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**Language, belonging and psychosis:
a mixed methods study testing the presence of a linguistic
group density association in Wales and its possible
mechanisms**



PRIFYSGOL
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Thesis submitted in partial fulfilment of the requirements for the degree of
Doctor of Philosophy

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Declaration

‘Yr wyf drwy hyn yn datgan mai canlyniad fy ymchwil fy hun yw’r thesis hwn, ac eithrio lle nodir yn wahanol. Caiff ffynonellau eraill eu cydnabod gan droednodiadau yn rhoi cyfeiriadau eglur. Nid yw sylwedd y gwaith hwn wedi cael ei dderbyn o’r blaen ar gyfer unrhyw radd, ac nid yw’n cael ei gyflwyno ar yr un pryd mewn ymgeisiaeth am unrhyw radd oni bai ei fod, fel y cytunwyd gan y Brifysgol, am gymwysterau deuol cymeradwy.’

Rwy’n cadarnhau fy mod yn cyflwyno’r gwaith gyda chytundeb fy Ngrichwyliwr (Goruchwylwyr)’

‘I hereby declare that this thesis is the results of my own investigations, except where otherwise stated. All other sources are acknowledged by bibliographic references. This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree unless, as agreed by the University, for approved dual awards.’

I confirm that I am submitting the work with the agreement of my Supervisor(s)

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This thesis is a collaborative effort, and I am grateful to each person who played a part in its completion. First, I express my deepest gratitude to my supervisors, Dr. Chris Saville and Dr. Mike Jackson, for their exceptional support, patience and the wealth of knowledge generously shared throughout both my master's and PhD journeys. Their guidance has been invaluable, and I could not have asked for better mentors to navigate me through this process.

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In dedication, I remember three extraordinary people who, unfortunately, did not witness the culmination of this PhD journey. Their influence and steadfast support throughout my life and in the pursuit of my aspirations cannot be overstated. This thesis is dedicated to the memory of my Grandma, Grandad John and Auntie Jen – Joan Mary Crathorne, John Roger Crathorne, and Jennifer Ryan. Their strength, tenacity, and humour continue to inspire me, especially in the face of challenges.

Thesis Abstract

Background. Minority group status is a well-established social risk factor for mental illness. However, the extent of this risk appears to be somewhat dependent on the immediate area in which the minority group individual lives. Over the past two decades, studies have revealed a robust “ethnic” or “group” density association, whereby some minority group individuals face a higher risk of mental illness when residing in areas with fewer members of their own group. Notably, this association appears more pronounced for psychosis compared to common mental health problems, suggesting specific relevance to understanding pathways to psychosis.

Objectives. Examining whether group density associations extend to other socially salient identities could provide clues about likely mechanisms. However, to date, most studies have exclusively examined group density associations in racially minoritised and migrant groups. This thesis sought to address this key gap in the literature by testing whether group density associations for mental illness extend to linguistic groups in Wales. Employing a mixed-methods approach, this thesis aimed to examine the presence of a linguistic group density association and explore potential mechanisms.

Summary of findings. For Chapter 2, a systematic review and multilevel meta-analysis of the ethnic density effect in psychosis was conducted. This review found that a ten-percentage-point decrease in own group density was associated with a 20% increase in psychosis. Further, this review provided the first meta-analytic evidence that lower own group density does not confer the same risk across minority groups, with the strongest associations observed in Black individuals. Identified gaps in the evidence-base included a lack of studies exploring associations for other socially salient identity characteristics, a predominantly urban focus in existing studies, and limited non-epidemiological exploration of group density phenomena.

Chapter 3 qualitatively explored the subjective experience of group density from the perspective of individuals with experience of psychosis to gain insights into possible mechanisms. Four themes were derived from the reflexive thematic analysis of the interview transcripts (Theme 1. Exposure to social adversity, Theme 2. Place as a reservoir of risk or resilience, Theme 3. Outsider status, Theme 4. Protective

strategies). Negative social comparisons and perceptions of “outsider status” appeared more common in non-Welsh speakers living in high density Welsh speaking communities. In contrast, Welsh speakers more often viewed living in a Welsh-speaking area as protective and identity-affirming. Participants in both groups employed strategies to protect themselves from the adverse psychological effects of not belonging. These strategies encompassed efforts to establish a stable social identity, the adoption of safety behaviours, and staying socially connected.

Finally, Chapter 4 built on these findings by using mixed-effects models to test the presence of a linguistic group density association in Wales. This study found that Welsh speakers and non-Welsh speakers living in low own linguistic group density areas were more likely to report feeling like an outsider where they live. Notably, a robust linguistic group density interaction for mental illness was found in both non-Welsh and Welsh speakers. However, it remains unclear whether this finding extends to psychosis. In the absence of a validated measure of psychosis, endorsement of a conspiracy theory about Covid-19 was used as an analogue, but no evidence of a linguistic group density interaction with this analogue variable was found. Further, outsider status did not attenuate group density associations for either mental health variable.

Conclusions

This thesis presents a novel application of group density methods to linguistic groups, providing evidence that group density associations in mental illness, conventionally observed in racially minoritised groups, may also extend to other socially salient identities, including linguistic groupings. Negative social comparison and outsider status are suggested as key psychosocial processes behind these findings. Future studies should replicate and build upon these findings by verifying the presence of a linguistic group density association, employing a validated measure of psychosis. Further work should draw from mixed methods to elucidate mechanisms in addition to longitudinal approaches, which are capable of establishing causation.

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Chapter 1: General introduction

"We are driven by five genetic needs: survival, love and belonging, power, freedom, and fun." - William Glasser.

1.1 THE SOCIAL DETERMINANTS OF MENTAL ILLNESS

Professor Sir Michael Marmot has said, "What good does it do to treat people and send them back to the conditions that made them sick? We need to address the conditions that make people sick." (Marmot, 2017). Taking measures to better understand the social risk factors associated with poorer mental health is of vital importance. Severe mental illness¹ [SMI] in particular, is linked to a myriad of other adversities – people with SMI have a lower quality of life, they are also more likely to be unemployed, have poorer physical health, and are estimated to have a life expectancy that is 13-15 years less than that of the general population (Hjorthøj, Stürup, McGrath, & Nordentoft, 2017, Nevarez-Flores *et al.*, 2018; Samele, (2004). As well as the human cost, mental illness also carries a huge economic burden – in the UK, mental ill health has been estimated to cost £117.9 billion per year which is roughly equal to 5% of the UK's Gross Domestic Product (McDaid *et al.*, 2022).

Mental illness is not evenly distributed throughout the population – a social gradient has been observed whereby individuals who are more disadvantaged are at an elevated risk of mental ill health than those who are more socially advantaged (Solar & Irwin, 2010). Social determinants of mental illness include adverse childhood experiences, low educational attainment, unemployment, limited job opportunities, poverty, living in a deprived neighbourhood, restricted access to health services, exclusion, and discrimination (Jeste & Pender, 2022). Structural determinants are the factors that drive inequities in mental health because they shape the social determinants – these include the social and economic policies that affect the opportunities and resources needed for a person to improve their circumstances (Hastings, Guyer, & Para, 2022).

¹ Severe Mental Illness [SMI] is used to describe mental health difficulties that can cause severe impairment to daily functioning. This term is usually used to refer to mental health diagnoses such as schizophrenia and bipolar disorder.

The idea that our position in the social hierarchy is closely connected to our health has deep historical roots. In the early 20th century, Dr. Parran, who served as the 6th Surgeon General of the United States between 1936-1948, played an instrumental role in demonstrating the link between social class and health status (Parran, 1939).

In recent times, the pioneering Marmot reviews demonstrated marked disparities between the most advantaged and disadvantaged people in the UK on a range of mental and physical health outcomes (Marmot, 2010, 2020). Based on most recent analyses, these inequities unfortunately only appear to be getting worse (Marmot, 2020). These findings are well-replicated – studies have found that children who grow up below the poverty line experience poorer mental health in adulthood (Evans & Cassells, 2013) in addition to other negative social outcomes such as lower academic achievement (Nikulina, Widom, & Czaja, 2011). Associations have also been observed between inadequate living income and later risk of mental disorders and suicide attempts (Sareen et al., 2011). Further, the risk of suicide in the most socially disadvantaged men in the UK is estimated to be up to ten times higher than the most advantaged (Bambra *et al.*, 2017).

The seminal work of Pickett and Wilkinson (2010) has also highlighted the “pernicious effects that inequality has on societies”, in terms of “eroding trust, increasing anxiety and illness, and encouraging excessive consumption.” The authors measured income inequality² in countries across the world and found that country-level income inequality was related to a range of health and social issues, including mental illness, trust in others, mortality rates and crime. They found that more unequal countries (*e.g.*, UK, USA, Australia, Portugal, and Singapore) had poorer outcomes than countries with lower income inequality (*e.g.*, Denmark, Sweden, Norway, Finland, and Japan).

Reflecting on these findings, Pickett and Wilkinson (2010) and Marmot (2004) suggested that poorer health and social outcomes observed in those lower in the social hierarchy are driven by perceptions of lower status and feeling a lack of power over one’s life circumstances and ability to participate fully in society (Marmot, 2004). Marmot has referred to this as “status syndrome”. It has also been suggested that the

² The difference in income between the richest and poorest quintile in each country.

negative impact of status syndrome can be attenuated when individuals are socially connected, with access to good social support networks, for example (Marmot, 2004).

1.2 PSYCHOSIS AND THE SOCIAL CONTEXT

It appears that status syndrome poses a particularly strong risk for psychosis. Marmot (2010) reported that the social gradient is especially steep for SMI – for common mental health problems such as anxiety and depression the prevalence was twice as high in the lowest quintile of household income compared to the highest, but psychotic disorders were nine times more prevalent in the lowest quintile relative to the highest. Further, Gutman *et al.*, (2015) found that the risk of developing serious mental health problems by age eleven was four times higher in the poorest fifth of family households compared to the most affluent.

This section will first describe what is meant by “psychosis”, then move on to describe the processes behind common experiences of psychosis, and finally, discuss the evidence linking social adversity to psychosis.

1.2.1 What is psychosis?

The term psychosis is used to describe distortions in perception and thoughts about the self and the external world that make it difficult for the individual to discern what is and is not real. These experiences are distinct from what a person might perceive as part of their usual cultural or subcultural beliefs (World Health Organisation [WHO], ICD-11, 2022). Experiences of psychosis include hallucinations, delusions, and disorganised thoughts. Individuals experiencing hallucinations perceive stimuli that are not experienced by other people – this can occur in one or more sensory modality but most commonly involve auditory hallucinations *e.g.*, hearing one or multiple voices in the absence of external stimuli (Waters *et al.*, 2012; WHO, ICD-11, 2022). Hallucinations can also be visual *i.e.*, seeing things that have little to no basis in reality – this might include abnormal experiences of colours, objects, or space (Sass *et al.*, 2017; WHO, ICD-11, 2022). This may also encompass perceptions of humans, animals or other life forms that are not real. Less common experiences include hallucinations that involve tactile, olfactory, or gustatory senses (Lewandowski *et al.*, 2009; WHO, ICD-11, 2022). Delusions are strong and unfounded beliefs that are typically irrational and persist even after evidence to the contrary is presented (Garety *et al.*, 2005). Individuals often experience more than one type of delusions, but

delusions of persecution are thought to be the most common (Freeman *et al.*, 2002). Individuals who experience this have persistent and distressing beliefs that others are conspiring to harm them. Persecutory delusions are at the extreme end of the paranoia continuum – individuals who experience paranoia are excessively fearful and mistrustful of others, while those who have delusions of persecution hold more fixed beliefs that they are being targeted that are resistant to evidence refuting their claims (Freeman & Garety, 2014). Other types include delusions of reference – those who experience this believe that random occurrences or coincidences have special relevance to them, *e.g.*, messages are being transmitted to them via the television. People who experience grandiose delusions believe that they have “*special powers, wealth, mission, or identity*” (Isham *et al.*, 2022, p.792) *e.g.*, an individual believing they are a powerful political or religious figure. There are also several delusions relating to individuals’ beliefs about the integrity of their sense of self or coherence of their self-concept. Delusions of thought control involve the belief that one’s thoughts are being controlled by external forces, delusions of thought insertion entail the belief that one’s thoughts do not belong to oneself, delusions of thought withdrawal involve the belief that one’s thoughts have been taken from them, and finally, delusions of thought broadcast encompass the belief that one’s thoughts are being projected and can be perceived by others. Persons with psychosis might also experience disorganised thinking which might include racing and unusual thoughts that commonly manifest in incoherent spoken or written language which has been described as “word salad” (Shimizu *et al.*, 2021; WHO, ICD-11, 2022).

