* = 0.03, *SE* = 0.09, *p* = 0.69. No indication of differential effects in subgroups defined by age, gender, ethnicity, educational attainment, or employment status.	-0.01(-0.12 to 0.11) SDQ
Regeneration		
Dunn et al. 2023	Royston vs control difference in difference = - .16 (− .60, .28), *p* =.56 Keith vs control difference in difference = − .24 (− .68, .20), *p* =.47 McQueen vs control difference in difference = − .38 (− .80, .04), *p* =.26 Rolston vs control difference in difference = −.46(−.86,−.06), *p* =.12 Stinson vs control difference in difference = - .26 (− .72, .19), *p* =.47 Stipley vs control difference in difference = -.08 (− .35, .50), *p* =.78	
Jalaudin et al. 2012	Fewer households reported ‘high/very high’ psychological distress pre=41%, post= 26%, p=0.39.	

Ruijsbroek et al. 2022	Percentage of people with fairly good or good mental health, intervention group pre-intervention = 80.9%, late-intervention = 81.2%, *p* = 0.95. Comparator group, pre = 83.5%, late = 89.7%, *p* = 0.17. Difference in difference = -5.9, 95%CI [-18.8;6.9], *p*=0.37, appeared to favour the control group.	1.99 (1.3524 to 2.9177)
Stafford et al. 2008	New Deal for Communities intervention area mean change, MD = 0.52, SE = 0.31. Comparator area mean change, MD = 1.08, SE = 10.3. The difference between the improvements in these two areas was *p* > 0.05.	
Mohan, Longo & Kee 2017	The adjusted difference in the difference between intervention and control pre-launch and post-launch of regeneration on mental distress appeared to favour the intervention group. Difference in difference = 0.03, 95% CI [−0.42 to 0.48], *p*= ns.	
Walthery et al. 2014	The overall change in mental health between 2002 and 2008 was 0.07 SDs (95% CI −0.18 to 0.32). The slope coefficient of the mental health outcome was not statistically significant, indicating no overall change between 2002 and 2008 among residents of NDC areas. Similarly, the slope regression coefficient indicated no change over time in comparator areas. However, we found a weakly significant gap in mental health between high and low socioeconomic status individuals in comparator areas which widened over time to a greater extent than in NDC areas.	

Jongeneel-Grimen et al. 2016	The difference between the relatively stable trend in the deprived target districts and the negative trend in the control districts was not statistically significant (eg, Δ slope 0.06 (-0.08 to 0.20) ‘broad definition’ group. A similar pattern was found for the comparison group ‘rest of the Netherlands’. Residents of the intense intervention areas reported a sharp decrease in the prevalence of fair or good mental health in the preintervention period, followed by an improvement in the intervention period. The trend change was more positive than in comparably deprived areas ((Δ slope 0.19 (0.01 to 0.38) ‘broad definition’)) and the rest of the Netherlands (Δ slope 0.18 (0.01 to 0.36)). In contrast, in the 17 ‘low intensity’ target districts, the prevalence of fair or good mental health declined in the intervention period (from 80.5% to 76.9%).	
Stafford et al. 2014	Small improvements in mental wellbeing was seen in intervention NDC areas but similar improvements were also seen in comparator areas. NDC MD(SE) = 0.52(0.31), Comparator MD(SE)= 1.08 (1.03), *p*= ns.	0.065 (0.9894 to 1.2788)
Ruijsbroek et al. 2017	Changes in fair/good mental health from pre-intervention to the intervention period were about equally large in the target and control districts and the DiD impact estimates were inconsistent and non-significant, though appeared to favour the intervention group DID 0.7 (CI-5.3;6.7) p= 0.8. For female residents, a tendency to more favourable changes in mental health between the pre-intervention and intervention period in the target districts compared with the control areas was found, which was not found among men. Female: Did -2.3 (-9.8;5.2) p=0.55. Male Did 3.4 (-5.7;12.4) p=0.4.No significant effects of the regeneration	1.27 (1.0931 to 1.46830)

	programme (compared to control areas) in either high intensity or low intensity areas (though DID favoured both intervention areas).	
Timmermans 2016	Intervention pre/post anxiety *MD* = -0.4, depression *MD* = -0.8. Control areas pre/post anxiety *MD* = 0.00, depression *MD* =0.6. The difference in difference between intervention and control pre-launch and post-launch of regeneration on anxiety was -0.5, 95% CI [-1.5–0.6], $p = 0.38$ and on depression was -1.4, 95% CI [-3.7–0.8], $p = 0.38$. The DiD for higher intensity districts versus control favoured and low-intensity districts versus control are favoured the intervention area for anxiety and depression, except depression in low-intensity areas.	Anxiety 0.03 (-0.29 to 0.22) HADS Depression 0.07 (0.13 to -033) HADS
White 2016	Regeneration was associated with an improvement in the mental health of residents in intervention areas compared with control neighbourhoods, $\beta = 1.54$, 95% CI [0.50, 2.59]. Intervention areas pre *M* = 22.3, *SD* = 66.6, post *M* = 19.9, *SD* = 66.3, *MD* = -0.4. Control areas pre *M* = 20.8, *SD* = 71.0, post *M* = 18.3, SD = 70.8, MD = -0.2.	-0.023 (-0.062 to 0.02)

Appendix D

Journal for systematic review (health and place)

Introduction

The journal is an interdisciplinary journal dedicated to the study of all aspects of health and health care in which place or location matters.

Recent years have seen closer links evolving between medical geography, medical sociology, health policy, public health and epidemiology. The journal reflects these convergences, which emphasise differences in health and health care between places, the experience of health and care in specific places, the development of health care for places, and the methodologies and theories underpinning the study of these issues.

The journal brings together international contributors from geography, sociology, social policy and public health. It offers readers comparative perspectives on the difference that place makes to the incidence of ill-health, the structuring of health-related behaviour, the provision and use of health services, and the development of health policy.

At a time when health matters are the subject of ever-increasing attention, *Health & Place* provides accessible and readable papers summarizing developments and reporting the latest research findings.

Types of paper

Articles should normally be 4000-6000 words long (excluding figures, tables and references), although articles longer than 6000 words will be accepted on an occasional basis, if the topic demands this length of treatment. Authors are responsible for ensuring that all manuscripts (whether original or revised) are accurately typed before final submission. Manuscripts will be returned to the author with a set of instructions if they are not submitted according to our style.

The Short Communication section allows authors to submit material which might not be appropriate for full-length articles but is worthy of publication. It may report work-in-progress or elements of larger projects (1000-2000 words).

The Opinion Paper section exists for the expression of opinion and as a forum for debate (1000-2000 words).

Review articles may provide scholarly assessments of new policies or practices, or academic overviews of new areas of study (5000-6000 words).

Special issue policy

Our policy on special issues is that we will not do complete special issues, rather we will consider special sections of 4-10 papers. Specials need to be proposed to the Editor in Chief and will be evaluated by Assistant Editors and one or more Board Members and/or external advisors. Proposals should normally include abstracts and must include a clearly argued case for the special. Exceptionally we will consider specials based around a call-for-papers. Evaulation will focus on the coherence, topicality and market for the special. We expect specials to pursue an agenda and to be introduced by an agenda-setting paper, which could take the form of a guest editorial. All papers in specials, including the lead paper should be submitted in the normal way and will undergo normal peer review. We anticipate one special per year.

Contact details for submission

Health & Place has an online submission system with the aim of improving our editorial procedure for authors, reviewers and the editor. The website address is: https://www.editorialmanager.com/JHAP/default.aspx.

If this is your first time using the system you will need to go to the above page and register as a new author by clicking the 'Register' link. Once registered you may then submit your paper by clicking 'Submit New Manuscript' and following the instructions. All correspondence between the editor and authors will be performed by e-mail and paper copies will not be required at the original submission stage.

Review Policy

Please note that the journal has adopted a double blind reviewing policy, so authors should use separate pages for all identifying information (name, affiliation etc.). Replace all references to the author in the main paper with "Author, 2003", "Author et al, 2006", etc. In the reference list, use the format "Author 2003 [details removed for peer review]". **Papers that have not had all such features removed will be returned without review to the author for alteration**. Reviewer's names will not be made available to authors under any circumstances.

Before you begin

Ethics in publishing

Please see our information on Ethics in publishing.

Declaration of interest

All authors must disclose any financial and personal relationships with other people or organizations that could inappropriately influence (bias) their work. Examples of potential competing interests include employment, consultancies, stock ownership, honoraria, paid expert testimony, patent applications/registrations, and grants or other funding. Authors must disclose any interests in two places: 1. A summary declaration of interest statement in the title page file (if double anonymized) or the manuscript file (if single anonymized). If there are no interests to declare then please state this: 'Declarations of interest: none'. 2. Detailed disclosures as part of a separate Declaration of Interest form, which forms part of the journal's official records. It is important for potential interests to be declared in both places and that the information matches. More information.

Declaration of generative AI in scientific writing

The below guidance only refers to the writing process, and not to the use of AI tools to analyse and draw insights from data as part of the research process.

Where authors use generative artificial intelligence (AI) and AI-assisted technologies in the writing process, authors should only use these technologies to improve readability and language. Applying the technology should be done with human oversight and control, and authors should carefully review and edit the result, as AI can generate authoritative-sounding output that can be incorrect, incomplete or biased. AI and AI-assisted technologies should not be listed as an author or co-author, or be cited as an author. Authorship implies responsibilities and tasks that can only be attributed to and performed by humans, as outlined in Elsevier’s AI policy for authors.

Authors should disclose in their manuscript the use of AI and AI-assisted technologies in the writing process by following the instructions below. A statement will appear in the published work. Please note that authors are ultimately responsible and accountable for the contents of the work.

Disclosure instructions

Authors must disclose the use of generative AI and AI-assisted technologies in the writing process by adding a statement at the end of their manuscript in the core manuscript file, before the References list. The statement should be placed in a new section entitled ‘Declaration of Generative AI and AI-assisted technologies in the writing process’.

Statement: During the preparation of this work the author(s) used [NAME TOOL / SERVICE] in order to [REASON]. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

This declaration does not apply to the use of basic tools for checking grammar, spelling, references etc. If there is nothing to disclose, there is no need to add a statement.

Submission declaration and verification

Submission of an article implies that the work described has not been published previously (except in the form of an abstract, a published lecture or academic thesis, see 'Multiple, redundant or concurrent publication' for more information), that it is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere in the same form, in English or in any other language, including electronically without the written consent of the copyright-holder. To verify compliance, your article may be checked by Crossref Similarity Check and other originality or duplicate checking software.

Preprints

Please note that preprints can be shared anywhere at any time, in line with Elsevier's sharing policy. Sharing your preprints e.g. on a preprint server will not count as prior publication (see 'Multiple, redundant or concurrent publication' for more information).