Individuals with psychosis might also experience a decline in their usual affective, social and cognitive functioning, this may include emotional blunting whereby the individual has difficulty responding to expressing emotions *e.g.*, they might have slow or slurred speech and find it hard to show their emotion through their facial expression or tone of voice (Kilian *et al.*, 2015; WHO, ICD-11, 2022). Other experiences include anhedonia, *i.e.*, losing the motivation or ability to experience pleasure. Persons with psychosis also commonly experience social withdrawal – a loss of interest and drive to engage in social interaction. Finally, cognitive changes are often also present in psychosis, *e.g.*, difficulties relating to attention, concentration, and memory (Kay & Fiszbein, 1987).

Not everybody who has these experiences has a need for care – there are several factors that distinguish individuals who experience psychosis who require care from

those who do not. These include whether their experiences are negative or cause distress, the duration and frequency of their experiences, the control the person has over their experiences, and whether their experiences disrupt the individual's daily functioning (Johns *et al.*, 2014). Individuals who have experiences of psychosis might receive a diagnosis of a psychotic disorder. Psychotic disorders encompass a wide range of clinical diagnoses demarcated into “affective” and “non-affective” psychotic disorders based on whether the psychosis is accompanied with significant disturbances in mood. “Bipolar 1” and “Bipolar 2” are examples of affective disorders – the former includes experiences of mania which might involve feelings of euphoria, hallucinations or delusions, and a lack of sleep. This may alternate with episodes of depression. The latter involves experiences of hypomania, which are less intense experiences of mania but individuals with “Bipolar 2” will always experience severe depressive episodes. Non-affective disorders encompass diagnoses such as “schizophrenia” and “delusional disorder” which primarily involve persistent delusions, hallucinations, or disorganised thinking. Other diagnoses such as “schizoaffective disorder” have features of both affective and non-affective disorders. See ICD-11³ criteria for more detail on diagnostic criteria for psychotic disorders (WHO, ICD-11, 2022).

It has been estimated that around 50-75% of people with a diagnosis of bipolar disorder experience psychosis (Baethge *et al.*, 2005). There is some evidence that certain experiences of psychosis are more typical of particular diagnoses – for example, grandiose delusions are more frequent in bipolar disorders than in individuals with schizophrenia and persecutory delusions are more commonly observed in schizophrenia and delusional disorder than in bipolar disorders (Picardi *et al.*, 2018)

That said, psychosis encompasses heterogeneous experiences and whether diagnostic criteria (DSM-5 and ICD-11) can reliably separate psychotic disorders like schizophrenia and bipolar disorder into discrete clinical diagnoses has been the subject of intensive debate.⁴ Not only are there concerns about the reliability and validity of these phenomena as clinical constructs but diagnoses such as “schizophrenia” are

³ [ICD-11 diagnostic criteria \(Version: 01/2023\)](#)

⁴ For a detailed exploration of this debate, see Read & Dillon (2013) Models of madness, Chapter 5 “Does ‘schizophrenia’ exist” and Bentall (2003) Madness explained, Part 1: The origins of our misunderstandings about madness.

perceived by some patients and family members as harmful and stigmatising (Howe *et al.*, 2014; Lasalvia *et al.*, 2015).

1.2.2 Processes underpinning experience of psychosis

Persecutory delusions

Delusions of persecution are an archetypal experience of psychosis – in individuals who experience a first episode of psychosis, delusions of persecution are present in 70% of cases (Freeman & Garety, 2014). Theoretical models have suggested that persecutory delusions are triggered by a stressful event which is commonly aggravated by increased anxiety, depression, and sleep deprivation (Freeman *et al.*, 2002). In psychosis prone individuals, it has been suggested that stress precipitates “*inner-outer confusion*” (Fowler, 2000) which in turn causes internal anomalous experiences – altered states of consciousness which are often unusual and difficult to explain (Rabeyron & Loose, 2015). What follows is a search for the meaning of this anomalous experience – whereby the individual draws upon recent events and their beliefs about themselves, other people, and the external world (Freeman *et al.*, 2002). These beliefs will determine whether or not a persecutory delusion is formed and will shape the content of the delusion. Freeman *et al.*, (2002) has theorised that this process is more likely to manifest as a persecutory delusion if the individual considers themselves to be vulnerable and others as a threat – beliefs that often follow experiences of adversity or trauma (Howes & Murray, 2014). Delusions of persecution might also form if the individual thinks they deserve to be harmed based on their past actions (Trower & Chadwick, 1995).

Another factor that shapes the meaning that the individual ascribes to their experiences is the presence of cognitive biases – which are defined as information processing errors (Peters *et al.*, 2014). The “jumping to conclusions” cognitive bias has been found to be a key process involved in psychotic experiences (Garety, Hemsley & Wessely, 1991). Jumping to conclusion bias arises when individuals make decisions on the basis of inadequate evidence – this bias has been found to be more common in individuals with psychosis (Freeman, 2007). There is also evidence that state anxiety makes jumping to conclusions biases more likely – Lincoln (2009, p.1141) argues that anxiety makes it less likely for an individual to process events adequately, instead *opting for “quick and dirty” explanations* for their experiences, which are frequently not grounded in objective evidence. Another relevant cognitive

bias to formation of persecutory delusions is the “theory of mind” bias – this relates to errors in judging the intentions of others, again this kind of bias is more common in individuals with psychosis (Bora & Pantelis, 2013) and increases the risk of the individual misinterpreting the actions or behaviours of others as threatening.

Finally, Freeman *et al.*, (2002) has argued that the causal explanation that the belief that the individual forms in response to their experience will be shaped by three other factors. The first relates to the person’s perception of mental illness – some might choose to attribute their experiences to an external force because they might feel this is less distressing than the alternative which is that they are experiencing the persecutory belief because they are mentally ill. This process protects the individual’s self-esteem and has been described as a defensive attribution. The second factor is related to social support – the absence of social interaction means that it is likely that the unusual beliefs will remain unchallenged and untested and therefore more likely to be maintained. Finally, if the individual has a limited capacity for considering other explanations relating to poor belief flexibility or anxiety about ambiguity, they might be more inclined to resort to their initial persecutory belief.

To summarise, persecutory delusions are thought to arise via a stressful triggering event which is often exacerbated by anxiety, depression, and sleep deprivation. Individuals then experience anomalous experiences which precipitate a search for meaning. Their causal explanation is influenced by various emotional and cognitive factors, including their beliefs about themselves and others, as well as the presence of cognitive biases that may heighten susceptibility to misinterpreting the actions of others as a threat. Finally, the formation of a persecutory delusion is mediated by other factors, including the individual’s beliefs about mental illness, social support, and belief flexibility. Freeman and colleagues’ (2002) influential cognitive model of persecutory delusions is shown in Figure 1.

Hallucinations

Hallucinations are another typical experience of psychosis – auditory hallucinations thought to be more common, experienced by 60-80% of individuals with psychosis, compared to visual hallucinations which are estimated to affect around 33% of first-episode psychosis cases (Allen *et al.*, 2023). Similar to the formation of persecutory delusions, hallucinations are precipitated by a stressful experience (Bentall, Baker, & Havers, 1991) and are suggested to arise from an internal or external trigger that the

individual then attempts to make sense of. The general agreement across cognitive models is that hallucinations manifest when the internal cognitive processes are misattributed as coming from an external source (Bentall, 1990).

Difficulties with self- and source-monitoring are thought to be key mechanisms behind experiences of hallucinations (Cho & Wu, 2013). Self-monitoring relates to the individual's ability to recognise that their inner speech or thoughts are self-generated (Brookwell, Bentall, & Varese, 2013). This experience is more common in individuals with psychosis than in healthy controls and is more marked in individuals who experience hallucinations (Waters *et al.*, 2012). However, for this experience to manifest as a hallucination, errors in source-monitoring must also be present (Brookwell, Bentall, & Varese, 2013). Bentall (1990) suggested that in addition to errors in recognising self-generated thoughts, individuals more susceptible to hallucinations are more likely to have an externalising cognitive bias, meaning they are more prone to attributing internal cognitive processes to an external force. There is substantial evidence indicating that source monitoring errors are more prevalent in individuals with psychosis than in healthy controls. Moreover, these errors are more pronounced in persons with psychosis who experience hallucinations compared to those who do not (Damiani *et al.*, 2022).

Like cognitive models of paranoia, Morrison (2001) suggested that hallucinations are maintained due to the misinterpretation of potentially benign voices as threatening. For instance, hearing voices might be interpreted as a symptom of mental illness or as an imminent threat, such as the belief that not obeying the voices will result in harm. The negative psychological impact of these misinterpretations then perpetuates a vicious cycle of further hallucinations and distress.

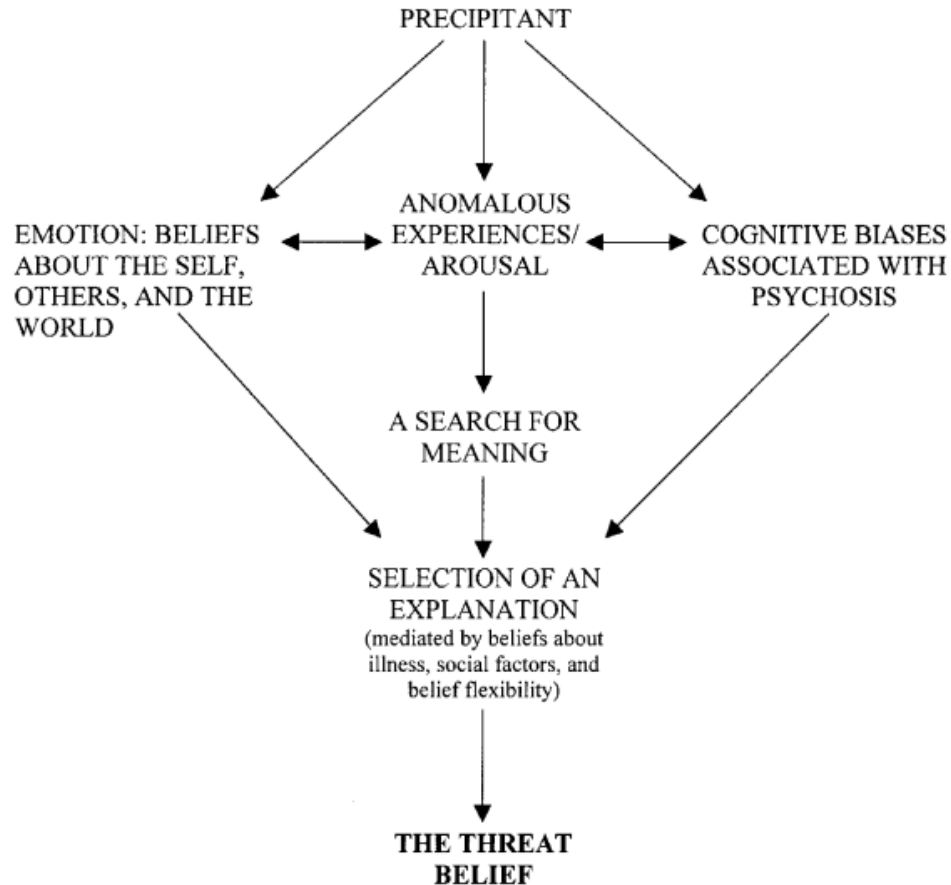


Figure 1. Cognitive model showing the processes behind the development of persecutory delusions – taken from Freeman et al., (2002).

1.2.3 The psychosis continuum

The global prevalence of psychotic disorders is estimated to be around 1-3% (Mwesiga *et al.*, 2020). However, subclinical experiences of psychosis are much more common with an estimated rate of around 7%. Psychosis has been found to exist on a continuum ranging from “normal” functioning to a clinical psychotic disorder (van Os *et al.*, 2009).

There is strong evidence that exposure to stressful life events precede the onset of psychosis (Longden & Read, 2016). The stress-vulnerability model of schizophrenia (Zubin & Spring, 1977) has been proposed as an explanation for why some individuals then go on to develop a psychotic disorder while others do not. This model suggests that people vary in terms of their vulnerability to stress, and clinical psychotic symptoms manifest when “a threshold of stressors exceeds the individual's vulnerability level.” (Myin-Germeys & van Os, 2007, p.410).

Evidence suggests that individuals with psychosis (and persons who are susceptible to developing psychosis) have a heightened sensitivity to social stress (Reininghaus *et al.*, 2016). In support of this idea, Myin-Germeys and colleagues employed experience sampling to investigate reactivity to everyday stress in two groups vulnerable to psychosis – participants with remitted psychotic symptoms and their relatives – alongside a healthy control group. The two vulnerable groups exhibited heightened sensitivity to stress in relation to the control group (Myin-Germeys *et al.*, 2001, Myin-Germeys & van Os, 2007). In summary, while social stress can be detrimental for everyone, it is thought to have particularly strong mental health consequences for individuals who are vulnerable to psychosis..

1.2.4 Mechanisms linking social stress and psychotic experiences

van Os, Kenis, and Rutten (2010, p.203) have described psychoses as “disorders of adaptation to the social context.” In their review, the authors highlighted the significant role that environmental factors have in the aetiology of psychosis. They concluded, “The human brain has evolved as a highly context-sensitive system, enabling behavioural flexibility in the face of constantly changing environmental challenges. There is evidence that genetic liability for psychotic syndrome is mediated in part by differential sensitivity to environments of victimization, experience of social exclusion and substances affecting brain functioning, having an impact during development.” (p.210).

Zubin and Spring (1977) argued that an individual’s sensitivity to stress can be acquired. Exposure to psychosocial stress, such as social adversity and trauma, changes the way an individual navigates their social world with recurrent experiences of stressors resulting in increasingly sensitised responses (Longden & Read, 2016; van Winkel, Stefanis & Myin-Germeys, 2008). Neurological and structural changes in the brain that have been found to drive this increased sensitivity include the hypothalamic-pituitary-adrenal axis and the dopamine system, with the latter suggested to be the “final pathway” to psychosis (Bentall *et al.*, 2014, p.1012).

Adversity also changes the way individuals attach meaning to their experiences – Howes & Murray (2014) suggest that adversity “biases the cognitive schema that the individual uses to interpret experiences towards paranoid interpretations.” (p.1677). Common cognitive schemas include viewing the self as weak or worthless and others as dangerous or having malevolent intentions (Humphrey *et al.*, 2021). The

socioenvironmental-cognitive model of psychosis ties these biological and cognitive processes together arguing that life stressors alter both the dopamine system and the propensity to develop negative cognitive schemas leading to experiences being interpreted as excessively threatening. This in turn results in greater stress and dysfunction of dopamine activity. This has been described as a “vicious cycle” which cumulates into psychotic beliefs becoming “hardwired” (Howes & Murray, 2014, p.1682). This process is illustrated in Figure 2.

In the case of hallucinatory experiences, it is thought that alterations in the dopaminergic system are also implicated in cognitive biases which can in turn result in source monitoring errors, for example, misattributing an internal voice as occurring externally (Howes & Murray, 2014). Another theory that links social adversity, particularly social isolation, to hallucinations is the social deafferentation hypothesis. This theory draws parallels with sensory deafferentation, such as phantom limb experiences, and argues that the “social brain” adjusts to compensate for the loss of social input by generating hallucinations (Hoffman, 2007, 2008).

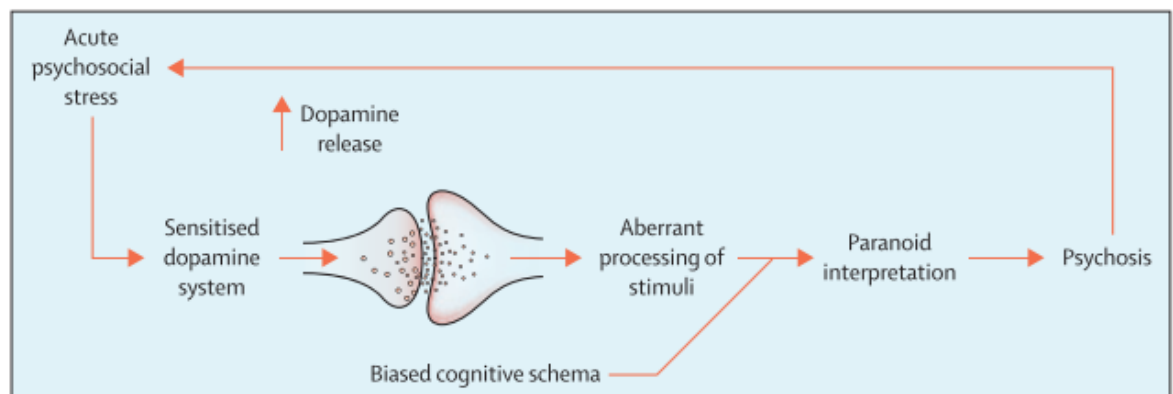


Figure 2. A model showing the biopsychosocial mechanisms linking social stress to experience of psychosis – taken from Howes & Murray (2014).

1.3 MINORITY GROUP STATUS AND MENTAL ILLNESS

One well-established social risk factor for psychosis is minority group status (van Os, Kenis & Rutten, 2010). This section will first conceptualise what is meant by minority group position and then go on to review the evidence for minority group position as a risk factor for mental illness and psychosis specifically.

1.3.1 Defining minority groups

The term minority can be defined in different ways. It can be understood numerically, in terms of the proportion of the population that a certain socially defined group comprises. For example, the United Nation's [UN] definition is: "An ethnic, religious or linguistic minority is any group of persons which constitutes less than half of the population in the entire territory of a State whose members share common characteristics of culture, religion or language, or a combination of any of these" (UN, 2023).

However, anthropological and sociological approaches argue that a key defining characteristic is a power imbalance between the minority and the majority group in a given society. Wirth (1945) conceptualised minority groups as being different to others based on a physical or cultural characteristic and who are subject to discrimination or unfair treatment because of this difference. Wirth (1945) said that minority group membership can be ascribed by the self or others, a person might position themselves within the group to garner a sense of belonging or solidarity with others who are similar. Additionally, minority status is ascribed by others who categorise an individual within a certain group based on a salient characteristic.

Similarly, Feagin (1984, p.10) suggests that minority groups are characterised by the following: "(1) suffering discrimination and subordination, (2) physical and/or cultural traits that set them apart, and which are disapproved by the dominant group, (3) a shared sense of collective identity and common burdens, (4) socially shared rules about who belongs and who does not determine minority status, and (5) tendency to marry within the group."

In the early psychological literature, Allport (1954) described the distinction between "mere actuarial minorities" and "psychological minorities" – the former was used to describe groups that comprise a numerical minority but are not subject to negative treatment on the basis of their minority characteristic, whereas the latter was

used to describe minorities who are discriminated against or used as scapegoats due to their minority group membership (Allport, 1954).

More recently, the term “minoritised” has been used more frequently to refer to minority groups. This term was first proposed by Jasmin Gunaratnam in 2003 as a more suitable way to refer to racial and ethnic minority groups. It is suggested that this term better captures the power imbalance between the minority and majority group as an active process. Racially minoritised people do not just exist as numerical minorities – the concepts of race and ethnicity⁵ have been socially constructed and actively used as a basis of maintaining an unequal balance of power that is beneficial to the White majority group (Gunaratnam, 2003; Milner & Jumbe, 2020; Selvarajah *et al.*, 2020).

Empowerment has been defined by the UN as “a process of enabling people to increase control over their lives, to gain control over the factors and decisions that shape their lives, to increase their resources and qualities, and to build capacities to gain access, partners, networks, a voice, in order to gain control” (UN, 2012, cited in Qureshi, 2019).

The structural and social determinants of mental health empower some groups of people but disempower others based on their social characteristics *e.g.*, their socio-economic status, race, gender, sexuality or where they live. The expression “you have to work twice as hard to get half as far” (DeSante, 2013) has been used to describe the experience of racially minoritised individuals living in White majority countries. This is a reference to the social structures that restrict their autonomy over their lives and their ability to obtain a more favourable position in the social hierarchy (Jongsma *et al.*, 2021; Marmot, 2004).

1.3.2 Minority group position as a social risk factor for mental illness

This disempowerment is thought to be behind the well-established finding that some minoritised ethnic groups are at a substantially increased risk of mental illness relative to their White majority counterparts (Anglin, 2020). This risk is particularly marked for SMIs and suicide as opposed to more Common Mental Disorders [CMDs] such as anxiety and depression (Bécares, Dewey & Das-Munshi, 2018; Shaw *et al.*, 2012). These differences in risk cannot be explained by factors such as misdiagnosis or

⁵ Milner & Jumbe (2020, p.419) write, “Race refers to perceived biological difference linked with physical characteristics such as skin colour and hair texture, whereas ethnicity refers to perceived cultural differences between groups.”

similarly high rates of mental illness in minorities' countries of origin – for a comprehensive review see Dykxhoorn and Kirkbride (2018).

Throughout this thesis, there will be discussions of studies comparing racially minoritised groups. As a preface to this, it is important to critically examine potential issues surrounding the precision and sensitivity of language as well as potential pitfalls related to defining and categorising groups to analyse mental health disparities. For instance, many of the studies reviewed in this thesis utilised large secondary datasets, including mental health administrative data sources. While this is a valuable approach, it can also introduce challenges. For example, group categorisations are often not based on self-ascribed identity and therefore may not accurately reflect the identity of the individual. Additionally, many studies do not discern between first and second-generation migrants, each with distinct backgrounds and social experiences. A second-generation migrant of Indian origin in the UK might identify more strongly as British than Indian and will likely have distinctly different experiences to those of their parents and grandparents. Finally, it is common practice for studies to use crude groupings of racially minoritised groups such as Black or South Asian. While this is commonly done for reasons of statistical power, these broadly defined categories encompass a range of different groups with diverse experiences. These groupings can obscure important variations that could become apparent when comparing more detailed and refined groups.

Several studies have investigated mental health disparities in minoritised ethnic groups. A review of including n=25 studies across six countries (USA, UK, Israel, Sweden, New Zealand, and Switzerland) found that the prevalence of depression was marginally higher in minoritised ethnic groups relative to the ethnic majority, but no evidence of an ethnic difference for anxiety was found (Tarricone *et al.*, 2012). Troya *et al.*, (2022) examined suicide rates in of minoritised ethnic groups across n=128 studies conducted in thirty-one different countries. They found tentative evidence that suicide rate was elevated in minoritised ethnic groups but more substantial evidence that suicide risk was higher in indigenous groups.

The elevated risk associated with belonging to a racially minoritised group appears to be more consistently observed for SMI. Jongsma and colleagues (2019) conducted a meta-analysis to examine international variation in the incidence of psychotic disorders. This study included n=177 studies, most of which were conducted in Europe (79%) with the remaining in North America, and Asia. Minoritised ethnic

group status was associated with an increased risk of psychotic disorders but when more detailed groupings were examined, there were marked differences in risk. When considering risk of all psychotic disorders, the highest incidence was observed in Black Sub-Saharan African migrants in Paris, while Indian migrants in East-Anglia in the UK were at the lowest risk, in fact exhibiting a lower rate than the majority White British population. For non-affective psychotic disorders alone, Moroccan migrants to the Hague in the Netherlands had the highest risk, and the lowest risk was again in Indian migrants in East Anglia. (Jongsma *et al.*, 2019, appendix, p19).

Elevated risk in minoritised ethnic groups has also been observed for subclinical psychotic experiences – a meta-analysis of studies across twenty-three countries found that minoritised ethnic position was associated with increased risk of subclinical psychotic experiences (Leaune *et al.*, 2019). However, subgroup analyses revealed differences in risk by specific minoritised ethnic groups. The highest risk was observed in Black populations as well as people from the Maghreb and the Middle East in Europe and Hispanic individuals in the USA.

A frequent finding across these studies is that combining samples into one aggregated racial minority group masks substantial variation in psychosis risk between more specific minority groupings. The finding that risk is consistently elevated in specific minoritised groups likely reflects the disproportionate disempowerment experienced by these groups. Excess risk in visible minorities⁶ is also commonly observed, particularly in Black populations. Visible minority groups have been found to have unequal access to the structural and social determinants of mental health *e.g.*, good quality education and healthcare (Baker *et al.*, 2021). In line with this, a review by Das-Munshi and colleagues (2012) found that rates of mental illness in migrants varied based on their socio-economic position – in migrants who faced downward social mobility there were elevated rates of CMDs relative to migrants who experienced upward social mobility or whose socio-economic status had remained stable. In addition, racial discrimination increases risk of and severity of symptoms of mental illness, particularly psychosis (Anglin *et al.*, 2014) and visible minorities have

⁶ The term “visible minority/minorities” is frequently used in the literature. However, it is important to note that this term has been criticised by the UN Committee on the Elimination of Racial Discrimination and the UN Independent Expert on Minority Issues (*e.g.*, UN, 2010). It is stated that the lack of precision that comes with categorising diverse ethnic and cultural groups under this umbrella term poses a barrier to recognising and addressing the socio-economic gaps of different minority groups. It also masks the distinct histories, cultures, and social contexts that characterise different groups. Finally, the term has been described as Eurocentric as it assumes a white majority as the norm.

also been found to experience more discriminatory harassment than non-visible minorities and the ethnic majority (Cotter, 2022; Vaswani & Esses, 2021). Further, in relation to the White majority, Black individuals have also been found to disproportionately experience coercive pathways to mental health care including police involvement and compulsory detention under the Mental Health Act (Anderson *et al.*, 2014; Barnett *et al.*, 2019)

This elevated risk of mental illness is not exclusive to racially minoritised groups but also extends to minorities grouped by other characteristics. Murphy & Vega (1982) found raised rates of schizophrenia in Roman Catholics in Northern Ireland using admission data from 1970-1972 (during this time period, Roman Catholics comprised a numerical minority). However, since this there appears to have been limited investigation of rates of mental illness in religious minorities at a nationwide level, perhaps because in many social contexts it would be difficult to tease apart whether risk is attributable to ethnic or religious characteristics.