Use of inclusive language

Inclusive language acknowledges diversity, conveys respect to all people, is sensitive to differences, and promotes equal opportunities. Content should make no assumptions about the beliefs or commitments of any reader; contain nothing which might imply that one individual is superior to another on the grounds of age, gender, race, ethnicity, culture, sexual orientation, disability or health condition; and use inclusive language throughout. Authors should ensure that writing is free from bias, stereotypes, slang, reference to dominant culture and/or cultural assumptions. We advise to seek gender neutrality by using plural nouns ("clinicians, patients/clients") as default/wherever possible to avoid using "he, she," or "he/she." We recommend avoiding the use of descriptors that refer to personal attributes such as age, gender, race, ethnicity, culture, sexual orientation, disability or health condition unless they are relevant and valid. When coding terminology is used, we recommend to avoid offensive or exclusionary terms such as "master", "slave", "blacklist" and "whitelist". We suggest using alternatives that are more appropriate and (self-) explanatory such as "primary", "secondary", "blocklist" and "allowlist". These guidelines are meant as a point of reference to help identify appropriate language but are by no means exhaustive or definitive.

Reporting sex- and gender-based analyses

Reporting guidance

For research involving or pertaining to humans, animals or eukaryotic cells, investigators should integrate sex and gender-based analyses (SGBA) into their research design according to funder/sponsor requirements and best practices within a field. Authors should address the sex and/or gender dimensions of their research in their article. In cases where they cannot, they should discuss this as a limitation to their research's generalizability. Importantly, authors should explicitly state what definitions of sex and/or gender they are applying to enhance the precision, rigor and reproducibility of their research and to avoid ambiguity or conflation of terms and the constructs to which they refer (see Definitions section below). Authors can refer to the Sex and Gender Equity in Research (SAGER) guidelines and the SAGER guidelines checklist. These offer systematic approaches to the use and editorial review of sex and gender information in study design, data analysis, outcome reporting and research interpretation - however, please note there is no single, universally agreed-upon set of guidelines for defining sex and gender.

Definitions

Sex generally refers to a set of biological attributes that are associated with physical and physiological features (e.g., chromosomal genotype, hormonal levels, internal and external anatomy). A binary sex categorization (male/female) is usually designated at birth (""sex assigned at birth""), most often based solely on the visible external anatomy of a newborn. Gender generally refers to socially constructed roles, behaviors, and identities of women, men and gender-diverse people that occur in a historical and cultural context and may vary across societies and over time. Gender influences how people view themselves and each other, how they behave and interact and how power is distributed in society. Sex and gender are often incorrectly portrayed as binary (female/male or woman/man) and unchanging whereas these constructs actually exist along a spectrum and include additional sex categorizations and gender identities such as people who are intersex/have differences of sex development (DSD) or identify as non-binary. Moreover, the terms ""sex"" and ""gender"" can be ambiguous—thus it is important for authors to define the manner in which they are used. In addition to this definition guidance and the SAGER guidelines, the resources on this page offer further insight around sex and gender in research studies.

Author contributions

For transparency, we require corresponding authors to provide co-author contributions to the manuscript using the relevant CRediT roles. The CRediT taxonomy includes 14 different roles describing each contributor's specific contribution to the scholarly output. The roles are: Conceptualization; Data curation; Formal analysis; Funding acquisition; Investigation; Methodology; Project administration; Resources; Software; Supervision; Validation; Visualization; Roles/Writing - original draft; and Writing - review & editing. Note that not all roles may apply to every manuscript, and authors may have contributed through multiple roles. More details and an example.

Changes to authorship

Authors are expected to consider carefully the list and order of authors **before**submitting their manuscript and provide the definitive list of authors at the time of the original submission. Any addition, deletion or rearrangement of author names in the authorship list should be made only **before** the manuscript has been accepted and only if approved by the journal Editor. To request such a change, the Editor must receive the following from the **corresponding author**: (a) the reason for the change in author list and (b) written confirmation (e-mail, letter) from all authors that they agree with the addition, removal or rearrangement. In the case of addition or removal of authors, this includes confirmation from the author being added or removed.

Only in exceptional circumstances will the Editor consider the addition, deletion or rearrangement of authors **after** the manuscript has been accepted. While the Editor considers the request, publication of the manuscript will be suspended. If the manuscript has already been published in an online issue, any requests approved by the Editor will result in a corrigendum.

Article transfer service

This journal uses the Elsevier Article Transfer Service to find the best home for your manuscript. This means that if an editor feels your manuscript is more suitable for an alternative journal, you might be asked to consider transferring the manuscript to such a journal. The recommendation might be provided by a Journal Editor, a dedicated Scientific Managing Editor, a tool assisted recommendation, or a combination. If you agree, your manuscript will be transferred, though you will have the opportunity to make changes to the manuscript before the submission is complete. Please note that your manuscript will be independently reviewed by the new journal. More information.

Copyright

Upon acceptance of an article, authors will be asked to complete a 'Journal Publishing Agreement' (see more information on this). An e-mail will be sent to the corresponding author confirming receipt of the manuscript together with a 'Journal Publishing Agreement' form or a link to the online version of this agreement.

Subscribers may reproduce tables of contents or prepare lists of articles including abstracts for internal circulation within their institutions. Permission of the Publisher is required for resale or distribution outside the institution and for all other derivative works, including compilations and translations. If excerpts from other copyrighted works are included, the author(s) must obtain written permission from the copyright owners and credit the source(s) in the article. Elsevier has preprinted forms for use by authors in these cases.

For gold open access articles: Upon acceptance of an article, authors will be asked to complete a 'License Agreement' (more information). Permitted third party reuse of gold open access articles is determined by the author's choice of user license.

Author rights

As an author you (or your employer or institution) have certain rights to reuse your work. More information.

Elsevier supports responsible sharing

Find out how you can share your research published in Elsevier journals.

Role of the funding source

You are requested to identify who provided financial support for the conduct of the research and/or preparation of the article and to briefly describe the role of the sponsor(s), if any, in study design; in the collection, analysis and interpretation of data; in the writing of the report; and in the decision to submit the article for publication. If the funding source(s) had no such involvement, it is recommended to state this.

Open access

Please visit our Open Access page for more information about open access publishing in this journal.

Elsevier Researcher Academy

Researcher Academy is a free e-learning platform designed to support early and mid-career researchers throughout their research journey. The "Learn" environment at Researcher Academy offers several interactive modules, webinars, downloadable guides and resources to guide you through the process of writing for research and going through peer review. Feel free to use these free resources to improve your submission and navigate the publication process with ease.

Language (usage and editing services)

Please write your text in good English (American or British usage is accepted, but not a mixture of these). Authors who feel their English language manuscript may require editing to eliminate possible grammatical or spelling errors and to conform to correct scientific English may wish to use the Language Editing service available from Elsevier's Language Services.

Preparation

Queries

For questions about the editorial process (including the status of manuscripts under review) or for technical support on submissions, please visit our Support Center.

NEW SUBMISSIONS

Submission to this journal proceeds totally online and you will be guided stepwise through the creation and uploading of your files. The system automatically converts your files to a single PDF file, which is used in the peer-review process.

As part of the Your Paper Your Way service, you may choose to submit your manuscript as a single file to be used in the refereeing process. This can be a PDF file or a Word document, in any format or lay-out that can be used by referees to evaluate your manuscript. It should contain high enough quality figures for refereeing. If you prefer to do so, you may still provide all or some of the source files at the initial submission. Please note that individual figure files larger than 10 MB must be uploaded separately.

References

There are no strict requirements on reference formatting at submission. References can be in any style or format as long as the style is consistent. Where applicable, author(s) name(s), journal title/book title, chapter title/article title, year of publication, volume number/book chapter and the article number or pagination must be present. Use of DOI is highly encouraged. The reference style used by the journal will be applied to the accepted article by Elsevier at the proof stage. Note that missing data will be highlighted at proof stage for the author to correct.

Formatting requirements

There are no strict formatting requirements but all manuscripts must contain the essential elements needed to convey your manuscript, for example Abstract, Keywords, Introduction, Materials and Methods, Results, Conclusions, Artwork and Tables with Captions.

If your article includes any Videos and/or other Supplementary material, this should be included in your initial submission for peer review purposes.

Divide the article into clearly defined sections.

Figures and tables embedded in text

Please ensure the figures and the tables included in the single file are placed next to the relevant text in the manuscript, rather than at the bottom or the top of the file. The corresponding caption should be placed directly below the figure or table.

Peer review

This journal operates a double anonymized review process. All contributions will be initially assessed by the editor for suitability for the journal. Papers deemed suitable are then typically sent to a minimum of two independent expert reviewers to assess the scientific quality of the paper. The Editor is responsible for the final decision regarding acceptance or rejection of articles. The Editor's decision is final. Editors are not involved in decisions about papers which they have written themselves or have been written by family members or colleagues or which relate to products or services in which the editor has an interest. Any such submission is subject to all of the journal's usual procedures, with peer review handled independently of the relevant editor and their research groups. More information on types of peer review.

Double anonymized review

This journal uses double anonymized review, which means the identities of the authors are concealed from the reviewers, and vice versa. More information is available on our website. To facilitate this, please include the following separately:

Title page (with author details): This should include the title, authors' names, affiliations, acknowledgements and any Declaration of Interest statement, and a complete address for the corresponding author including an e-mail address.

Anonymized manuscript (no author details): The main body of the paper (including the references, figures, tables and any acknowledgements) should not include any identifying information, such as the authors' names or affiliations.

REVISED SUBMISSIONS

Use of word processing software

Regardless of the file format of the original submission, at revision you must provide us with an editable file of the entire article. Keep the layout of the text as simple as possible. Most formatting codes will be removed and replaced on processing the article. The electronic text should be prepared in a way very similar to that of conventional manuscripts (see also the Guide to Publishing with Elsevier). See also the section on Electronic artwork.

To avoid unnecessary errors you are strongly advised to use the 'spell-check' and 'grammar-check' functions of your word processor.

LaTeX

You are recommended to use the latest Elsevier article class to prepare your manuscript and BibTeX to generate your bibliography.
Our Guidelines has full details.

Article structure

Essential title page information

- ***Title.*** Concise and informative. Titles are often used in information-retrieval systems. Avoid abbreviations and formulae where possible.
- ***Author names and affiliations.*** Please clearly indicate the given name(s) and family name(s) of each author and check that all names are accurately spelled. You can add your name between parentheses in your own script behind the English transliteration. Present the authors' affiliation addresses (where the actual work was done) below the names. Indicate all affiliations with a lower-case superscript letter immediately after the author's name and in front of the appropriate address. Provide the full postal address of each affiliation, including the country name and, if available, the e-mail address of each author.
- ***Corresponding author.*** Clearly indicate who will handle correspondence at all stages of refereeing and publication, also post-publication. This responsibility includes answering any future queries about Methodology and Materials. **Ensure that the e-mail address is given and that contact details are kept up to date by the corresponding author.**
- ***Present/permanent address.*** If an author has moved since the work described in the article was done, or was visiting at the time, a 'Present address' (or 'Permanent address') may be indicated as a footnote to that author's name. The address at which the author actually did the work must be retained as the main, affiliation address. Superscript Arabic numerals are used for such footnotes.

Optimizing the title and abstract of an article for your audience

In order to increase the exposure of your article, we suggest the following:

- The title of your article must be clear and descriptive, using keywords that are relevant to the subject area, and would most likely be used in an online search.
- The abstract must also contain keywords and common phrases for the subject area, perhaps using wording from the title. These carefully chosen keywords and phrases can also be emphasised in the text, however please do this with caution as some search engines can reject overly repetitive webpages.

Highlights

Highlights are mandatory for this journal as they help increase the discoverability of your article via search engines. They consist of a short collection of bullet points that capture the novel results of your research as well as new methods that were used during the study (if any). Please have a look at the example Highlights.

Highlights should be submitted in a separate editable file in the online submission system. Please use 'Highlights' in the file name and include 3 to 5 bullet points (maximum 85 characters, including spaces, per bullet point).

Abstract

A concise and factual abstract of about 100 words is required. The abstract should state briefly the purpose of the research, the principal results and major conclusions. An abstract is often presented separately from the article, so it must be able to stand alone. For this reason, References should be avoided, but if essential, then cite the author(s) and year(s). Also, non-standard or uncommon abbreviations should be avoided, but if essential they must be defined at their first mention in the abstract itself.

Keywords

Immediately after the abstract, provide a maximum of 6 keywords, using American spelling and avoiding general and plural terms and multiple concepts (avoid, for example, 'and', 'of'). Be sparing with abbreviations: only abbreviations firmly established in the field may be eligible. These keywords will be used for indexing purposes.

Formatting of funding sources

List funding sources in this standard way to facilitate compliance to funder's requirements:

Funding: This work was supported by the National Institutes of Health [grant numbers xxxx, yyyy]; the Bill & Melinda Gates Foundation, Seattle, WA [grant number zzzz]; and the United States Institutes of Peace [grant number aaaa].

It is not necessary to include detailed descriptions on the program or type of grants and awards. When funding is from a block grant or other resources available to a university, college, or other research institution, submit the name of the institute or organization that provided the funding.

If no funding has been provided for the research, it is recommended to include the following sentence:

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Footnotes

Footnotes should be used sparingly. Number them consecutively throughout the article. Many word processors build footnotes into the text, and this feature may be used. Should this not be the case, indicate the position of footnotes in the text and present the footnotes themselves separately at the end of the article.

Artwork

Electronic artwork

General points

- Make sure you use uniform lettering and sizing of your original artwork.

- Preferred fonts: Arial (or Helvetica), Times New Roman (or Times), Symbol, Courier.
- Number the illustrations according to their sequence in the text.
- Use a logical naming convention for your artwork files.
- Indicate per figure if it is a single, 1.5 or 2-column fitting image.
- For Word submissions only, you may still provide figures and their captions, and tables within a single file at the revision stage.
- Please note that individual figure files larger than 10 MB must be provided in separate source files.

A detailed guide on electronic artwork is available.
You are urged to visit this site; some excerpts from the detailed information are given here.
Formats
Regardless of the application used, when your electronic artwork is finalized, please 'save as' or convert the images to one of the following formats (note the resolution requirements for line drawings, halftones, and line/halftone combinations given below):
EPS (or PDF): Vector drawings. Embed the font or save the text as 'graphics'.
TIFF (or JPG): Color or grayscale photographs (halftones): always use a minimum of 300 dpi.
TIFF (or JPG): Bitmapped line drawings: use a minimum of 1000 dpi.
TIFF (or JPG): Combinations bitmapped line/half-tone (color or grayscale): a minimum of 500 dpi is required.
Please do not:

- Supply files that are optimized for screen use (e.g., GIF, BMP, PICT, WPG); the resolution is too low.
- Supply files that are too low in resolution.
- Submit graphics that are disproportionately large for the content.

Color artwork
Please make sure that artwork files are in an acceptable format (TIFF (or JPEG), EPS (or PDF) or MS Office files) and with the correct resolution. If, together with your accepted article, you submit usable color figures then Elsevier will ensure, at no additional charge, that these figures will appear in color online (e.g., ScienceDirect and other sites) in addition to color reproduction in print. Further information on the preparation of electronic artwork.
Figure captions
Ensure that each illustration has a caption. A caption should comprise a brief title (**not** on the figure itself) and a description of the illustration. Keep text in the illustrations themselves to a minimum but explain all symbols and abbreviations used.
Tables

Please submit tables as editable text and not as images. Tables can be placed either next to the relevant text in the article, or on separate page(s) at the end. Number tables consecutively in accordance with their appearance in the text and place any table notes below the table body. Be sparing in the use of tables and ensure that the data presented in them do not duplicate results described elsewhere in the article. Please avoid using vertical rules and shading in table cells.

References

Citation in text

Please ensure that every reference cited in the text is also present in the reference list (and vice versa). Any references cited in the abstract must be given in full. Unpublished results and personal communications are not recommended in the reference list, but may be mentioned in the text. If these references are included in the reference list they should follow the standard reference style of the journal and should include a substitution of the publication date with either 'Unpublished results' or 'Personal communication'. Citation of a reference as 'in press' implies that the item has been accepted for publication.

Reference links

Increased discoverability of research and high quality peer review are ensured by online links to the sources cited. In order to allow us to create links to abstracting and indexing services, such as Scopus, Crossref and PubMed, please ensure that data provided in the references are correct. Please note that incorrect surnames, journal/book titles, publication year and pagination may prevent link creation. When copying references, please be careful as they may already contain errors. Use of the DOI is highly encouraged.

A DOI is guaranteed never to change, so you can use it as a permanent link to any electronic article. An example of a citation using DOI for an article not yet in an issue is: VanDecar J.C., Russo R.M., James D.E., Ambeh W.B., Franke M. (2003). Aseismic continuation of the Lesser Antilles slab beneath northeastern Venezuela. Journal of Geophysical Research, https://doi.org/10.1029/2001JB000884. Please note the format of such citations should be in the same style as all other references in the paper.

Web references

As a minimum, the full URL should be given and the date when the reference was last accessed. Any further information, if known (DOI, author names, dates, reference to a source publication, etc.), should also be given. Web references can be listed separately (e.g., after the reference list) under a different heading if desired, or can be included in the reference list.

Data references

This journal encourages you to cite underlying or relevant datasets in your manuscript by citing them in your text and including a data reference in your Reference List. Data references should include the following elements: author name(s), dataset title, data repository, version (where available), year, and global persistent identifier. Add [dataset] immediately before the reference so we can properly identify it as a data reference. The [dataset] identifier will not appear in your published article.

Preprint references

Where a preprint has subsequently become available as a peer-reviewed publication, the formal publication should be used as the reference. If there are preprints that are central to your work or that cover crucial developments in the topic, but are not yet formally published, these may be referenced. Preprints should be clearly marked as such, for example by including the word preprint, or the name of the preprint server, as part of the reference. The preprint DOI should also be provided.

References in a special issue

Please ensure that the words 'this issue' are added to any references in the list (and any citations in the text) to other articles in the same Special Issue.

Reference management software

Most Elsevier journals have their reference template available in many of the most popular reference management software products. These include all products that support Citation Style Language styles, such as Mendeley. Using citation plug-ins from these products, authors only need to select the appropriate journal template when preparing their article, after which citations and bibliographies will be automatically formatted in the journal's style. If no template is yet available for this journal, please follow the format of the sample references and citations as shown in this Guide. If you use reference management software, please ensure that you remove all field codes before submitting the electronic manuscript. More information on how to remove field codes from different reference management software.

Reference formatting

There are no strict requirements on reference formatting at submission. References can be in any style or format as long as the style is consistent. Where applicable, author(s) name(s), journal title/book title, chapter title/article title, year of publication, volume number/book chapter and the article number or pagination must be present. Use of DOI is highly encouraged. The reference style used by the journal will be applied to the accepted article by Elsevier at the proof stage. Note that missing data will be highlighted at proof stage for the author to correct. If you do wish to format the references yourself they should be arranged according to the following examples:

Reference Style

For *Health & Place* the Harvard system is to be used: authors' names (no initials) and dates (and specific pages, only in the case of quotations) are given in the main body of the text, e.g. (Phillips, 1990, p, 40). References are listed alphabetically at the end of the paper, double spaced and conform to current journal style:

For journals: Macintyre, S., Maclver, S., Sooman, A., 1993. Area, class and health: should we be focusing on places or people? Journal of Social Policy 22, 213-234.

For books: Jones, K., Moon, G., 1987. Health, Disease and Society. RKP, London.

For Chapters of edited Books: Laws, G., Dear, M., 1988. Coping in the community: a review of factors and influencing the lives of deinstitutionalized ex-psychiatric patients. In: Smith, C., Giggs, J. (Eds), Location and Stigma. Unwin Hyman, London, pp. 83-102.

Other publications: Where there is doubt include bibliographical details.

Video

Elsevier accepts video material and animation sequences to support and enhance your scientific research. Authors who have video or animation files that they wish to submit with their article are strongly encouraged to include links to these within the body of the article. This can be done in the same way as a figure or table by referring to the video or animation content and noting in the body text where it should be placed. All submitted files should be properly labeled so that they directly relate to the video file's content. In order to ensure that your video or animation material is directly usable, please provide the file in one of our recommended file formats with a preferred maximum size of 150 MB per file, 1 GB in total. Video and animation files supplied will be published online in the electronic version of your article in Elsevier Web products, including ScienceDirect. Please supply 'stills' with your files: you can choose any frame from the video or animation or make a separate image. These will be used instead of standard icons and will personalize the link to your video data. For more detailed instructions please visit our video instruction pages. Note: since video and animation cannot be embedded in the print version of the journal, please provide text for both the electronic and the print version for the portions of the article that refer to this content.

Data visualization

Include interactive data visualizations in your publication and let your readers interact and engage more closely with your research. Follow the instructions here to find out about available data visualization options and how to include them with your article.

Supplementary material

Supplementary material such as applications, images and sound clips, can be published with your article to enhance it. Submitted supplementary items are published exactly as they are received (Excel or PowerPoint files will appear as such online). Please submit your material together with the article and supply a concise, descriptive caption for each supplementary file. If you wish to make changes to supplementary material during any stage of the process, please make sure to provide an updated file. Do not annotate any corrections on a previous version. Please switch off the 'Track Changes' option in Microsoft Office files as these will appear in the published version.

Research data

This journal encourages and enables you to share data that supports your research publication where appropriate, and enables you to interlink the data with your published articles. Research data refers to the results of observations or experimentation that validate research findings, which may also include software, code, models, algorithms, protocols, methods and other useful materials related to the project.

Below are a number of ways in which you can associate data with your article or make a statement about the availability of your data when submitting your manuscript. If you are sharing data in one of these ways, you are encouraged to cite the data in your manuscript and reference list. Please refer to the "References" section for more information about data citation. For more information on depositing, sharing and using research data and other relevant research materials, visit the research data page.

Data linking

If you have made your research data available in a data repository, you can link your article directly to the dataset. Elsevier collaborates with a number of repositories to link articles on ScienceDirect with relevant repositories, giving readers access to underlying data that gives them a better understanding of the research described.

There are different ways to link your datasets to your article. When available, you can directly link your dataset to your article by providing the relevant information in the submission system. For more information, visit the database linking page.