There is also substantial evidence suggesting that LGBTQIA+ identifying individuals are at a higher risk of mental illness. Studies conducted in the Netherlands found an increased risk of psychotic disorders in sexual minority populations (Gevonden *et al.*, 2014; Post & Veling, 2021). However, a study in the UK found no relationship between sexual minority status and probable psychosis but did note an association with paranoia specifically (Qi *et al.*, 2019). For all these studies, associations were at least partly mediated after controlling for social adversities including bullying, drug use, and reduced social support.

All the studies that have been discussed so far examined the relationship between minority status and mental illness at large geographic unit, usually the nationwide level, however, when minorities are examined at a more local geographical level, a more complicated picture emerges. Research indicates that the immediate area in which a minority individual lives significantly impacts their vulnerability to mental illness.

The idea that a mismatch between an individual and where they live is linked to poorer mental health is not a novel one but originated with Emile Durkheim's theories of suicide in the late nineteenth century. Durkheim observed differences in suicide rates in Catholic and Protestant areas across Europe. A higher rate of suicide in Protestants than in Catholics and argued that this was due to a "weakening of the

social fabric” amongst Protestants, whilst the stronger cohesion in Catholics was protective against alienation and suicide (Durkheim, 1897; Rose, 2015).

1.3.3 Social causation, selective migration and social drift

In 1939, Faris and Dunham’s seminal study examined the relationship between minority status, place, and mental illness – see Figure 3. It was observed that schizophrenia was more prevalent in the inner-city areas of Chicago which were characterised by greater neighbourhood social disorganisation *e.g.*, fragmented ethnic groups, increased population turnover, and higher deprivation compared to the surrounding more suburban areas (March *et al.*, 2008). However, this pattern was not as consistently observed for “manic depression”. Faris & Dunham (1939) proposed a social causation hypothesis to explain these findings, like Durkheim, the authors argued that the living in a socially disorganised area with high deprivation and poor community cohesion was what was behind the increased risk of schizophrenia in the more inner-city areas (Silver, Mulvey & Swanson, 2002).

However, Ødegaard, (1932) proposed an alternative hypothesis and argued that the higher rates of schizophrenia found in migrants could be explained by selective migration. Ødegaard, (1932) observed higher rates of schizophrenia amongst Norwegian immigrants to USA and suggested that this was attributable to the fact that people who are more prone to developing schizophrenia are more likely to migrate before the onset of their psychosis. Ødegaard ascribed this trend to the individuals’ poor histories of social adaptation and integration, and theorised that these persons would have still developed schizophrenia if they had remained in Norway (Selten *et al.*, 2002).

The social drift hypothesis suggests that psychosis prone individuals experience downward social mobility (Dohrenwend *et al.*, 1992). Therefore, when observing a higher prevalence of psychosis in poorer areas, proponents of the social drift hypothesis would suggest that this is not living in a poor area that caused the psychosis rather that individuals that experience challenges related to their psychosis “drift” to more deprived areas (Sariaslan *et al.*, 2016).

To summarise, both social drift and selective migration are selection effects – they posit that individuals prone to psychosis are more likely to migrate or drift due to their illness (Dykxhoorn & Kirkbride, 2019). On the other hand, the social causation hypothesis suggests causation operates in the opposite direction, and adverse social

factors such as living in a socially disorganised neighbourhood cause the onset of psychosis. Selection effects emphasise the consequences of experiences of psychosis on an individual's position in the social hierarchy, while social causation suggests that it is the person's lower social standing that is causally related to psychosis. The social causation vs. social drift hypothesis is illustrated in Figure 4.

1.3.4 Ecological studies

Following this work, several studies predominantly conducted in the USA, examined rates of psychosis in minority groups at a more local area-level (Halpern, 1993). Rosenberg (1962) examined rates of “emotional disturbance” in Catholic, Protestant and Jewish children in New York. Higher rates of mental illness were observed in children brought up in “culturally dissimilar” neighbourhoods *i.e.*, communities where a large proportion of the population had a different religion. Similar findings were observed for several migrant groups in New York, including migrants from Black, Puerto Rican, Irish, Italian, German, Polish, and Austrian, Hungarian backgrounds as well as migrants from what was then the Union of Soviet Socialist Republics [USSR] (Rabkin, 1979; Muhlin, 1979). This pattern was also observed in Boston for Italian migrants (Mintz & Schwartz, 1964) and in Chicago for Black populations (Levy & Rowitz, 1973). Studies also noted that the same relationship was seen for the White majority such that there were higher rates of mental illness in White groups living in areas with lower proportions of White individuals (*e.g.*, Levy & Rowitz, 1973).

It appears that Wechsler & Pugh (1967) was the only ecological study of this time period to test what they referred to as the “fit hypothesis” for social characteristics other than minoritised ethnic or migrant status. This study was conducted in Boston and looked at whether psychiatric hospitalisation rates were higher in certain groups in localities where fewer others shared the same characteristic. They found this to be the case for several characteristics⁷ including those who are married, born in Massachusetts, have a certain occupation, and are younger. The authors argued that the elevated rates in certain groups were due to a poor person-environment fit.

⁷ Full list of characteristics - (1) younger (15-34 years), (2) medium age (35-54), (3) married, (4) Massachusetts born, (5) born elsewhere in the United States, (6) professional workers, (7) craftsmen, (8) operatives, and (9) persons of unknown occupation (Wechsler & Pugh, 1967).

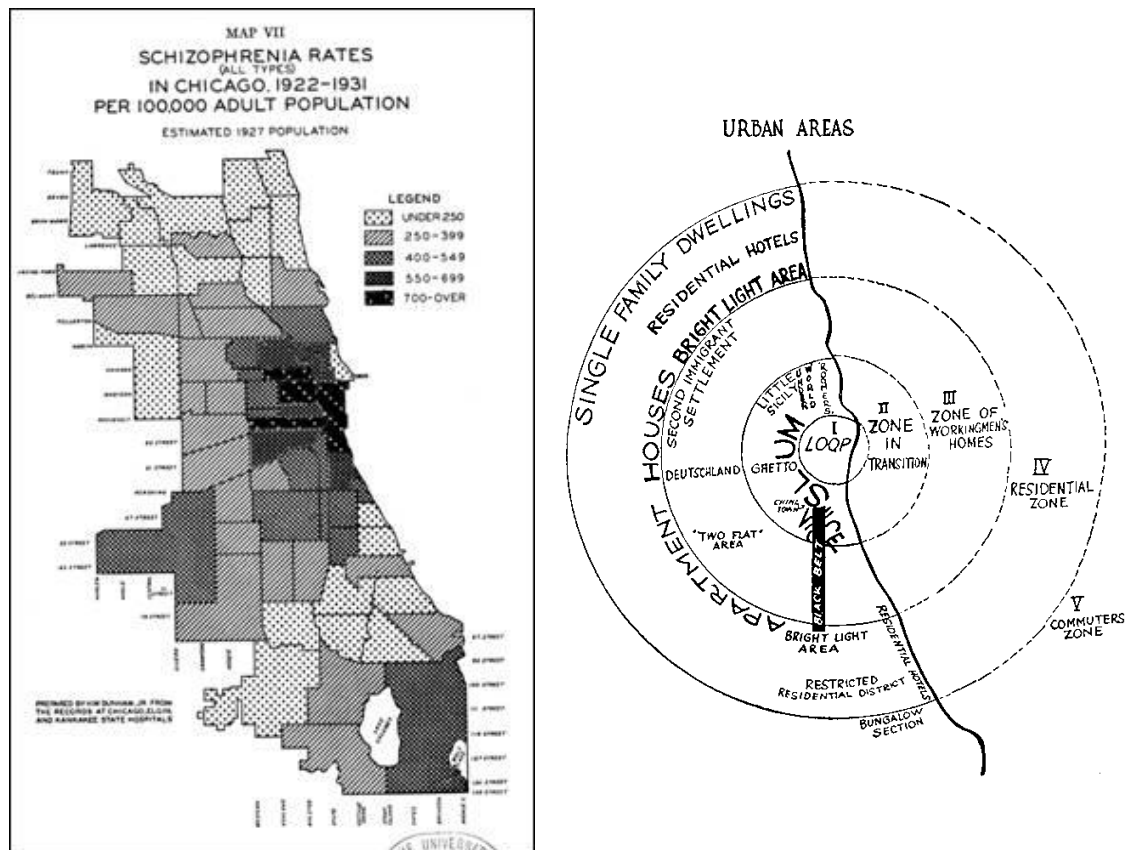


Figure 3. On the left is Faris and Dunham’s (1939) spatial mapping of Schizophrenia rates in Chicago, USA. On the right is the Park and Burgess’s (1925) concentric zone model of schizophrenia. Schizophrenia rates reduce with the concentric circles further out from the inner city.

These early ecological studies into minority status and mental illness at the area-level suggested that not belonging and feeling different to others is what drives the increased risk of mental illness in areas where there are fewer people who are similar (Rosenberg, 1962). Muhlin (1979, p.264) noted that people “living in neighbourhoods where the dominant lifestyle, culture and language are different from their own are very much at risk”. Issues of ethnocentrism and discrimination were also proposed as contributing factors, it was argued individuals are more likely to be subject to negative treatment based on their minority status in neighbourhoods where they are more outnumbered (Rosenberg, 1962).

There is strong geographical variation in the rates of SMI (March *et al.*, 2008), more so than observed for CMDs, which suggests that examining the social risk factors at the local area level (*e.g.*, neighbourhood-level) is particularly useful for providing clues about the aetiological underpinnings of mental illness, and specifically psychosis (Halpern, 1993).

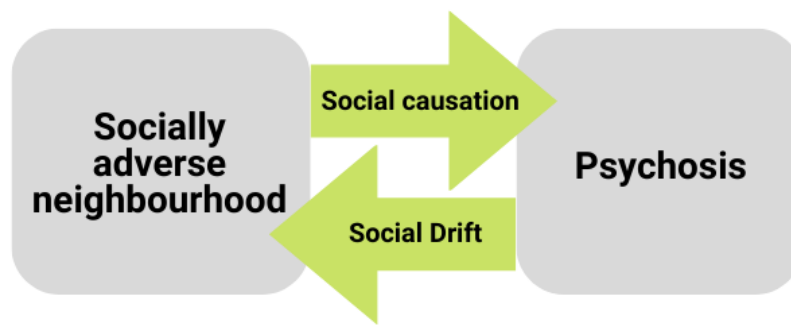


Figure 4. A diagram illustrating the social causation vs. social drift hypothesis.

1.3.5 Multilevel modelling

A key limitation of these early ecological studies is that they only compared group-level rates mental illness in different areas. They could not examine interactions between the characteristics of individual and those of their local area, nor were they able to account for the hierarchical structure of the data *i.e.*, individuals (level 1) are nested within neighbourhoods (level 2) and substantial variation exists at each of these levels. For example, an individual might share unmeasured confounding variables by virtue of them living in the same area. Multilevel modelling can appropriately manage this by partitioning the variance, enabling exploration of how much of the variation in mental health can be attributed to individual and area-level factors (Merlo *et al.*, 2004).

Using another method such as multiple regression to conduct analyses on data with a multilevel structure would result in inflated type one errors (Harrer *et al.*, 2019). This is because multiple regression assumes the observations are independent and is unable to account for nesting or clustering of data (Harrer *et al.*, 2019). Studies that preceded multilevel modelling were therefore unable to estimate the mental health risk associated with minoritised ethnic group position while simultaneously controlling for individual- and area-level covariates including age, gender, and neighbourhood deprivation. Multilevel modelling⁸ however, is a powerful method that can explore contextual effects – it is able to examine cross-level (individual-neighbourhood) interactions, while controlling for confounds at both levels. It is also able to manage smaller sample sizes at the neighbourhood level.

That said, multilevel modelling is not without its limitations. It is critical that the choices around variables to be included in the model are based on a strong

⁸ Multilevel models are also known as hierarchical linear models, linear mixed-effect model, mixed models, nested data models, random coefficient, random-effects models, random parameter models, or split-plot designs.

theoretical foundation. Failure to do so can lead to overfitting and ungeneralisable models. Checking for multicollinearity is another important consideration – if individual or area-level predictors are highly correlated, this makes it difficult to disentangle their respective effects on the outcome variable.