For supported data repositories a repository banner will automatically appear next to your published article on ScienceDirect.

In addition, you can link to relevant data or entities through identifiers within the text of your manuscript, using the following format: Database: xxxx (e.g., TAIR: AT1G01020; CCDC: 734053; PDB: 1XFN).

Research Elements

This journal enables you to publish research objects related to your original research – such as data, methods, protocols, software and hardware – as an additional paper in a Research Elements journal.

Research Elements is a suite of peer-reviewed, open access journals which make your research objects findable, accessible and reusable. Articles place research objects into context by providing detailed descriptions of objects and their application, and linking to the associated original research articles. Research Elements articles can be prepared by you, or by one of your collaborators.

During submission, you will be alerted to the opportunity to prepare and submit a manuscript to one of the Research Elements journals.

More information can be found on the Research Elements page.

Data statement

To foster transparency, we require you to state the availability of your data in your submission if your data is unavailable to access or unsuitable to post. This may also be a requirement of your funding body or institution. You will have the opportunity to provide a data statement during the submission process. The statement will appear with your published article on ScienceDirect. For more information, visit the Data Statement page..

Checklist

• Have you told readers, at the outset, what they might gain by reading your paper?

• Have you made the aim of your work clear?

• Have you explained the significance of your contribution?

• Have you set your work in the appropriate context by giving sufficient background (including a complete set of relevant references) to your work?

• Have you addressed the question of practicality and usefulness?

• Have you identified future developments that may result from you work?

• Have you structured you papers in a clear and logical fashion?

• Have you provided an abstract and keywords?

Submission checklist

The following list will be useful during the final checking of an article prior to sending it to the journal for review. Please consult this Guide for Authors for further details of any item. **Ensure that the following items are present:**

One author has been designated as the corresponding author with contact details:

- E-mail address
- Full postal address

All necessary files have been uploaded, and contain:

- Keywords
- All figure captions
- All tables (including title, description, footnotes)

Further considerations

- Manuscript has been 'spell-checked' and 'grammar-checked'
- Files submitted for review have had all identifying information removed (see review policy above), whether in the file text, the file name or the file properties.
- All references mentioned in the Reference list are cited in the text, and vice versa
- Permission has been obtained for use of copyrighted material from other sources (including the Internet)

Printed version of figures (if applicable) in color or black-and-white

- Indicate clearly whether or not color or black-and-white in print is required.

For any further information please visit our Support Center"

After acceptance

Online proof correction

To ensure a fast publication process of the article, we kindly ask authors to provide us with their proof corrections within two days. Corresponding authors will receive an e-mail with a link to our online proofing system, allowing annotation and correction of proofs online. The environment is similar to MS Word: in addition to editing text, you can also comment on figures/tables and answer questions from the Copy Editor. Web-based proofing provides a faster and less error-prone process by allowing you to directly type your corrections, eliminating the potential introduction of errors. If preferred, you can still choose to annotate and upload your edits on the PDF version. All instructions for proofing will be given in the e-mail we send to authors, including alternative methods to the online version and PDF.
We will do everything possible to get your article published quickly and accurately. Please use this proof only for checking the typesetting, editing, completeness and correctness of the text, tables and figures. Significant changes to the article as accepted for publication will only be considered at this stage with permission from the Editor. It is important to ensure that all corrections are sent back to us in one communication. Please check carefully before replying, as inclusion of any subsequent corrections cannot be guaranteed. Proofreading is solely your responsibility.

Offprints

The corresponding author will, at no cost, receive a customized Share Link providing 50 days free access to the final published version of the article on ScienceDirect. The Share Link can be used for sharing the article via any communication channel, including email and social media. For an extra charge, paper offprints can be ordered via the offprint order form which is sent once the article is accepted for publication. Corresponding authors who have published their article gold open access do not receive a Share Link as their final published version of the article is available open access on ScienceDirect and can be shared through the article DOI link.

Author inquiries

Visit the Elsevier Support Center to find the answers you need. Here you will find everything from Frequently Asked Questions to ways to get in touch. You can also check the status of your submitted article or find out when your accepted article will be published.

Appendix E

Demographic data from empirical paper stratified by ethnicity

N(%)	White British *n*=1,565	White Non-British *n*=2,796	Mixed *n*=1,204	Asian *n*=393	Black African *n*=196	Black Caribbean	Black British	Other
Deprivation[1]								
1	502(22.31)	146(23.74)	55(21.32)	114(26.89)	150(28.79)	232(29.15)	304(28.84)	54(30.17)
2	868(38.58)	311(50.57)	134(51.94)	184(43.40)	260(49.90)	412(51.76)	522(49.53)	85(47.49)
3	512(22.76)	113(18.37)	47(18.22)	80(18.87)	95(18.23)	120(15.08)	185(17.55)	34(18.99)
4	231(10.27)	37(6.02)	17(6.59)	28(6.60)	14(2.69)	24(3.02)	32(3.04)	3(1.68)
5	137(6.09)	8(1.30)	5(1.94)	18(4.25)	2(0.38)	8(1.01)	11(1.04)	3(1.68)
Gender[2]								
Male	1,271(52.65)	432(55.74)	143(51.44)	261(55.77)	323(58.09)	455(52.72)	662(58.90)	120(55.05)
Female	1,143(47.35)	343(44.26)	135(48.56)	207(44.23)	233(41.91)	408(47.28)	462(41.10)	98(44.95)
Age M(SD)	38(12.44)	36(11.42)	34(10.87)	36(11.85)	43(12.33)	37(11.23)	35(11.59)	34(11.22)
Primary Diagnosis								

Substance-induced psychosis	3(0.12)	3(0.39)	1(0.36)	2(0.43)	2(0.36)	4(0.46)	2(0.18)	21(9.63)
Schizophrenia	334(13.82)	149(19.23)	68(24.46)	90(19.23)	235(42.27)	272(31.52)	359(31.94)	3(1.38)
Delusional disorder	32(1.32)	10(1.29)	4(1.44)	6(1.28)	9(1.62)	14(1.62)	16(1.42)	8(3.67)
Acute psychosis	67(2.77)	39(5.03)	7(2.52)	25(5.34)	22(3.96)	51(5.91)	67(5.96)	8(3.67)
Schizo-affective	114(4.72)	45(5.81)	21(7.55)	28(5.98)	64(11.51)	112(12.98)	136(12.10)	14(6.42)
Unspecified psychosis	162(6.71)	103(13.29)	40(14.39)	65(13.89)	59(10.61)	142(16.45)	197(17.53)	37(16.97)
other	23(0.95)	8(1.03)	2(0.72)	3(0.64)	4(0.72)	5(0.58)	12(1.07)	1(0.46)
Psychosis as secondary diagnosis	1,681(69.58)	418(53.94)	135(48.56)	249(53.21)	161(28.96)	263(30.48)	335(29.80)	134(61.47)
Admission to PICU								
No	1,361(86.96)	2,403(85.94)	234(84.17)	428(91.45)	466(83.81)	690(79.95)	869(77.31)	204(93.58)
Yes	204(13.04)	393(14.06)	44(15.83)	40(8.55)	90(16.19)	173(20.05)	255(22.69)	14(6.42)
Admission to Forensic								

No	2,377(98.39)	758(97.81)	268(96.40)	459(98.08)	520(93.53)	828(95.94)	1,062(94.48)	215(98.62)
Yes	39(1.61)	17(2.19)	10(3.60)	9(1.92)	36(6.47)	35(4.06)	62(5.52)	3(1.38)
Use of MHA								
No	1,113(53.93)	237(30.58)	85(30.58)	128(27.35)	97(17.45)	142(16.45)	200(17.79)	71(32.57)
Yes	1,303(53.93)	538(69.42)	193(69.42)	340(72.65)	459(82.55)	721(83.55)	924(82.21)	147(67.43)
Number of sections Mdn(IQR)	1 (2)	1(2)	1(3)	1(2)	2(2)	2(2)	2(2)	1(2)
Experienced Seclusion								
No	2,401(99.38)	768(99.10)	266(95.68)	460(98.29)	537(96.58)	823(95.37)	1,062(94.48)	213(97.710
Yes	15(0.62)	7(0.90)	12(4.32)	8(1.71)	19(3.42)	40(4.63)	62(5.52)	5(2.29)
LOS Mdn(IQR)	34.5(91)	30(63)	36.5(90)	38(87)	64(149)	55(112)	54.5(112)	26.5(46)
No. admissions Mdn(IQR)	1(3)	1(1)	2(2)	1(1)	2(2)	2(2)	2(3)	1(1)

Missing records: [1] 69 participants, [2] 3 participants, IMD 613 participants

Appendix F

Table _Sociodemographic variables for whole sample from empirical paper

Ethnicity	**Number(%)**
White British	2,416 (36.07)
White non-British	775 (11.57)
Mixed	278(4.15)
Asian	468 (6.99)
Black African	566 (8.30)
Black Caribbean	863(12.88)
Black other	1,124(16.78)
Other	218 (3.25)
Gender	
Female	3,061(45.25)
Male	3,7061(54.75)
Age M(SD)	37(12.06) mean (SD)
IMD quintile	
1 Most	1,565 (25.43)
2	2,796 (45.43)
3	1,204 (19.56)
4	393 (6.39)
5 Least	196 (3.18)
Primary Diagnosis	
Substance-induced psychosis	17(0.25)
Schizophrenia	1,529(22.60)
Delusional disorder	95(1.40)
Acute psychosis	291(4.30)
Schizo-affective	535(7.91)
Unspecified psychosis	812(12)
other	58(0.86)
Not stated	3,2429(50.68)
PICU	

No	5,925(87.57)
Yes	841(12.43)
Forensic	
No	
Yes	
MHA	
No	2,123(31.38)
Yes	4,643(68.62)
MHA number	
Seclusion	
No	1,524(97.38)
Yes	41(2.62)
Length of stay Mdn(IQR)	41(15-109)
Number of admissions Mdn(IQR)	1(1-3)