1.3.6 Ecological vs. atomistic fallacies

Finally, when designing and interpreting the results of Multilevel models, it is important to consider possible ecological and atomistic fallacies. Ecological fallacies refer to incorrect assumptions about individuals based on observations at the neighbourhood level. For example, a study may find that a higher average income in a neighbourhood is linked to lower rates of mental illness and then directly apply that conclusion to individuals within the neighbourhood. However, the level of protection that a person might experience by living in a wealthy area is influenced by their individual experiences and characteristics.

On the other hand, atomistic fallacies refer to erroneous conclusions about the neighbourhood based on individual characteristics. For example, a study observing higher rates of mental illness in individuals with lower income might conclude that individual-level economic disadvantage causes mental illness. However, this fails to account for characteristics of the neighbourhood which could also influence mental health risk, such as the accessibility of healthcare services and community social capital.

Multilevel modelling is well-equipped to mitigate the risk of ecological and atomistic fallacies – it can account for nesting and clustering, can assess individual and neighbourhood level effects concurrently, and examine cross-level interactions. Despite this, these fallacies could still happen – for example, inaccurate conclusions about individual or neighbourhood level factors could occur through a failure to include important predictors or interactions or adequately control for confounding variables. If the factors include in the model are not reliable or valid this could also increase the risk of fallacies.

1.4 NEIGHBOURHOOD-LEVEL STUDIES

In the literature, the term neighbourhood-level is used to describe sub-national units of geography that measure characteristics of areas at a more local level. In England and Wales, the Middle Super Output Area [MSOA] and Lower Super Output Area [LSOA]

are commonly used geographical units. LSOAs comprise 400-1,200 households and 1000-3000 people. England is made up of 33,755 LSOAs and Wales, 1,917. MSOAs are slightly larger areas consisting of 2,000-6,000 households and 5,000-15,000 people (Office for National Statistics [ONS], 2021). However, studies also examine larger geographical areas such as local authorities or municipalities.

As multilevel modelling became established in the psychiatric epidemiological literature, there was a surge of studies examining associations between neighbourhood-level exposures and mental illness (Allardyce & Boydell, 2006). Because of the strong geographical variation in SMI, examining area-level risk factors for schizophrenia and other psychoses was the focus of many of these studies.

Urbanicity has been consistently linked with psychotic disorders – in line with the early work of Faris and Dunham (1939) living in cities and more densely populated areas has been found to be associated with increased risk of psychosis, and this has been demonstrated cross-sectionally and longitudinally (Heinz, Deserno, & Reininghaus, 2013). The increased social stressors and environmental pollution in more urban areas has been thought to be behind this risk (van Os, 2004), however, a review by Fett, Lemmers and Krabbendam (2019) found that the relationship between urban living and psychosis is complicated – the risk associated with urbanicity appears to differ between Northern and Southern European cities and between cities in low-, middle- and high-income countries. The authors also suggested that social factors may be of greater importance when considering the risk of urban environments, and that more studies are needed to understand what mechanisms are involved.

There is limited research examining social risk factors for psychosis in the context of a rural environment (Omer *et al.*, 2014). A review of psychotic disorders in rural areas found that many of studies conducted in a rural context have been conducted in China and India (Peritogiannis, & Samakouri, 2021). UK-based studies that have examined social risk factors for psychosis in rural environments used the Social Epidemiology of Psychoses in East Anglia study which comprised data on psychosis incidence cases in a predominantly rural areas within Eastern England (Kirkbride *et al.*, 2017; Richardson *et al.*, 2018). These studies found that social risk factors for psychosis including ethnic minority group position were also present in a rural context.

Recently there has been growing interest in the protective properties of access to green and blue space, however much of this research appears to be relation to urban

green space (Fett, Lemmers-Jansen & Krabbendam, 2019; Ebisch, 2020). For example, a recent study conducted in Toronto by Rotenberg and colleagues (2022) found residence in communities with the lowest green space was associated with a 24% increase in schizophrenia risk.

There is also strong evidence that living in more deprived areas is associated with an increased risk of psychosis, again this has been demonstrated both cross-sectionally and longitudinally (O'Donoghue, Roche & Lane, 2016). In a review by O'Donoghue, Roche, and Lane (2016), seventeen of the twenty-three studies (74%) conducted across several countries found that living in a more deprived neighbourhood was associated with an increased risk of psychosis.

Studies have also found associations between neighbourhood social disorganisation and psychosis. Social disorganisation is typically measured as an aggregate of area-level data on the proportion of unmarried people, single person households, rental housing, and levels of population turnover (Allardyce & Boydell, 2006). Studies have found that living in areas with higher levels of social disorganisation is associated with elevated risk of psychosis across different countries (Jongsma *et al.*, 2018) *e.g.*, the UK (Allardyce *et al.*, 2005), the Netherlands (van Os *et al.*, 2000), Sweden (Lögberg, 2004) and the USA (Silver, Mulvey & Swanson, 2002).

1.5 GROUP DENSITY ASSOCIATIONS

These earlier ecological studies paved the way for what are referred to as “ethnic density” studies. These studies have found that minority groups living in areas where there is a large proportion of their own group are at lower risk than when they live in neighbourhoods where there are fewer of their group (Boydell *et al.*, 2001). In the late 1990s and early 2000s, with the growing popularity of multilevel modelling, there was a sharp increase in studies examining ethnic density associations. Figure 5 shows the frequency of studies using the term “ethnic density” over time. However, unlike early ecological studies, more recent studies have been able to examine interactions between individual-level minority status and the proportion of others in their neighbourhood belonging to the same group while controlling for confounding variables such as age, sex, area deprivation and population density. As the name suggests, the majority of this work has focussed on minoritised ethnic groups. This thesis explores ethnic

density associations in racially minoritised groups and other social groupings, so hereafter the term “group density” will be used.

Group density findings are interesting in a theoretical sense because they suggest that the risk of lower own group density is largely psychosocial nature – the excess risk associated with belonging to a minority group is somewhat contingent on the proportion of others in their neighbourhood who belong to the same group. Further the fact that these associations hold after controlling for confounds suggests that the influence of group density is strong and independent from other well-established neighbourhood level risk factors.

In addition, group density findings can shed light on the social causation vs. social drift debate. Group density associations are more consistent with the idea of social causation – *i.e.*, it is the social experience of a neighbourhood that is behind the excess risk rather than an increased propensity to move into a particular neighbourhood (Halpern, 1993). Minoritised ethnic groups disproportionately cluster in more deprived neighbourhoods (*e.g.*, see Das-Munshi *et al.*, 2010) so while social drift could plausibly explain higher rates of mental illness in White groups in areas with higher proportions of minoritised ethnic groups, it cannot explain the finding that minoritised ethnic groups have lower rates of mental health problems in more ethnically dense areas. The social drift hypothesis would predict the opposite – minoritised groups in areas with fewer other ethnic minorities (and less deprivation) would have better mental health.

To date, there have been three reviews of the group density effect in psychosis.⁹ The first was a narrative review conducted by Shaw & colleagues (2012) which included studies published up until 2011. This review considered group density relationships for psychotic experiences and diagnosed psychotic disorders in addition to density associations for suicide, self-harm, and CMDs. Studies examining psychosis were all conducted in the UK except for one carried out in the Netherlands (Veling *et al.*, 2008). All studies examined group density relationships in minoritised ethnic groups in the UK groups including Black Caribbean, Black African, White Other, Mixed ethnicity, Asian, and more specific Asian subgroups (Pakistani, Bangladeshi, Chinese, Indian). In the Netherlands groups included Moroccan, Surinamese, and Turkish. Five examined associations for psychotic disorders (Boydell

⁹ More detailed results from the studies included in these reviews are reported in Chapter 2.

et al., 2001, Kirkbride *et al.*, 2007, Kirkbride *et al.*, 2008, Schofield, Ashworth, & Jones, 2010; Veling *et al.*, 2008) and two looked at subclinical psychotic experiences (Bécares *et al.*, 2009; Halpern & Nazroo, 2000).

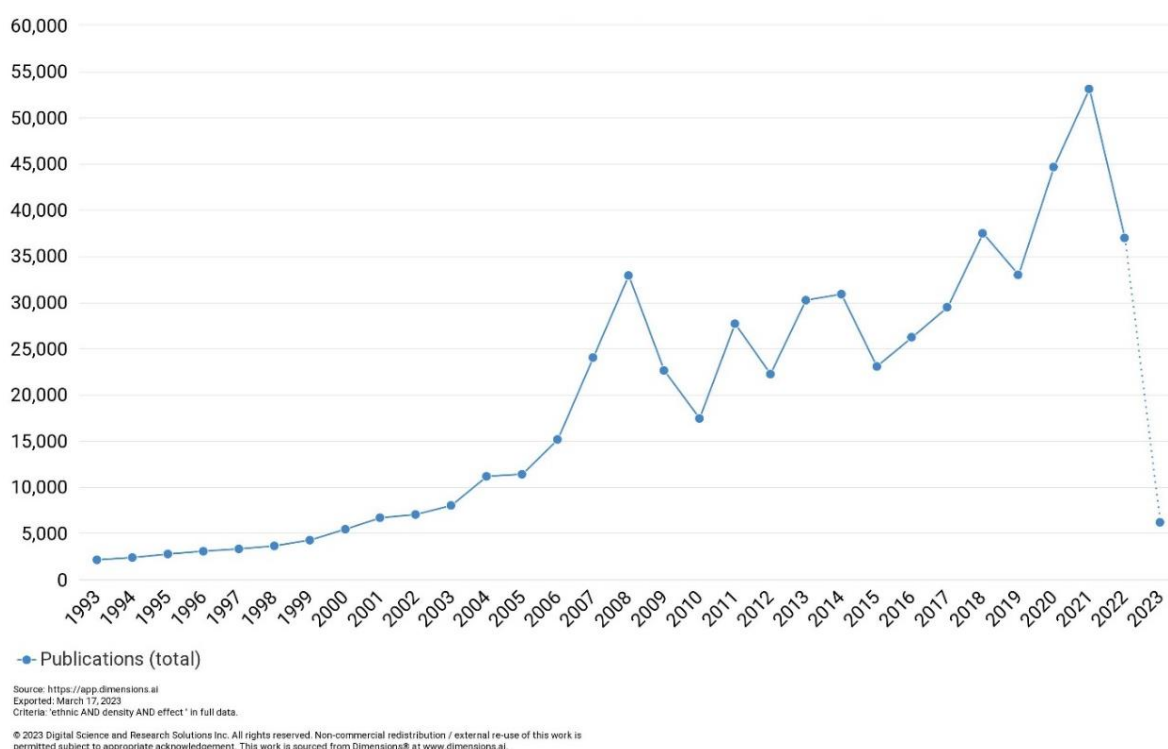


Figure 5. Line graph showing the number of studies over time containing the term “ethnic density” from 1993 – March 2023. Made using Dimensions¹⁰

The next review was conducted by Bosqui, Hoy, and Shannon (2014) and comprised studies published up until 2012. This was a systematic review and meta-analysis and included eight studies looking at group density associations for psychotic disorders. Included studies were the same as Shaw & colleagues (2012) but with the addition of Cochrane & Bal (1988). The meta-analysis contained five studies (Boydell *et al.*, 2001; Kirkbride *et al.*, 2007; Kirkbride *et al.*, 2008; Schofield, Ashworth & Jones, 2011; Veling *et al.*, 2008) and found evidence of a group density association. There was a negligible difference in risk of psychotic disorders between the combined minoritised ethnic group and the majority group at highest level of ethnic density but ethnic minorities in low ethnic density were at around three to six times more risk of psychotic disorder.

¹⁰ Link to dimensions which can be used to track research trends over time: <https://app.dimensions.ai/discover/publication>

The third review was conducted by Bécaries *et al.*, (2018) and contained studies published up until 2016. This was also systematic review and meta-analysis which assessed group density associations for psychosis, suicide, and CMDs. There were ten psychosis studies – six looking at clinical cases (Kirkbride 2007; Kirkbride 2008; Kirkbride 2014; Menezes 2011; Mezuk 2015,) and four examining subclinical psychotic experiences (Bécaries 2009; Bécaries & Das Munshi 2013; Halpern & Nazroo, 2000; Das-Munshi *et al.*, 2012). Unlike Bosqui, Hoy, & Shannon (2014) this review's meta-analysis included data from studies that examined subclinical psychosis. This found that ten percentage-point increases of group density were associated with significantly reduced odd of psychotic experiences (OR=0.82, 0.76–0.89).

Reviews that included studies examining group density associations for psychosis as well as other mental health problems noted that interactions were stronger and more consistent for psychosis as opposed to CMDs (Bécaries *et al.*, 2018; Shaw *et al.*, 2012) although Bécaries *et al.*, (2018) did also report a strong association for suicidal ideation (OR 0.88, 0.79– 0.98).