Appendix G

Odds ratios and Incident rate ratio for intersectionality analysis

		LOS		MHA		Number of admissions	
1Least	White non-British	.89(.70-1.11)	.88(.70-1.11)	1.72(1.16-2.56)**	1.71(1.15-2.55)**	.90(.771.06)	.90(.77-1.06)
	mixed	1.01(.76-1.52)	1.07(.76-1.53)	1.66(.91-3.02)	1.66(.912-3.04)	1.09(.86-1.37)	1.07(.85-1.35)
	Asian/south Asian	1.19(.92-1.54)	1.18(.91-1.512)	2.17(1.38-3.44)**	2.13(1.35-3.38)**	1.93(.87-1.22)	1.04(.87-1.23)
	Black African	1.57(1.25-1.97)***	1.54(1.22-1.93)***	3.29(2.15-5.32)***	3.38(1.35-3.38)***	1.12(1.01-1.36)*	1.19(1.03-1.23)*
	Black Caribbean	1.46(1.20-1.78)***	1.44(1.18-1.75)***	4.48(2.98-6.74)***	3.38(2.14-5.33)***	1.31(1.24-1.56)***	1.31(1.15-1.48)***
	Black British	1.43(1.20-1.71)***	1.46(1.22-1.75)***	2.96(2.12-4.12_***	4.46(2.96-6.71)***	1.39(1.24-1.56)***	1.38(1.23-1.55)***
	Other	.74(.52-1.05)	.77(.54-1.10)	1.76(.96-3.25)	1.81(.98-3.35)	.90(.71-1.16)	.89(.6**9-1.13)**
2	White non-British	.83(.71-.97)*	.88(.75-1.03)	1.48(1.13-1.95)**	1.53(1.16-2.001)**	.92(.83-1.03)	.92(.82-1.02)
	mixed	1.08(.87-1.36)	1.42(.98-1.05)	1.45(.99-2.13)	1.57(1.062-2.31)*	1.21(1.05-1.39)**	1.19(.103-1.37)*
	Asian/south Asian	.96(.79-1.16)	.99(.74-1.31)	1.86(1.32-2.64)***	1.93(1.36-2.74)***	.92(.80-1.05)	.90(.79-1.04)
	Black African	1.88(1.59-2.26)****	1.42(1.08-1.86))***	3.70(2.600-5.27)***	3.57(2.50-5.09)***	1.26(1.3-1.40)***	1.26(1.13-1.40)***
	Black Caribbean	1.31(1.14-1.51)***	1.31(1.03-1.67)***	3.70(2.60-5.28)***	4.14(3.06-5.08)***	1.27(1.16-1.39)***	1.26(1.15-1.39)***

	Black British	1.37(1.20-1.56)***	1.54(1.25-1.89)***	4.05(3.08-5.33)***	4.18(3.17-5.51)***	1.34(1.23-1.46)***	1.32(1.21-1.34)***
	Other	.56(.43-.74)***	.53(.35-.82)**	1.58(.98-2.54)	1.64(1.02-2.64)*	.81(.67-.99)*	.80(.65-.97)*
3	White non-British	.90(.70-1.15)	.88(.75-1.03)	2.46(1.57-3.84)***	2.60(1.66-4.09)***	1.16(.97-1.38)	1.41(.96-1.36)
	mixed	1.64(1.14-2.37)**	1.17(.94-1.46)	2.71(1.37-5.34) **	2.78(1.40-5.47)**	1.26(.98-1.62)	1.25(.98-1.61)
	Asian/south Asian	.99(1.14-2.37)	1.01(.83-1.22)	2.78(1.63-4.76)***	2.90(1.70-4.98)***	.99(.81-1.23)	.99(.80-1.22)
	Black African	1.58(1.21-2.07)**	1.77(1.50-2.09)*	3.71(2.18-6.32)***	2.91(1.70-4.98)***	1.27(1.06-1.53)**	1.29(1.07-1.55)**
	Black Caribbean	1.37(1.07-1.75) *	1.35(1.17-1.56)*	3.52(2.20-5.66)***	3.56(2.09-6.08)***	1.33(1.13-1.57)***	1.32(1.12-1.55)**
	Black British	1.61(1.31-1.98)***	1.38(1.21-1.57)***	3.59(2.42-5.34)***	3.78(2.53-5.65)***	1.43(1.24-1.64)***	1.39(1.21-1.60)***
	Other	.57(.37-.87)0.010**	.62(.48-.82)**	.923(.46-1.86)	.94(.469-1.89)	.91(.67-1.26)	.90(.66-.124)
4	White non-British	.79(.52-1.21)	.85(.56-1.29)	3.21(1.5-6.80)**	3.32(1.55-7.12)**	1.10(.82-1.46)	1.09(.82-1.45)
	mixed	.88(.48-1.59)	.82(.45-1.48)	1.94(.713-5.27)	2.14(.77-5.94)	1.24(.85-1.83)	1.26(.85-1.86)
	Asian/south Asian	1.22(.76-1.96)	1.14(.71-1.82)	3.39(1.43-8.021)**	3.89(1.62-9.36)**	1.04(.75-1.44)	1.05(.76-1.46)
	Black African	1.07(.56-2.07)	.98(.510-1.87)	4.98(1.35-18.31)*	4.31(1.15-16.12) *	1.86(1.29-2.68)**	1.82(1.26-2.62)**
	Black Caribbean	.72(.43-1.21)	.73(.44-1.22)	5.16(1.86-14.29)**	5.77(2.06-16.23)**	1.48)1.09-2.03)*	1.49(1.09-2.04)*

	Black British	.75(.48-1.18)	.75(.48-1.17)	4.07(1.75-9.45)**	3.78(1.61-8.85)**	1.66(1.28-2.17)***	1.65(1.26-2.15)***
	Other	IRR = .64, CI = .51-.75,.095(0.22-.39)**	.08(0.20-.34)**			0.60(.18-2.01)	.63(.19-2.08)
5	White Non-British	.71(.31-1.61)	.89(.40-1.99)	2.9(.66-12.65)	2.82(.61-12.90)	1.27(.74-2.18)	1.25(.73-2.15)
	mixed	.80(.29-2.23)	1.02(.37-2.76)			1.59(.87-2.93)	1.68(.91-3.09)
	Asian/south Asian	.65(.37-1.14)	.77(.44-1.33)	2.73(1.0-7.50)**	3.17(1.11-9.04)**	1.37(.95-1.97)	1.40(.97-2.02)
	Black African	.35(.07-1.74)	.25(.05-1.18)			.72(.18-2.92)	.68(.17-2.76)
	Black Caribbean	.589(.26-1.33)	1.04(.52-2.10)	1.74(.42-7.26)	1.43(.32-6.28)	1.09(.61-1.96)	1.10(.61-1.98)
	Black British	1.32(.65-2.67)	1.05(.52-2.10)	7.83(1.63-37.68)**	6.19(1.24-30.98)*	2.11(1.45-3.07)***	2.01(1.37-2.97)****
	Other	.30(.08-1.13)	.23(.064-.85)			.72(.23-2.27)	.70(.22-2.19)

Appendix H

Journal guidelines for empirical paper

Rapid publication is a priority; hence, authors are requested to pay close attention to the following instructions for the submission of manuscripts to the journal *Psychiatry Research*.

Preparation of manuscripts

Title page. The Title page should include the author byline, with names of authors on the same line(s). Superscript letters (a, b, c), not numerals, should be used to key institutional affiliation (if all authors are in the same department, the superscript letter should be omitted); an asterisk should be entered to designate the corresponding author. Underneath the byline, institutional affiliations should be listed (department, institution, city, state or province (if applicable) and country. Funding information should not be included on the title page but should instead be given following the Discussion section.In an asterisked Corresponding Author footnote at the bottom of the title page, telephone/fax numbers and e-mail address of the corresponding author should be provided; e-mail addresses, if desired, may also be provided for the co-authors (or co-corresponding author, if applicable).

Abstract. The Abstract should be 150-200 words for full-length articles and 100 words for short communications (formally known as Brief Communications), summarizing the aims of the study, the methods used, the results and the major conclusions. Do not include a summary at the end of the article. Note that *Psychiatry Research* does not use the structured abstract style; do not include bold-faced headings within the abstract. The Abstract should be a single paragraph. Do not include detailed statistics or p-values in the abstract; simply say “significant “or “non-significant” .

The abstract should be followed by up to seven key words which accord with the indexing conventions of Index Medicus.

Note that the keywords should not duplicate words used in the title of the article, which will be automatically indexed.

Text. Although exceptions will be considered, manuscripts should not exceed 5000 words, and shorter manuscripts (e.g., 3000 words) are preferred. Each article should contain the following major headings: Introduction (preceded by arabic number 1.), Methods (preceded by number 2.), Results (preceded by number 3.), Discussion (preceded by number 4.), Acknowledgment (optional section following the discussion, which should not be preceded by a numeral), and References (should not be preceded by a numeral).

Subheadings should follow the numbering system used in the major heading; for example, the subheading "Subjects" within the Methods section should be flush left on a separate line and designated 2.1., the subheading "Procedures" should be designated 2.2., etc.

Lower level headings, if required, should also be numbered (e.g., "2.1.1. Patients." as a lower order heading under "2.1. Subjects."). Only the first letter of the first word of each heading should be capitalized.

The use of abbreviations within the text should be minimized, and each abbreviation, when introduced, must be defined and used consistently thereafter. Systeme International measurements should be used. For products or instruments (do not abbreviate) used in the research reported, provide the name, city and country of the supplier in parentheses. All tables and figures must be referred to in the text.

Manuscript categories

Research Articles. Although exceptions will be considered, manuscripts should not exceed 5000 words, and shorter manuscripts (e.g., 3000 words) are preferred. Each article should contain the following major headings: Introduction (preceded by arabic number 1.), Methods (preceded by number 2.), Results (preceded by number 3.), Discussion (preceded by number 4.), Acknowledgment (optional section following the discussion, which should not be preceded by a numeral), and References (should not be preceded by a numeral). Subheadings should follow the numbering system used in the major heading; for example, the subheading "Subjects" within the Methods section should be flush left on a separate line and designated 2.1., the subheading "Procedures" should be designated 2.2., etc. Lower level headings, if required, should also be numbered (e.g., "2.1.1. Patients." as a lower order heading under "2.1.Subjects."). Only the first letter of the first word of each heading should be capitalized.

Short communications. Short communications (formally called Brief reports) should not exceed 1500 words, including a 100-word abstract, 3 keywords, text, and references plus 1 table or 1 figure.

Case reports. Case reports will only be considered as Correspondence (see following instructions.)

CorrespondenceCorrespondence items (formally Letters to the Editor) should be 750-1000 words or less. It should not include a title page, abstract or key words. Authors' names and affiliations should be listed at the end of the letter, along with the corresponding author's email address. There should be no more than 5 references, and no tables or figures.

Manuscript categories

Conflict of interest. All authors are requested to disclose any actual or potential conflict of interest including any financial, personal or other relationships with other people or organizations within three (3) years of beginning the work submitted that could inappropriately influence, or be perceived to influence, their work. Examples of potential conflicts of interest that should be disclosed include employment, consultancies, stock ownership (except for personal investment purposes equal to the lesser of one percent (1%) or USD 5000), honoraria, paid expert testimony, patent applications, registrations, and grants. If there are no conflicts of interest, authors should state that there are none.

Abbreviations. Define abbreviations at their first occurrence in the article. Abbreviations should be defined when they first occur in the abstract, in the text, and also in tables and figure legends. Once an abbreviation has been introduced in the main body of the text, it should be used throughout.

Statistical reporting. Statistical reporting should be complete, including at a minimum name of statistical test, test value, degrees of freedom where appropriate, and *p*-value. Italic font should be used for *n* (sample size) and statistical terms, e.g., *t, r, F, U, p*.

Submission of manuscripts

Psychiatry Research proceeds totally online via an electronic submission system. In case you do not have an Internet connection, please contact the Managing Editor for alternative instructions. By accessing the online submission at https://www.editorialmanager.com/psy/default.aspx you will be guided stepwise through the creation and uploading of the various files. Authors will be requested to direct the manuscripts to the most appropriate Section/Category of research to assist in editor assignment.