From the evidence reviewed, it remains unclear whether group density relationships differ by specific minoritised ethnic group. Two reviews found that associations were more constantly observed in aggregated ethnic groups, but findings were mixed when specific minority groups were considered. However, Bécaries *et al.*, (2018) found no moderating effect of minoritised ethnic group for any mental health outcome.

Additionally, it has been suggested that group density associations are strongest at less populous units of geography (Schofield, Ashworth, & Jones, 2011). However, the potential moderating effect of area size was not considered in these reviews. From the present reviews it was also unclear whether there are any differences in group density associations when clinical cases of psychosis are examined as opposed to studies that looked at measures of subclinical psychotic experiences.

Reviews also applied narrow inclusion criteria – only epidemiological studies were included and no studies assessing group density associations using other methodologies were reviewed. Further, all the studies included in the reviews were conducted in similar contexts – large cities in the UK and the Netherlands. Finally, reviews only considered studies comprising ethnic minorities and migrants – they did not explore whether density associations are also observed in other socially defined

groups.

Finding out whether density associations differ by group is theoretically useful in terms of elucidating common mechanisms behind these interactions. This includes assessing associations in groups defined by other social characteristics in addition to racially minoritised groups. Doing so raises the question, what is it about the social experience of this particular group that renders them more at risk of psychosis when they live in an area with fewer people who belong to the same group? This is perhaps particularly useful for shedding light on the aetiological underpinnings of psychosis specifically given that group density associations appear to be more consistently observed for psychosis (Bécares *et al.*, 2018; Shaw *et al.*, 2012).

There has been some exploration of group density associations for other social characteristics in studies that have looked at broader mental health outcomes. For example, Saville (2020) examined group density associations for mental health in groups defined by their political affiliation. This study included “remain” and “leave” groups in the UK, *i.e.*, people who voted to remain or leave in European Union [EU] in the UK’s EU referendum. Results revealed that living in a neighbourhood with a lower proportion of people who shared the same political identity was a risk factor for both “remain” and “leave” groups and this association remained after adjustment for age, sex, income, ethnicity, education, and area level deprivation.

In another study, Saville and Mann (2022) tested the presence of a group density association for social class in the UK. Drawing upon Bourdieu’s theoretical framework (Bourdieu, 1986), the authors examined density associations with economic capital (material assets) and cultural capital (symbolic indicators of social class such as particular tastes and interests). This study found no evidence of a group density association for economic capital, but for cultural capital, a significant group density relationship was observed whereby higher area-level cultural capital was associated with poorer mental health in individuals who had lower cultural capital but protective for people with higher cultural capital. The authors suggested these findings were likely because cultural capital is a more salient marker of group identity than economic capital.

In the USA, Hatzenbuehler, Keyes, and McLaughlin (2011) examined density relationships for sexual minority status. This study found a significantly lower rate of CMDs in LGB individuals living in states with a higher percentage of same-sex couples relative to states with lower proportions. Further, there was evidence that

higher own group density attenuated the risk associated with experiences of economic adversity and social isolation. This study suggested several potential mechanisms behind their findings, for example, LGB identifying people in lower own group areas might have reduced social capital and be more likely to be subject to discriminatory behaviours and attitudes.

Bosqui *et al.*, (2017) examined religious group density associations for the context of religious sectarianism in Northern Ireland. This study contextualised the social salience of religious affiliation in Northern Ireland with reference to the conflict known as “The Troubles” and subsequent signing of the Good Friday Agreement in 1998. The authors reported that in Northern Ireland, Catholics and Protestants now comprise 45% and 48% of the population respectively but there is significant variation at the neighbourhood level. Group density associations were not found in this study – there was no association between own group density and mental health for Protestant individuals and for Catholic people, a harmful association was observed such that Catholic individuals were at a higher risk of mental illness in higher own group density neighbourhoods. Reflecting on these findings, the authors highlighted the complexity of group density associations and that the harmful effects are contingent on a range of potential factors, including social, cultural, and political influences.

Another study conducted in Northern Ireland examined associations between residential segregation and mental illness in religious groups (Maguire, French, O'Reilly, 2015). In Northern Ireland, physical barriers known as “peacelines” were erected to segregate Catholic and Protestant communities and many still exist today. This population-wide study found that living in a residentially segregated area was not associated with mental illness, however living in close proximity to a “peaceline” was associated with increased likelihood of antidepressant and anxiolytic prescriptions after adjustment for confounders (age, gender, and area deprivation). This study suggested that the “heightened sense of other” might be behind the elevated risk of mental illness associated with living close to a peace line (Maguire, French, & O'Reilly, 2015., p.845).

1.6 POSSIBLE MECHANISMS BEHIND GROUP DENSITY ASSOCIATIONS

1.6.1 Identity and belonging

Theories about the categorisation of ingroup and outgroups are well-established, in the early nineteenth century, Hume (1817) described three social biases that shape how humans interact with others – 1. Similarity (bias in favour of people who are like us), 2. Kin (bias in favour of kin), and 3. Contact (bias towards people we have direct contact with).

Tajfel and Turner's (1979) social identity approach (which consists of social identity theory and self-categorisation theory), has been one of the most influential theoretical frameworks in the psychological literature. A person's social identity is the sense of self concept that they derive through their membership with social groups. People are motivated to identify with groups and incorporate this into a positive social identity to achieve a sense of belonging and bolster their self-esteem. The social identity approach originated from studies conducted by Tajfel and colleagues in the early 1970s that used a "minimal group paradigm" – these studies suggested that individuals have an inherent need to categorise themselves and others into groups and would give preferential treatment to their group even when the basis for the group classification is entirely arbitrary *e.g.*, decided by a coin flip (Billig & Tajfel, 1973).

Reflecting on these findings, Tajfel and Turner (1979) suggested that people rarely interact only on an interpersonal level (perceiving the other person as an individual), instead intergroup social interaction tends to be the norm (perceiving the other person through the lens of the social group that they belong to) (Hornsey, 2008). Tajfel also argued that the distinction of the ingroup (us) vs. the outgroup (them) shapes the way a person relates to themselves and others. When group categorisations are salient, the individual will tend to overstate similarities within social groups while at the same time exaggerate differences between groupings – a process known as accentuation (Turner *et al.*, 1987).

When a person establishes their membership to a group, this becomes internalised as part of their social identity. With this, the individual forms a sense of belonging and attachment to their social group and has a propensity to conform to the social norms of group within which they identify. There are many strands to a person's social identity, and people consider some components of their identity as more important than others. These aspects may include intersecting identities such as race,

gender, ethnicity, and socioeconomic status, which collectively contribute to the complexity of person's social identity. The social context will also influence the salience of a given identity – in some situations a certain component of a person's social identity will have more social relevance so they will be more likely to invoke that identity in that given situation – this is referred to as identity salience (Stryker & Serpe, 1982).

To preserve their social identity, individuals are motivated to see their ingroup as a positive entity that is distinctive from other groups (Hornsey, 2008). To do so involves positively evaluating their group in relation to outgroups. This will commonly involve intergroup bias *i.e.*, the tendency to ascribe positive attributes to the ingroup and negative characteristics to the outgroup. This process has a positive and negative side – at one end is a positive sense of belonging and distinctiveness from other groups, but at the extreme end of the spectrum is ethnocentrism and discrimination towards other groups (Grant, 1993). The concept of “othering” relates to the process whereby “insiders” and “outsiders” are established which are then used as the basis for discrimination against minority groups (Søraa *et al.*, 2020). Marginalised minority groups are more likely to be singled out and discriminated against on the basis of their identity and this has been found to increase the risk and severity of mental illness (Oh *et al.*, 2014).

When an individual evaluates their group negatively in relation to others, this presents a threat to the positive distinctiveness of their group. “Identity threat” occurs when an individual feels their group is viewed unfavourably, for example via negative stereotypes about their group (Major & Schmader, 2018). To protect their identity and self-esteem, the individual might therefore choose to no longer identify with their group or alternatively they might demonstrate further intergroup bias by homing in on the undesirable characteristics of the outgroup and the positive aspects of the ingroup (Hornsey, 2008). The way identity threat is addressed is based on different factors, including the permeability of group boundaries and whether the individual perceives this negative evaluation as stable (Hornsey, 2008). For example, some identities are more fixed such as visible minority status, while others are more fluid, for example, political affiliation. Another example is an individual's perceived position in the social hierarchy – if they view the boundary between lower status and higher status as permeable, having a lower social position might be less harmful to the person (Lalonde & Silverman, 1994). The process of the social identity theory is shown in Figure 6.



Figure 6. A diagram showing the processes involved in the social identity approach.

Having a positive identity has been found to have mental health benefits because it provides a sense of belonging which in turn furnishes the individual with self-esteem (Haslam *et al.*, 2009). On the other hand, the absence of a sense of belonging depletes self-esteem and has detrimental mental health consequences (Sargent *et al.*, 2002). Navigating a positive sense of identity is something that is often difficult for people who experience psychosis (Perry, Taylor, & Shaw, 2009). Individuals experiencing psychosis often grapple with a sense of feeling different or disconnected from others, encountering difficulties in navigating a healthy sense of identity, belonging, and purpose (Conneely *et al.*, 2021). Further, individuals with psychosis experience more social isolation than any other diagnostic group and have smaller social networks (Palumbo *et al.*, 2015). Some have suggested that psychosis can be accurately captured as a “disturbance of selfhood or self-experience” (Sass & Parnas, 1998, p.427). When an individual begins to have experiences of psychosis and receives a diagnosis of a psychotic disorder, this brings about profound changes to their sense of identity and how they relate to themselves and others (Conneely *et al.*, 2021).

There is substantial evidence demonstrating a link between low self-esteem (negative perceptions of the self) and psychosis – specifically paranoia (McIntyre *et al.*, 2018). People with psychosis and those vulnerable to psychosis have been found to have lower self-esteem (Romm *et al.*, 2011). Similarly, an experience sampling study found that paranoia was associated with greater fluctuations in self-esteem, and drops in self-esteem were immediately followed by heightened paranoia in both clinical and non-clinical participants (Thewissen *et al.*, 2008).

Additionally, McIntyre *et al.*, (2018) found evidence of an association between social identity and paranoia, with self-esteem having a mediating role. The authors hypothesised that social identity would protect against paranoia specifically because positive group identification is thought to confer its buffering influence via increased

self-esteem, and evidence points to a unique role of self-esteem in persecutory beliefs, while different pathways are thought to be involved in AVHs, *e.g.*, dissociative experiences (Pilton *et al.*, 2015). Supporting this, they found that positive social identity (which included having a sense of belonging to one's neighbourhood), was associated with a reduced paranoia in a non-clinical sample, and self-esteem partially mediated this relationship. No such relationship was found between social identity and AVHs (McIntyre *et al.*, 2018).

1.6.2 Belonging to a lower status group

Like the ideas of negative social comparison outlined in the social identity approach, the psychological experience of perceiving oneself as having an inferior or lower social status in relation to others has been proposed as a key driver of poorer mental health in marginalised groups (Marmot, 2004). For example, a report by the WHO noted: “the experience of living in social settings of inequality forces people constantly to compare their status, possessions and life circumstances with those of others, engendering feelings of shame and worthlessness in the disadvantaged, along with chronic stress that undermines health.” (Solar & Irwin, 2010 p.15). Wilkinson and Pickett (2010) also proposed this as a mechanism behind their findings. Drawing upon Alfred Adler's concepts of inferiority (*e.g.*, Adler & Wolfe, 1927), they suggested that the heightened stress and anxiety arising from negative social comparison provides an explanation for the association between income inequality and various health issues observed across multiple countries, including poorer mental health. Social evaluative threat is a similar concept – this theory argues that humans are motivated to protect their status and feel accepted, so when faced with a situation where they perceive negative judgement from others based on a focal part of their identity, social evaluative threat is experienced, which induces a stress response (Dickerson *et al.*, 2009). Other similar concepts include status syndrome (Marmot, 2004), status anxiety (Layte & Whelan, 2014), and the fear of negative evaluation (Collins *et al.*, 2005).

Selten and colleagues (2005, 2013, 2023) proposed a hypothesis that linked these ideas to psychosis specifically. Their “social defeat” hypothesis posits that “unwanted outsider status or subordinate position” sensitises the mesolimbic dopamine system which increases risk of psychotic experiences (Selten *et al.*, 2023, p.610). An earlier version of the framework conceptualised social defeat as “the negative experience of being excluded from the majority group” (Selten *et al.*, 2013,

p.1180) and was borne out of research on social defeat in animals. One such study found that mice who experienced socially defeating experiences exhibited alterations in neuronal dopamine transporter binding – the part of the dopaminergic system involved in regulating the neurotransmission of dopamine. However, this was only observed in mice who were isolated after their defeating experience – with the duration of isolation exacerbating this effect in a dose-response manner. In mice who were housed amongst their familiar group after defeat, there were no such changes in striatal dopamine transporter binding (Isovich *et al.*, 2001). Selten and Cantor-Graae (2005) drew parallels to the buffering hypothesis of ethnic density – the idea that living amongst one’s own group buffers against the social stress associated with a more vulnerable minority position.