NOTE TO AUTHORS: Psychiatry Research has a separate section to which neuroimaging-related articles should be submitted. All articles about MRI, PET, fMRI, SPECT, MEG and topographic EEG should be submitted to the Neuroimaging Section: https://www.editorialmanager.com/psyn/default.aspx.

Submission checklist

You can use this list to carry out a final check of your submission before you send it to the journal for review. Please check the relevant section in this Guide for Authors for more details.

Ensure that the following items are present:

One author has been designated as the corresponding author with contact details:
- E-mail address
- Full postal address

All necessary files have been uploaded:
Manuscript:
- Include keywords
- All figures (include relevant captions)
- All tables (including titles, description, footnotes)
- Ensure all figure and table citations in the text match the files provided
- Indicate clearly if color should be used for any figures in print

Graphical Abstracts / Highlights files (where applicable)
Supplemental files (where applicable)

Further considerations
- Manuscript has been 'spell checked' and 'grammar checked'
- All references mentioned in the Reference List are cited in the text, and vice versa
- Permission has been obtained for use of copyrighted material from other sources (including the Internet)
- A competing interests statement is provided, even if the authors have no competing interests to declare
- Journal policies detailed in this guide have been reviewed
- Referee suggestions and contact details provided, based on journal requirements

For further information, visit our Support Center.

Before you begin

Ethics in publishing

Please see our information on Ethics in publishing.

Studies in humans and animals

If the work involves the use of human subjects, the author should ensure that the work described has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans. The manuscript should be in line with the Recommendations for the Conduct, Reporting, Editing and Publication of Scholarly Work in Medical Journalsand aim for the inclusion of representative human populations (sex, age and ethnicity) as per those recommendations. The terms sex and gender should be used correctly.

The author should ensure that the manuscript contains a statement that all procedures were performed in compliance with relevant laws and institutional guidelines and have been approved by the appropriate institutional committee(s). This statement should contain the date and reference number of the ethical approval(s) obtained. Authors should also include a statement in the manuscript that informed consent was obtained for experimentation with human subjects. The privacy rights of human subjects must always be observed.

The journal will not accept manuscripts that contain data derived from unethically sourced organs or tissue, including from executed prisoners or prisoners of conscience, consistent with recommendations by Global Rights Compliance on Mitigating Human Rights Risks in Transplantation Medicine. For all studies that use human organs or tissues authors must provide sufficient evidence that they were procured in line with WHO Guiding Principles on Human Cell, Tissue and Organ Transplantation. The source of the organs or tissues used in clinical research must be transparent and traceable. Authors of manuscripts describing organ transplantation must additionally declare within the manuscript:

1. that autonomous consent free from coercion was obtained from the donor(s) or their next of kin; and
2. that organs/tissues were not sourced from executed prisoners or prisoners of conscience.

All animal experiments should comply with the ARRIVE guidelines and should be carried out in accordance with the

U.K. Animals (Scientific Procedures) Act, 1986 and associated guidelines, EU Directive 2010/63/EU for animal experiments, or the National Research Council's Guide for the Care and Use of Laboratory Animals and the authors should clearly indicate in the manuscript that such guidelines have been followed. The sex of animals must be indicated, and where appropriate, the influence (or association) of sex on the results of the study.

Declaration of interest

All authors must disclose any financial and personal relationships with other people or organizations that could inappropriately influence (bias) their work. Examples of potential competing interests include employment, consultancies, stock ownership, honoraria, paid expert testimony, patent applications/registrations, and grants or other funding. Authors must disclose any interests in two places: 1. A summary declaration of interest statement in the title page file (if double anonymized) or the manuscript file (if single anonymized). If there are no interests to declare then please state this: 'Declarations of interest: none'. 2. Detailed disclosures as part of a separate Declaration of Interest form, which forms part of the journal's official records. It is important for potential interests to be declared in both places and that the information matches. More information.

Declaration of generative AI in scientific writing

The below guidance only refers to the writing process, and not to the use of AI tools to analyse and draw insights from data as part of the research process.

Where authors use generative artificial intelligence (AI) and AI-assisted technologies in the writing process, authors should only use these technologies to improve readability and language. Applying the technology should be done with human oversight and control, and authors should carefully review and edit the result, as AI can generate authoritative-sounding output that can be incorrect, incomplete or biased. AI and AI-assisted technologies should not be listed as an author or co-author, or be cited as an author. Authorship implies responsibilities and tasks that can only be attributed to and performed by humans, as outlined in Elsevier's AI policy for authors.

Authors should disclose in their manuscript the use of AI and AI-assisted technologies in the writing process by following the instructions below. A statement will appear in the published work. Please note that authors are ultimately responsible and accountable for the contents of the work.

Disclosure instructions
Authors must disclose the use of generative AI and AI-assisted technologies in the writing process by adding a statement at the end of their manuscript in the core manuscript file, before the References list. The statement should be placed in a new section entitled 'Declaration of Generative AI and AI-assisted technologies in the writing process'.

Statement: During the preparation of this work the author(s) used [NAME TOOL / SERVICE] in order to [REASON]. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

This declaration does not apply to the use of basic tools for checking grammar, spelling, references etc. If there is nothing to disclose, there is no need to add a statement.

Submission declaration and verification

Submission of an article implies that the work described has not been published previously (except in the form of an abstract, a published lecture or academic thesis, see 'Multiple, redundant or concurrent publication' for more information), that it is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere in the same form, in English or in any other language, including electronically without the written consent of the copyright-holder. To verify compliance, your article may be checked by Crossref Similarity Check and other originality or duplicate checking software.

Preprints

Please note that preprints can be shared anywhere at any time, in line with Elsevier's sharing policy. Sharing your preprints e.g. on a preprint server will not count as prior publication (see 'Multiple, redundant or concurrent publication' for more information).

Use of inclusive language

Inclusive language acknowledges diversity, conveys respect to all people, is sensitive to differences, and promotes equal opportunities. Content should make no assumptions about the beliefs or commitments of any reader; contain nothing which might imply that one individual is superior to another on the grounds of age, gender, race, ethnicity, culture, sexual orientation, disability or health condition; and use inclusive language throughout. Authors should ensure that writing is free from bias, stereotypes, slang, reference to dominant culture and/or cultural assumptions. We advise to seek gender neutrality by using plural nouns ("clinicians, patients/clients") as default/wherever possible to avoid using "he, she," or "he/she." We recommend avoiding the use of descriptors that refer to personal attributes such as age, gender, race, ethnicity, culture, sexual orientation, disability or health condition unless they are relevant and valid. When coding terminology is used, we recommend to avoid offensive or exclusionary terms such as "master", "slave", "blacklist" and "whitelist". We suggest using alternatives that are more appropriate and (self-) explanatory such as "primary", "secondary", "blocklist" and "allowlist". These guidelines are meant as a point of reference to help identify appropriate language but are by no means exhaustive or definitive.

Reporting sex- and gender-based analyses

Reporting guidance

For research involving or pertaining to humans, animals or eukaryotic cells, investigators should integrate sex and gender-based analyses (SGBA) into their research design according to funder/sponsor requirements and best practices within a field. Authors should address the sex and/or gender dimensions of their research in their article. In cases where they cannot, they should discuss this as a limitation to their research's generalizability. Importantly, authors should explicitly state what definitions of sex and/or gender they are applying to enhance the precision, rigor and reproducibility of their research and to avoid ambiguity or conflation of terms and the constructs to which they refer (see Definitions section below). Authors can refer to the Sex and Gender Equity in Research (SAGER) guidelines and the SAGER guidelines checklist. These offer systematic approaches to the use and editorial review of sex and gender information in study design, data analysis, outcome reporting and research interpretation - however, please note there is no single, universally agreed-upon set of guidelines for defining sex and gender.

Definitions

Sex generally refers to a set of biological attributes that are associated with physical and physiological features (e.g., chromosomal genotype, hormonal levels, internal and external anatomy). A binary sex categorization (male/female) is usually designated at birth (""sex assigned at birth""), most often based solely on the visible external anatomy of a newborn. Gender generally refers to socially constructed roles, behaviors, and identities of women, men and gender-diverse people that occur in a historical and cultural context and may vary across societies and over time. Gender influences how people view themselves and each other, how they behave and interact and how power is distributed in society. Sex and gender are often incorrectly portrayed as binary (female/male or woman/man) and unchanging whereas these constructs actually exist along a spectrum and include additional sex categorizations and gender identities such as people who are intersex/have differences of sex development (DSD) or identify as non-binary. Moreover, the terms ""sex"" and ""gender"" can be ambiguous—thus it is important for authors to define the manner in which they are used. In addition to this definition guidance and the SAGER guidelines, the resources on this page offer further insight around sex and gender in research studies.

Author contributions

For transparency, we require corresponding authors to provide co-author contributions to the manuscript using the relevant CRediT roles. The CRediT taxonomy includes 14 different roles describing each contributor's specific contribution to the scholarly output. The roles are: Conceptualization; Data curation; Formal analysis; Funding acquisition; Investigation; Methodology; Project administration; Resources; Software; Supervision; Validation; Visualization; Roles/Writing - original draft; and Writing - review & editing. Note that not all roles may apply to every manuscript, and authors may have contributed through multiple roles. More details and an example.

Changes to authorship

Authors are expected to consider carefully the list and order of authors **before**submitting their manuscript and provide the definitive list of authors at the time of the original submission. Any addition, deletion or rearrangement of author names in the authorship list should be made only **before** the manuscript has been accepted and only if approved by the journal Editor. To request such a change, the Editor must receive the following from the **corresponding author**: (a) the reason for the change in author list and (b) written confirmation (e-mail, letter) from all authors that they agree with the addition, removal or rearrangement. In the case of addition or removal of authors, this includes confirmation from the author being added or removed.
Only in exceptional circumstances will the Editor consider the addition, deletion or rearrangement of authors **after** the manuscript has been accepted. While the Editor considers the request, publication of the manuscript will be suspended. If the manuscript has already been published in an online issue, any requests approved by the Editor will result in a corrigendum.

Article transfer service

This journal uses the Elsevier Article Transfer Service to find the best home for your manuscript. This means that if an editor feels your manuscript is more suitable for an alternative journal, you might be asked to consider transferring the manuscript to such a journal. The recommendation might be provided by a Journal Editor, a dedicated Scientific Managing Editor, a tool assisted recommendation, or a combination. If you agree, your manuscript will be transferred, though you will have the opportunity to make changes to the manuscript before the submission is complete. Please note that your manuscript will be independently reviewed by the new journal. More information.

Copyright

Upon acceptance of an article, authors will be asked to complete a 'Journal Publishing Agreement' (see more information on this). An e-mail will be sent to the corresponding author confirming receipt of the manuscript together with a 'Journal Publishing Agreement' form or a link to the online version of this agreement.

Subscribers may reproduce tables of contents or prepare lists of articles including abstracts for internal circulation within their institutions. Permission of the Publisher is required for resale or distribution outside the institution and for all other derivative works, including compilations and translations. If excerpts from other copyrighted works are included, the author(s) must obtain written permission from the copyright owners and credit the source(s) in the article. Elsevier has preprinted forms for use by authors in these cases.