Drawing on Marmot’s notion of status syndrome (Marmot, 2004), the social defeat hypothesis has since been updated to conceptualise defeat as relating to having lower status in relation to others (Selten & Ormel, 2023). They note that status is a different concept to socioeconomic status, rather, it relates to how individuals are evaluated by others based on their perceived value, a range of characteristics were noted that are deemed important antecedents of status, including education, appearance and occupation (Selten & Ormel, 2023).

Selten and colleagues (2005, 2013, 2023) argue that social defeat offers an overarching explanation for the excess risk of psychosis observed in several marginalised groups, *e.g.*, people with low IQ, minoritised ethnic groups, LGBTQIA+ identifying individuals. In line with this, perceived disadvantage and discrimination have been found to be associated with elevated risk of psychosis across different minoritised groups (Pearce *et al.*, 2019). Further, Reininghaus *et al.*, (2016) found that, compared to controls, persons with a first episode of psychosis and individuals at high risk of psychosis were more likely to report higher stress relating to feeling like an outsider¹¹ their experiences living in their local area. Interestingly, this study found evidence of stronger associations between outsider status and psychotic experiences in persons at high risk of psychosis compared to those with first episode psychosis and controls. The authors suggested that sensitivity to outsider status may occur prior to the onset of clinical psychosis, following this the individual might then experience heightened area-related stress and threat anticipation.

¹¹ Outsider status was measured by level of agreement with the statement (“I feel I am an outsider”) on a 7-point Likert scale (ranging from 1 [“not at all”] to 7 [“very much”]).

The “social defeat” hypothesis will be drawn upon throughout this thesis; however, a critical note on language is warranted. While this hypothesis provides a useful lens for exploration, it is important to be mindful of the possible negative connotations associated with its terminology. It is imperative to take a sensitive and respectful approach when engaging in discourse around minoritised individuals and the risk of mental illness. Describing minoritised populations actively confronting discrimination as experiencing “social defeat” may inadvertently detract from the strength and resilience demonstrated by these communities. This thesis highlights the importance of inclusive language that respects the diverse experiences of individuals while promoting understanding rather than stigmatisation.

1.6.3 Social capital

Early studies into the relationship between place and mental illness have suggested that the connections forged between people in communities are an important determinant of risk (Durkheim, 1897; Faris & Dunham, 1939). Broadly, social capital relates to the social networks within a community or the “glue” that joins people together (Lang & Hornburg, 1998). Social capital has been proposed as an important theoretical framework for understanding mental health disparities but reviews assessing the association between social capital and mental health have yielded mixed findings, with some studies reporting protective effects and others noting absent or detrimental associations (McKenzie, Whitley & Weich, 2002; De Silva *et al.*, 2005).

Further, there is a dearth of research examining social capital in relation to psychosis and like studies of broader mental health outcomes, it is difficult to arrive at any conclusions about the association between social capital and psychosis (Rotenberg, Anderson, & McKenzie, 2020). That is not to say social capital is not potentially important, there is strong theoretical justification for why social capital could be a key mechanism in neighbourhood-level studies of psychosis. Inconsistent findings are thought to be largely due to the variation in the way that social capital is defined and measured (Rotenberg, Anderson, & McKenzie, 2020).

The first theory is Putnam’s, which defines social capital as “connections among individuals – social networks and the norms of reciprocity and trustworthiness that arise from them.” (Putnam, 2000, p.19). Putnam suggests there are five components of social capital: “(1) community networks, voluntary, state, personal networks, and density; (2) civic engagement, participation, and use of civic networks;

(3) local civic identity—sense of belonging, solidarity, and equality with other members; (4) reciprocity and norms of cooperation, a sense of obligation to help others, and confidence in return for assistance; (5) trust in the community” (Putnam, 1993, p.36).

Putnam generally thought of social capital as a force for collective good (Putnam, 2000) – Bourdieu’s theory, on the other hand, viewed social capital as a means by which power imbalances are created and maintained in society (Gauntlett, 2011). Unlike Putnam, Bourdieu viewed social capital as property of the individual that is utilised to maintain their position in the social hierarchy. He defined social capital as: “The sum of the resources, actual or virtual, that accrue to an individual or a group by virtue of possessing a durable network of more or less institutionalized relationships of mutual acquaintance and recognition.” (Bourdieu & Wacquant, 1992, p.119 cited in Gauntlett, 2011). Bourdieu also identified two other related forms of capital – economic and cultural capital (Bourdieu & Wacquant, 1992). The former refers to a person’s material assets (*e.g.*, money and property ownership) and the latter, symbolic indicators of social class (*e.g.*, values and interests) (Saville & Mann, 2022).

Social capital has a structural and cognitive aspect – structural social capital refers to institutions and activities that are part of membership to a particular group and cognitive social capital refers to the psychological aspect of group membership *e.g.*, trust and sense of belonging (De Silva *et al.*, 2005). Cognitive social capital can be measured at the individual level or individual responses within defined geographical areas can be combined to create a measure of ecological social capital (Saville, 2020).

Social capital theories bare a resemblance to the social identity approach, for example, both refer to group membership and the sense of belonging that is derived from being part of a group (Richardson, Postmes, & Stroebe, 2022). However, the concept of social capital has been described as the most comprehensive way of exploring social relationships between individuals because it encompasses both a structural and cognitive component (Richardson, Postmes, & Stroebe, 2022). Using factor analysis, Richardson, Postmes and Stroebe, (2022) did note some overlap between social capital and other similar measures such as social identity, group membership and social support, but these three concepts were more closely interrelated. The authors suggested that all these concepts can be divided in terms of

whether they measure an individual's identification with their neighbourhood, family or friends.

1.6.4 Relating theoretical frameworks to group density associations

There has been limited empirical investigation of the above theoretical frameworks in relation to group density associations and the mechanisms behind these findings remain poorly understood (Bosqui, Hoy & Shannon, 2014). However, in their studies into group density associations with CMDs, Das-Munshi & colleagues (2010) did find that individuals living in areas with lower own group density reported more experiences of racism and discrimination, and reduced social support (Das-Munshi *et al.*, 2010). Another study found that minoritised ethnic groups in lower own group density neighbourhoods anticipated more discrimination from health services (Bécares & Das-Munshi, 2013).

There has been limited exploration of the role of identity, status and belonging in group density associations despite this plausibly being an important social process behind these findings. However, it is unclear how these concepts play out at the neighbourhood level.

A comprehensive review by Pickett and Wilkinson (2008) discussed the significance of material versus psychosocial factors in relation to ethnic density patterns in health. They suggested that the harmful mental health consequences of low own group density operate through psychosocial pathways, i.e., minority group individuals perceiving themselves as having lower status.

The risk of lower own group density might therefore be because these negative social comparisons are amplified in individuals who live in a neighbourhood where there are fewer others from the same group who occupy a similar social position. Consequently, it might be that lower own group density is particularly, if not exclusively, detrimental to marginalised minorities *e.g.*, racially minoritised groups or as Allport (1954) described such groups, “psychological minorities”. On the other hand, for an individual who perceives themselves as higher in the social hierarchy, living amongst a low proportion of other high-status individuals might not trigger the same degree of social evaluative threat.

However, another possibility is the risk of lower own group density will have negative mental health consequences for any outgroup position regardless of its perceived power and status. It might be that while holding a certain identity is

perceived as higher status more generally, this identity might be evaluated differently in a neighbourhood where it is less common. The risk of living in a low own group density neighbourhood might largely be due to the salient reminder of a person's position as an outgroup member which has a detrimental impact on their sense of belonging to where they live. Therefore, being a “mere actuarial minority” would also have negative mental health consequences. This is in line with studies finding group identity associations in individuals with both high and low cultural capital as well as in “leave” and “remain” groups (Saville, 2020; Saville & Mann, 2022). It is also consistent with findings that there are higher prescriptions of psychiatric medication in individuals who live in closer proximity to peace lines – which are a physical reminder of a salient group division (Maguire, French, & O'Reilly, 2016).

In both of these situations, individuals who sense themselves as outsiders in their local community may experience restricted access to social capital and whether real or perceived, the absence of the “buffering” influence offered by social capital could potentially have a detrimental impact on mental health (Bécares & Nazroo, 2013). This, in turn, might contribute to a cycle, fuelling further feelings of alienation.

1.7 LANGUAGE, IDENTITY AND POWER

“Language, identity, place, home: these are all of a piece - just different elements of belonging and not-belonging.” - Jhumpa Lahiri.

Early ecological studies suggested that a lack of social cohesion and poor channels of communication between groups within communities are plausible explanations for higher rates of mental illness in addition to negative treatment and discrimination based on minority status (Durkheim, 1897; Faris & Dunham, 1939; Muhlin, 1979). More recent studies have suggested that concepts related to identity and social capital likely have a role in group density relationships (Baker *et al.*, 2021). However, it appears there has been limited exploration of these mechanisms in the literature, particularly in relation to psychosis (Morgan, Knowles, & Hutchinson, 2019).

With these ideas in mind, one notable gap in the literature is that there has been limited exploration of the degree of similarity between the language that a person speaks and the linguistic composition of their local area – hereafter, this will be termed linguistic group density. Language is a very identity-laden characteristic. The language a person speaks is a salient marker of group membership, *i.e.*, if a person speaks language “x” they are a member of group “x” (Williams, 2009). Additionally, language

is a core part of a person's identity, with an individual's native language or mother tongue often referred to as the "language of the heart". As the language of their country and the language used to communicate with their friends and family, a person has a strong emotional attachment to their native language (Ivaz, Costa, & Duñabeitia, 2016). There is also evidence that people experience the world differently when they use their mother language, for example, studies have found that people process emotional content differently in their native language – with evidence that it is associated with greater emotional resonance (Wu & Thierry, 2012).

Issues of language and identity are often used as a political tool to appeal to people's intergroup bias and stoke anti-immigrant sentiment. For example, as well as UK politicians use of dehumanising terms such as "swarm" and "invasion" to refer to migrants (Kirkwood, 2017). Nigel Farage, the former leader of the UK Independence Party [UKIP] used language as a way of othering non-English speakers and portraying speakers of languages other than English as a threat to British culture. At a UKIP conference in 2014, he said:

"I got the train the other night, it was rush hour, from Charing Cross, it was the stopper going out. We stopped at London Bridge, New Cross, Hither Green...It wasn't until after we got past Grove Park that I could actually hear English being audibly spoken in the carriage. Does that make me feel slightly awkward? Yes...I wonder what's really going on. And I'm sure that's a view that will be reflected by three quarters of the population, perhaps even more...That does not mean one is anti-immigration, we're not anti-immigration, we want immigration, but we do absolutely believe we should be able to judge it both on quantity and quality." (Evening Standard, 2014)

Languages differ in terms of their power and status – as Noam Chomsky stated, "questions of language are questions of power" (1979, p.191, cited in May, 2012) states May (2012, p.1) defines a majority language as "a language of greater power, prestige, influence and/or communicative reach". The reason that a person does not use their native language is generally not through personal choice, rather it is because they find themselves pressurised into reducing or relinquishing the use of their native language because in that linguistic context, another language is more powerful (May, 2012). Issues of language are socially salient because the reduction in speakers of a

particular language is often the result of deliberate processes of minoritisation. For example, English remains the most widely spoken language in the world because of England's colonial past. There are approximately 1.5 billion English speakers worldwide, the English language is an official language in over fifty countries and the default language of many of the world's international organisations *e.g.*, the United Nations. The linguistic hegemony of the English language came about because England imposed their language and culture on other countries and disempowered speakers of other languages by making English the default language in social, cultural and political arenas (Yoo & Namkung, 2012). English remains a powerful language and the ability to speak English offers many advantages in terms of the increased opportunities and resources available to people with English proficiency.

A linguistic minority can be broadly defined as an individual whose native language is different to the majority-spoken language of the country in which they live (UN, 1992). However, there are a range of factors behind the linguistic compositions of areas – this is discussed in depth in Civico (2019). With reference to the work of Appel & Muysken (2005), Civico (2019, p.3) explained how countries where more than one language is spoken are generally characterised by one of the following:

- “1) two languages are spoken by two different groups and each group is monolingual, typical, for example, of early colonial settlements, where the colonizer and the colonized would each speak his or her own language;
- 2) two languages are spoken and everybody is bilingual, a situation often found in many African countries, where individuals often have command of the language of the former colonizer in addition to one or more local languages;
- 3) two languages are spoken, but one group is monolingual and the other is bilingual. An example of this type might be Ireland, where virtually everyone has full command of English and some are also able to speak Irish, though at different levels of fluency. A similar example is to be found in Friesland, a region in the North of the Netherlands, with Dutch and West Frisian.”