For gold open access articles: Upon acceptance of an article, authors will be asked to complete a 'License Agreement' (more information). Permitted third party reuse of gold open access articles is determined by the author's choice of user license.

Author rights

As an author you (or your employer or institution) have certain rights to reuse your work. More information.

Elsevier supports responsible sharing

Find out how you can share your research published in Elsevier journals.

Role of the funding source

You are requested to identify who provided financial support for the conduct of the research and/or preparation of the article and to briefly describe the role of the sponsor(s), if any, in study design; in the collection, analysis and interpretation of data; in the writing of the report; and in the decision to submit the article for publication. If the funding source(s) had no such involvement, it is recommended to state this.

Open access

Please visit our Open Access page for more information about open access publishing in this journal.

Elsevier Researcher Academy

Researcher Academy is a free e-learning platform designed to support early and mid-career researchers throughout their research journey. The "Learn" environment at Researcher Academy offers several interactive modules, webinars, downloadable guides and resources to guide you through the process of writing for research and going through peer review. Feel free to use these free resources to improve your submission and navigate the publication process with ease.

Language (usage and editing services)

Please write your text in good English (American or British usage is accepted, but not a mixture of these). Authors who feel their English language manuscript may require editing to eliminate possible grammatical or spelling errors and to conform to correct scientific English may wish to use the Language Editing service available from Elsevier's Language Services.

Submission

Our online submission system guides you stepwise through the process of entering your article details and uploading your files. The system converts your article files to a single PDF file used in the peer-review process. Editable files (e.g., Word, LaTeX) are required to typeset your article for final publication. All correspondence, including notification of the Editor's decision and requests for revision, is sent by e-mail.

Submit your article

Please submit your article
via https://www.editorialmanager.com/psy/default.aspx.

Suggesting reviewers

Please submit the names and institutional e-mail addresses of several potential reviewers.

You should not suggest reviewers who are colleagues, or who have co-authored or collaborated with you during the last three years. Editors do not invite reviewers who have potential competing interests with the authors. Further, in order to provide a broad and balanced assessment of the work, and ensure scientific rigor, please suggest diverse candidate reviewers who are located in different countries/regions from the author group. Also consider other diversity attributes e.g. gender, race and ethnicity, career stage, etc. Finally, you should not include existing members of the journal's editorial team, of whom the journal are already aware.

Note: the editor decides whether or not to invite your suggested reviewers.

Please submit, with the manuscript, the names, addresses and e-mail addresses of five potential referees. Note that the editor retains the sole right to decide whether or not the suggested reviewers are used.

Editorial Policy

Submitted manuscripts will be reviewed anonymously by at least two referees. Should a revised manuscript be required by the editors, the authors are requested to resubmit their revised manuscript to the journal within 6 months time. Studies on humans submitted to the journal must comply with the principles laid down in the Declaration of Helsinki (Br Med J 1964; 2: 177-178). The editors retain the right to reject papers on the grounds that, in their opinion, the ethical justification is questionable. Manuscripts may be edited to improve clarity and expression.

Manuscripts that are not published and that are not resubmitted in revised form will be destroyed within 1 year of the date of submission.

Preparation

Queries

For questions about the editorial process (including the status of manuscripts under review) or for technical support on submissions, please visit our Support Center.

Peer review

This journal operates a single anonymized review process. All contributions will be initially assessed by the editor for suitability for the journal. Papers deemed suitable are then typically sent to a minimum of two independent expert reviewers to assess the scientific quality of the paper. The Editor is responsible for the final decision regarding acceptance or rejection of articles. The Editor's decision is final. Editors are not involved in decisions about papers which they have written themselves or have been written by family members or colleagues or which relate to products or services in which the editor has an interest. Any such submission is subject to all of the journal's usual procedures, with peer review handled independently of the relevant editor and their research groups. More information on types of peer review.

Use of word processing software

It is important that the file be saved in the native format of the word processor used. The text should be in single-column format. Keep the layout of the text as simple as possible. Most formatting codes will be removed and replaced on processing the article. In particular, do not use the word processor's options to justify text or to hyphenate words. However, do use bold face, italics, subscripts, superscripts etc. When preparing tables, if you are using a table grid, use only one grid for each individual table and not a grid for each row. If no grid is used, use tabs, not spaces, to align columns. The electronic text should be prepared in a way very similar to that of conventional manuscripts (see also the Guide to Publishing with Elsevier). Note that source files of figures, tables and text graphics will be required whether or not you embed your figures in the text. See also the section on Electronic artwork.

To avoid unnecessary errors you are strongly advised to use the 'spell-check' and 'grammar-check' functions of your word processor.

Article structure

Subdivision - numbered sections

Divide your article into clearly defined and numbered sections. Subsections should be numbered 1.1 (then 1.1.1, 1.1.2, ...), 1.2, etc. (the abstract is not included in section numbering). Use this numbering also for internal cross-referencing: do not just refer to 'the text'. Any subsection may be given a brief heading. Each heading should appear on its own separate line.

Essential title page information

- ***Title.*** Concise and informative. Titles are often used in information-retrieval systems. Avoid abbreviations and formulae where possible.
- ***Author names and affiliations.*** Please clearly indicate the given name(s) and family name(s) of each author and check that all names are accurately spelled. You can add your name between parentheses in your own script behind the English transliteration. Present the authors' affiliation addresses (where the actual work was done) below the names. Indicate all affiliations with a lower-case superscript letter immediately after the author's name and in front of the appropriate address. Provide the full postal address of each affiliation, including the country name and, if available, the e-mail address of each author.
- ***Corresponding author.*** Clearly indicate who will handle correspondence at all stages of refereeing and publication, also post-publication. This responsibility includes answering any future queries about Methodology and Materials. **Ensure that the e-mail address is given and that contact details**

are kept up to date by the corresponding author.

- ***Present/permanent address.*** If an author has moved since the work described in the article was done, or was visiting at the time, a 'Present address' (or 'Permanent address') may be indicated as a footnote to that author's name. The address at which the author actually did the work must be retained as the main, affiliation address. Superscript Arabic numerals are used for such footnotes.

Highlights

Highlights are mandatory for this journal as they help increase the discoverability of your article via search engines. They consist of a short collection of bullet points that capture the novel results of your research as well as new methods that were used during the study (if any). Please have a look at the example Highlights.

Highlights should be submitted in a separate editable file in the online submission system. Please use 'Highlights' in the file name and include 3 to 5 bullet points (maximum 85 characters, including spaces, per bullet point).

Abstract

A concise and factual abstract is required. The abstract should state briefly the purpose of the research, the principal results and major conclusions. An abstract is often presented separately from the article, so it must be able to stand alone. For this reason, References should be avoided, but if essential, then cite the author(s) and year(s). Also, non-standard or uncommon abbreviations should be avoided, but if essential they must be defined at their first mention in the abstract itself.

Graphical abstract

Although a graphical abstract is optional, its use is encouraged as it draws more attention to the online article. The graphical abstract should summarize the contents of the article in a concise, pictorial form designed to capture the attention of a wide readership. Graphical abstracts should be submitted as a separate file in the online submission system.

Image size: Please provide an image with a minimum of 531 × 1328 pixels (h × w) or proportionally more. The image should be readable at a size of 5 × 13 cm using a regular screen resolution of 96 dpi. Preferred file types: TIFF, EPS, PDF or MS Office files. You can view Example Graphical Abstracts on our information site.

Keywords

Immediately after the abstract, provide a maximum of 20 keywords, using American spelling and avoiding general and plural terms and multiple concepts (avoid, for example, 'and', 'of'). Do not repeat words found in the title of the manuscript. Be sparing with abbreviations: only abbreviations firmly established in the field may be eligible. These keywords will be used for indexing purposes.

Abbreviations

Define abbreviations that are not standard in this field in a footnote to be placed on the first page of the article. Such abbreviations that are unavoidable in the abstract must be defined at their first mention there, as well as in the footnote. Ensure consistency of abbreviations throughout the article.

In the abstract, define all abbreviations so that electronic searches for commonly used abbreviations or the full name can be successful. Avoid abbreviations unique to the current article so as to widen the circle of readers. We recognize that many abbreviations or acronyms may be more familiar to the reader than the full name. However abbreviations and acronyms used by relatively few other published reports or abbreviations with several alternatate meanings in data base searches should always be spelled out throughout the report.

Acknowledgements

Collate acknowledgements in a separate section at the end of the article before the references and do not, therefore, include them on the title page, as a footnote to the title or otherwise. List here those individuals who provided help during the research (e.g., providing language help, writing assistance or proof reading the article, etc.).

Formatting of funding sources

List funding sources in this standard way to facilitate compliance to funder's requirements:

Funding: This work was supported by the National Institutes of Health [grant numbers xxxx, yyyy]; the Bill & Melinda Gates Foundation, Seattle, WA [grant number zzzz]; and the United States Institutes of Peace [grant number aaaa].

It is not necessary to include detailed descriptions on the program or type of grants and awards. When funding is from a block grant or other resources available to a university, college, or other research institution, submit the name of the institute or organization that provided the funding.

If no funding has been provided for the research, it is recommended to include the following sentence:

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Footnotes

Footnotes should be used sparingly. Number them consecutively throughout the article. Many word processors can build footnotes into the text, and this feature may be used. Otherwise, please indicate the position of footnotes in the text and list the footnotes themselves separately at the end of the article. Do not include footnotes in the Reference list.

Artwork

Electronic artwork

General points

- Make sure you use uniform lettering and sizing of your original artwork.
- Embed the used fonts if the application provides that option.
- Aim to use the following fonts in your illustrations: Arial, Courier, Times New Roman, Symbol, or use fonts that look similar.
- Number the illustrations according to their sequence in the text.

- Use a logical naming convention for your artwork files.
- Provide captions to illustrations separately.
- Size the illustrations close to the desired dimensions of the published version.
- Submit each illustration as a separate file.
- Ensure that color images are accessible to all, including those with impaired color vision.

A detailed guide on electronic artwork is available.
You are urged to visit this site; some excerpts from the detailed information are given here.
Formats
If your electronic artwork is created in a Microsoft Office application (Word, PowerPoint, Excel) then please supply 'as is' in the native document format.
Regardless of the application used other than Microsoft Office, when your electronic artwork is finalized, please 'Save as' or convert the images to one of the following formats (note the resolution requirements for line drawings, halftones, and line/halftone combinations given below):
EPS (or PDF): Vector drawings, embed all used fonts.
TIFF (or JPEG): Color or grayscale photographs (halftones), keep to a minimum of 300 dpi.
TIFF (or JPEG): Bitmapped (pure black & white pixels) line drawings, keep to a minimum of 1000 dpi.
TIFF (or JPEG): Combinations bitmapped line/half-tone (color or grayscale), keep to a minimum of 500 dpi.
Please do not:

- Supply files that are optimized for screen use (e.g., GIF, BMP, PICT, WPG); these typically have a low number of pixels and limited set of colors;
- Supply files that are too low in resolution;
- Submit graphics that are disproportionately large for the content.

Color artwork
Please make sure that artwork files are in an acceptable format (TIFF (or JPEG), EPS (or PDF), or MS Office files) and with the correct resolution. If, together with your accepted article, you submit usable color figures then Elsevier will

ensure, at no additional charge, that these figures will appear in color online (e.g., ScienceDirect and other sites) regardless of whether or not these illustrations are reproduced in color in the printed version. **For color reproduction in print, you will receive information regarding the costs from Elsevier after receipt of your accepted article**. Please indicate your preference for color: in print or online only. Further information on the preparation of electronic artwork.

Tables

Please submit tables as editable text and not as images. Tables can be placed either next to the relevant text in the article, or on separate page(s) at the end. Number tables consecutively in accordance with their appearance in the text and place any table notes below the table body. Be sparing in the use of tables and ensure that the data presented in them do not duplicate results described elsewhere in the article. Please avoid using vertical rules and shading in table cells.

References

Reference links

Increased discoverability of research and high quality peer review are ensured by online links to the sources cited. In order to allow us to create links to abstracting and indexing services, such as Scopus, Crossref and PubMed, please ensure that data provided in the references are correct. Please note that incorrect surnames, journal/book titles, publication year and pagination may prevent link creation. When copying references, please be careful as they may already contain errors. Use of the DOI is highly encouraged.

A DOI is guaranteed never to change, so you can use it as a permanent link to any electronic article. An example of a citation using DOI for an article not yet in an issue is: VanDecar J.C., Russo R.M., James D.E., Ambeh W.B., Franke M. (2003). Aseismic continuation of the Lesser Antilles slab beneath northeastern Venezuela. Journal of Geophysical Research, https://doi.org/10.1029/2001JB000884. Please note the format of such citations should be in the same style as all other references in the paper.

Web references

As a minimum, the full URL should be given and the date when the reference was last accessed. Any further information, if known (DOI, author names, dates, reference to a source publication, etc.), should also be given. Web references can be listed separately (e.g., after the reference list) under a different heading if desired, or can be included in the reference list.

Data references

This journal encourages you to cite underlying or relevant datasets in your manuscript by citing them in your text and including a data reference in your Reference List. Data references should include the following elements: author name(s), dataset title, data repository, version (where available), year, and global persistent identifier. Add [dataset] immediately before the reference so we can properly identify it as a data reference. The [dataset] identifier will not appear in your published article.

Preprint references

Where a preprint has subsequently become available as a peer-reviewed publication, the formal publication should be used as the reference. If there are preprints that are central to your work or that cover crucial developments in the topic, but are not yet formally published, these may be referenced. Preprints should be clearly marked as such, for example by including the word preprint, or the name of the preprint server, as part of the reference. The preprint DOI should also be provided.

Reference management software

Most Elsevier journals have their reference template available in many of the most popular reference management software products. These include all products that support Citation Style Language styles, such as Mendeley. Using citation plug-ins from these products, authors only need to select the appropriate journal template when preparing their article, after which citations and bibliographies will be automatically formatted in the journal's style. If no template is yet available for this journal, please follow the format of the sample references and citations as shown in this Guide. If you use reference management software, please ensure that you remove all field codes before submitting the electronic manuscript. More information on how to remove field codes from different reference management software.

Reference style

Text: All citations in the text should refer to:

1. *Single author:* the author's name (without initials, unless there is ambiguity) and the year of publication;
2. *Two authors:* both authors' names and the year of publication;
3. *Three or more authors:* first author's name followed by 'et al.' and the year of publication.

Citations may be made directly (or parenthetically). Groups of references can be listed either first alphabetically, then chronologically, or vice versa.

Examples: 'as demonstrated (Allan, 2000a, 2000b, 1999; Allan and Jones, 1999)…. Or, as demonstrated (Jones, 1999; Allan, 2000)… Kramer et al. (2010) have recently shown …'

List: References should be arranged first alphabetically and then further sorted chronologically if necessary. More than one reference from the same author(s) in the same year must be identified by the letters 'a', 'b', 'c', etc., placed after the year of publication.

Examples:

Reference to a journal publication:

Van der Geer, J., Hanraads, J.A.J., Lupton, R.A., 2010. The art of writing a scientific article. J. Sci. Commun. 163, 51–59. https://doi.org/10.1016/j.Sc.2010.00372.

Reference to a journal publication with an article number:

Van der Geer, J., Hanraads, J.A.J., Lupton, R.A., 2018. The art of writing a scientific article. Heliyon. 19, e00205. https://doi.org/10.1016/j.heliyon.2018.e00205.

Reference to a book:

Strunk Jr., W., White, E.B., 2000. The Elements of Style, fourth ed. Longman, New York.

Reference to a chapter in an edited book:

Mettam, G.R., Adams, L.B., 2009. How to prepare an electronic version of your article, in: Jones, B.S., Smith , R.Z. (Eds.), Introduction to the Electronic Age. E-Publishing Inc., New York, pp. 281–304.

Reference to a website:

Cancer Research UK, 1975. Cancer statistics reports for the UK. http://www.cancerresearchuk.org/aboutcancer/statistics/cancerstatsreport/ (accessed 13 March 2003).

Reference to a dataset:

[dataset] Oguro, M., Imahiro, S., Saito, S., Nakashizuka, T., 2015. Mortality data for Japanese oak wilt disease and surrounding forest compositions. Mendeley Data, v1. https://doi.org/10.17632/xwj98nb39r.1.

Reference to software:

Coon, E., Berndt, M., Jan, A., Svyatsky, D., Atchley, A., Kikinzon, E., Harp, D., Manzini, G., Shelef, E., Lipnikov, K., Garimella, R., Xu, C., Moulton, D., Karra, S., Painter, S., Jafarov, E., & Molins, S., 2020. Advanced Terrestrial Simulator (ATS) v0.88 (Version 0.88). Zenodo. https://doi.org/10.5281/zenodo.3727209.

Video

Elsevier accepts video material and animation sequences to support and enhance your scientific research. Authors who have video or animation files that they wish to submit with their article are strongly encouraged to include links to these within the body of the article. This can be done in the same way as a figure or table by referring to the video or animation content and noting in the body text where it should be placed. All submitted files should be properly labeled so that they directly relate to the video file's content. In order to ensure that your video or animation material is directly usable, please provide the file in one of our recommended file formats with a preferred maximum size of 150 MB per file, 1 GB in total. Video and animation files supplied will be published online in the electronic version of your article in Elsevier Web products, including ScienceDirect. Please supply 'stills' with your files: you can choose any frame from the video or animation or make a separate image. These will be used instead of standard icons and will personalize the link to your video data. For more detailed instructions please visit our video instruction pages. Note: since video and animation cannot be embedded in the print version of the journal, please provide text for both the electronic and the print version for the portions of the article that refer to this content.

Data visualization

Include interactive data visualizations in your publication and let your readers interact and engage more closely with your research. Follow the instructions here to find out about available data visualization options and how to include them with your article.

Supplementary material

Supplementary material such as applications, images and sound clips, can be published with your article to enhance it. Submitted supplementary items are published exactly as they are received (Excel or PowerPoint files will appear as such online). Please submit your material together with the article and supply a concise, descriptive caption for each supplementary file. If you wish to make changes to supplementary material during any stage of the process, please make sure to provide an updated file. Do not annotate any corrections on a previous version. Please switch off the 'Track Changes' option in Microsoft Office files as these will appear in the published version.

Research data

This journal encourages and enables you to share data that supports your research publication where appropriate, and enables you to interlink the data with your published articles. Research data refers to the results of observations or experimentation that validate research findings, which may also include software, code, models, algorithms, protocols, methods and other useful materials related to the project.

Below are a number of ways in which you can associate data with your article or make a statement about the availability of your data when submitting your manuscript. If you are sharing data in one of these ways, you are encouraged to cite the data in your manuscript and reference list. Please refer to the "References" section for more information about data citation. For more information on depositing, sharing and using research data and other relevant research materials, visit the research data page.

Data linking

If you have made your research data available in a data repository, you can link your article directly to the dataset. Elsevier collaborates with a number of repositories to link articles on ScienceDirect with relevant repositories, giving readers access to underlying data that gives them a better understanding of the research described.

There are different ways to link your datasets to your article. When available, you can directly link your dataset to your article by providing the relevant information in the submission system. For more information, visit the database linking page.

For supported data repositories a repository banner will automatically appear next to your published article on ScienceDirect.

In addition, you can link to relevant data or entities through identifiers within the text of your manuscript, using the following format: Database: xxxx (e.g., TAIR: AT1G01020; CCDC: 734053; PDB: 1XFN).

Research Elements

This journal enables you to publish research objects related to your original research – such as data, methods, protocols, software and hardware – as an additional paper in a Research Elements journal.

Research Elements is a suite of peer-reviewed, open access journals which make your research objects findable, accessible and reusable. Articles place research objects into context by providing detailed descriptions of objects and their application, and linking to the associated original research articles. Research Elements articles can be prepared by you, or by one of your collaborators.

During submission, you will be alerted to the opportunity to prepare and submit a manuscript to one of the Research Elements journals.

More information can be found on the Research Elements page.

Data statement
To foster transparency, we encourage you to state the availability of your data in your submission. This may be a requirement of your funding body or institution. If your data is unavailable to access or unsuitable to post, you will have the opportunity to indicate why during the submission process, for example by stating that the research data is confidential. The statement will appear with your published article on ScienceDirect. For more information, visit the Data Statement page.

After acceptance

Online proof correction

To ensure a fast publication process of the article, we kindly ask authors to provide us with their proof corrections within two days. Corresponding authors will receive an e-mail with a link to our online proofing system, allowing annotation and correction of proofs online. The environment is similar to MS Word: in addition to editing text, you can also comment on figures/tables and answer questions from the Copy Editor. Web-based proofing provides a faster and less error-prone process by allowing you to directly type your corrections, eliminating the potential introduction of errors.
If preferred, you can still choose to annotate and upload your edits on the PDF version. All instructions for proofing will be given in the e-mail we send to authors, including alternative methods to the online version and PDF.
We will do everything possible to get your article published quickly and accurately. Please use this proof only for checking the typesetting, editing, completeness and correctness of the text, tables and figures. Significant changes to the article as accepted for publication will only be

considered at this stage with permission from the Editor. It is important to ensure that all corrections are sent back to us in one communication. Please check carefully before replying, as inclusion of any subsequent corrections cannot be guaranteed. Proofreading is solely your responsibility.

Offprints

The corresponding author will, at no cost, receive a customized Share Link providing 50 days free access to the final published version of the article on ScienceDirect. The Share Link can be used for sharing the article via any communication channel, including email and social media. For an extra charge, paper offprints can be ordered via the offprint order form which is sent once the article is accepted for publication. Corresponding authors who have published their article gold open access do not receive a Share Link as their final published version of the article is available open access on ScienceDirect and can be shared through the article DOI link.

Author inquiries

Visit the Elsevier Support Center to find the answers you need. Here you will find everything from Frequently Asked Questions to ways to get in touch.
You can also check the status of your submitted article or find out when your accepted article will be published