At the neighbourhood-level, the concepts of minority status, identity and power become more complicated – particularly in scenario one and three. A person whose first language is different to that of the majority spoken language of their country might

feel their sense of belonging is destabilised if they live in a neighbourhood where fewer others share their language. If they have lower proficiency in the majority language, this also introduces more practical barriers, for example, accessing social capital and social support in their local area. However, it is more commonly the case that minority language speakers will be able to speak both their native minority language and the majority language of their country.

A person whose first language is the majority spoken language in their country might also feel a diminished sense of belonging in an area if they live in a neighbourhood where there is a higher proportion of people with a native language that is different to their own. However, because this group are more typically monolingual, there are more likely to find themselves in a position where they do not understand a widely spoken language in their local area. This group might therefore be more likely to experience barriers to social capital. See footnote for examples.¹²

When considering how the inability to comprehend a spoken language in our surroundings may constitute a risk factor for psychosis, Thomas *et al.*, (2017) drew parallels with the literature around hearing loss and paranoia (Thewissen *et al.*, 2005). It was proposed that the experience of not being able to understand our social world is stress inducing and makes it more likely for the thoughts and intentions of others to be misinterpreted as threatening, and thus confer risk of paranoia (Thomas *et al.*, 2017; Thewissen *et al.*, 2005).

1.8 A LINGUISTIC GROUP DENSITY EFFECT?

Studies that have examined group density associations in minoritised ethnic groups have suggested that linguistic factors *i.e.*, proficiency in the majority language are likely to be an important mechanism, particularly in first-generation migrants (Anglin, 2020; Dykxhoorn *et al.*, 2020;). However, the association between linguistic status and local level linguistic context has yet to be tested directly. An early group density study looking at minoritised ethnic groups in the UK did look at a potentially moderating role of linguistic status on group density associations in several minoritised ethnic groups in the UK (Halpern & Nazroo, 2000).¹³ This study found that adjusting for

¹² For example, in the context of Welsh speakers in English speaking neighbourhoods in Wales, French speakers in English speaking neighbourhoods in Canada, Māori speakers in English speaking neighbourhoods in New Zealand. Speakers of the minority language in their country (Welsh, French, Māori) are more likely to be bilingual than their linguistic majority counterpart.

¹³ Study included the following minoritised ethnic groups – Caribbean, Indian, African Asian, Pakistani, Bangladeshi

fluency in the majority language did weaken group density relationships. Further, this attenuation was strongest for psychotic experiences, as opposed to a more general measure of mental health (Halpern & Nazroo, 2000). However, less proficiency in the majority language was associated with *reduced* reporting of psychotic experiences. This study also found that factors related to lower “acculturation” (fluency in the majority language and older age at migration) explained more variance than own group density. The authors proposed an acculturation-bias hypothesis to explain this finding, suggesting that Westernised mental health assessments are poorer at identifying psychotic experiences in ethnic minorities who are less assimilated with Western culture, thus a group density effect is observed because such individuals are more likely to live in high own group areas (Halpern & Nazroo, 2000). This study, however, was conducted before multilevel models were standard practice in the group density literature, therefore findings should be interpreted with caution as it did not adjust for both the individual and area-level factors that are known to be important confounders in group density associations.

Studies into generational differences in group density relationships have perhaps provide the best clues about the importance of linguistic factors in group density associations. Given that first generation migrants are less likely to have proficiency in the majority spoken language of their host country (Anglin, 2020), if lower own group density confers a greater risk of psychosis to first generation migrants than to second generation migrants, this might suggest that linguistic factors play an important role in this risk. However, to date, only two studies have examined whether group density associations are stronger in first generation or second-generation migrants and findings are mixed (Dykxhoorn *et al.*, 2020; Schofield *et al.*, 2018). A study conducted in Sweden found that associations were similar in first- and second-generation migrants (Dykxhoorn *et al.*, 2020), but a study carried out in Denmark found that lower group density posed significantly greater risk to second-generation migrants (Schofield *et al.*, 2018). The authors suggested that difficulties navigating identity might have an explanatory role, *e.g.*, for second generation migrants the experience of living in low own group density communities might contribute to a marginalised (disconnect from both host and cultural identities) or assimilated identity (relinquishes cultural identity at the expense of identifying with the host culture) – both of which have been found to be associated with poorer mental health (Berry, 2005; Schofield *et al.*, 2018).

1.8.1 Linguistic minority status

There have been studies that have explored the relationship between linguistic minority status and mental health, but few have examined this in relation to psychosis. One such study conducted in Finland examined schizophrenia risk in Finnish and Swedish speaking Finns (Suvisaari *et al.*, 2014). Swedish speaking Finns are born in Finland and Swedish is recognised as an official language in Finland, but Swedish speaking Finns comprise a small minority of around five percent of the population. Compared with the Finnish speaking majority, Swedish speakers live longer, are more educated, have higher income, and have decreased rates of divorce and unemployment. The authors also cited evidence suggesting that Swedish speaking communities are associated with increased social participation and social capital (Hyypä & Mäki, 2003). Suvisaari and colleagues (2014) found a decreased risk of schizophrenia in the Swedish speaking minority relative to the Finnish speaking majority which was more marked in males. Notably, this study adjusted for parental employment but no measure of socioeconomic status. The authors concluded that the higher socioeconomic position and access to social capital in the Swedish speaking minority is likely protective and that the increased risk of schizophrenia observed in minority groups might not necessarily extend to minorities who experience social advantage.

Several studies examining the association between linguistic minority status and mental illness have been conducted in Canada. French and English are official languages in Canada, but French-speaking Canadians comprise a minority of about 23% of the population while English speaking Canadians make up approximately 75% of the population. However, in Quebec a majority of around 85% of the population are French-speaking Canadians (Statistics Canada, 2016). Vasiliadis *et al.*, (2012) found no difference in the prevalence of mental health conditions between the English-speaking Canadian majority and the French speaking Canadian minority after adjustment for socio-demographic and economic factors.¹⁴ Another study examined the association between linguistic minority status (*i.e.*, French speaking Canadians living outside Quebec and English speaking Canadians within Quebec) and found no difference between the minority and majority group in terms of their risk of mental illness (Puchala *et al.*, 2013). Chartier *et al.*, (2014) reported similar findings – there

¹⁴ Analyses adjusted for “age, sex, education, income, marital status, born in Canada/immigrated, province of Quebec, presence of a chronic condition and psychological distress in the past month”.

were no differences in risk of mental disorders between English speaking and French speaking Canadians after adjustment for covariates, though there was some evidence of a lower risk of substance abuse and suicidal behaviour in French speaking Canadians outside of urban areas.

There has been limited exploration of other linguistic minority groups in Canada, but one study found that areas with higher proportions of aboriginal language speakers has lower youth suicide rates than in areas with a lower density of aboriginal language speakers (Hallett, Chandler & Lalonde, 2007). Linguistic minority status also appears to be a significant risk factor in migrants to Canada – a twenty-five year retrospective cohort study of almost two million migrants found that just over a third of the sample spoke neither English or French and this was associated with a significantly increased risk of psychosis relative to the majority English speakers (Anderson *et al.*, 2022).

Further epidemiological evidence has found that linguistic factors are associated with elevated risk of psychosis in migrants to Europe (Jongsma *et al.*, 2020). This study looked at linguistic distance as a risk factor for psychosis which was operationalised as the degree of similarity to the majority language and fluency in the majority language.¹⁵ Overall, linguistic distance was associated with increased odds of psychotic disorders in several ethnic minority groups across seven European countries. In first generation migrant, linguistic distance conferred greater risk, while in second generation migrants, social disadvantage was more of an important factor. This study also found that after adjustment for linguistic distance (and social disadvantage), the risk of psychosis was similar in the ethnic minority and white majority group.

A later study by Alherz, Almusawi and Alsayegh (2022) examined associations between diglossia and psychosis in migrants to the UK, USA, Canada, Australia, New Zealand, and Ireland. Diglossia refers to a “hierarchical relationship in which the mother tongue contends unfavourably with a prestigious, imposed, and socially

¹⁵ A description of the linguistic distance variable taken from Jongsma *et al.*, (2020, p.1538): “Linguistic distance was operationalised using two measures: language distance and fluency in the majority language (Candelo, Croson, & Li, 2017; Koczan, 2016; West & Graham, 2004). We estimated language distance by scoring each participant’s first language as a function of distance on a language tree from the majority language in their country of residence (i.e., England, France, Spain, etc). Scores were rated from 0 (participant first language same as majority language in the country of residence) to 3 (participant first language from a different language family to majority language). Fluency in the majority language was a single, self-rated item and was rated on a 10-point scale. Variable - binary linguistic distance variable: no linguistic distance (language distance = 0, fluency = 10) or some linguistic distance (language distance ≥ 1 and/or fluency ≤ 9)”

desired language summarizes the individual experience of diglossia” (Alherz, Almusawi & Alsayegh, 2022, p.2). This study found a significant association between individuals who screened positive for diglossia and prodromal experiences of psychosis.

Finally, one study conducted in the United Arab Emirates examined the interplay between linguistic status, identity, and paranoia (Thomas *et al.*, 2017). The authors explained increasing expatriate population in the United Arab Emirates is causing a decline in the use of the Arabic language, particularly amongst younger Emiratis. Also, Emiratis in the United Arab Emirates are now a minority, comprising around 11% of the country’s population. The country is therefore becoming increasingly Westernised, for example, the education system is increasingly following Western curriculum and being taught in English. In a non-clinical sample of female Emirati students, this study found that individuals who had a less favourable view of their Emirati identity and lower proficiency in Arabic reported higher levels of persecutory ideation.

Studies into linguistic minority status and risk of mental illness reveal mixed findings – based on the existing literature, it is difficult to determine whether linguistic minority status is associated with poorer mental health. Further, the absence of studies examining the association between individual level linguistic status and local level linguistic composition is a clear gap in the evidence-base. Examining whether group density relationships extend to linguistic groups could help to elucidate the mechanisms behind these associations.

The reason why there is limited research in this area might be that it is difficult to tease apart any potential mental health risk associated with linguistic minority status as it is often conflated with many other known risk factors for psychosis, such as minoritised ethnic group status and urbanicity – for a discussion of the challenges sociolinguistic factors as a risk factor for psychosis see Alherz (2022).

1.9 THE WELSH CONTEXT

Wales presents an interesting social context within which to explore potential linguistic group density associations. Wales is one of four countries that make up the United Kingdom along with England, Scotland, and Northern Ireland. The population of Wales is 3.1 million, with neighbouring England having a population of approximately 56 million. Welsh and English are national languages in Wales, but

Welsh is only spoken by approximately 19% of the population. However, in many areas of Wales, Welsh speakers comprise the majority (Office for National Statistics, 2011). The map of Wales in Figure 7 shows the proportion of people in each MSOA who reported that they “can speak Welsh” in the 2011 UK census – higher Welsh speaking areas are shown in the darker colours. The map shows marked geographical variation in Welsh speakers, but the most Welsh speaking areas are situated in the West of the country, particularly in local authorities of Ynys Môn (Isle of Anglesey) and Gwynedd situated in the northwest of the country where the majority of the population are Welsh speakers. There are very few monolingual Welsh speakers and as is typically the case with linguistic minority groups, the majority of Welsh speakers are also proficient in the majority language, English. First language English speakers on the other hand, are less likely to know both languages. As shown in the second map (Figure 8), the proportion of people who have a Welsh national identity is high in the predominately Welsh speaking areas of northwest Wales, but Welsh national identity is also particularly high in the south of the country in the country’s capital, Cardiff and the south Wales valleys, where Welsh is less widely spoken.

Wales is a suitable context for a relatively clean test of a potential linguistic group density association because there is significant geographical variation in the rates of Welsh speakers, but Welsh speakers and non-Welsh speakers typically share a common White British ethnic identity.¹⁶ Therefore, linguistic status is not conflated with other known risk factors for psychosis, including ethnic minority status (Alherz, 2022).

In terms of other demographic characteristics, Wales is more rural than neighbouring England, with nine of the twenty-two (41%) local authorities in Wales being classified as rural¹⁷ and around a third of the population living in rural local authorities, compared to 20.9% in England (Scott, 2018; Welsh Government, 2008).

¹⁶ Identify as White English, Scottish, Welsh, Cornish, Northern Irish, or British

¹⁷ Rural Authorities. The nine authorities in Wales with population density below the Wales average of 140 persons per square kilometre: Isle of Anglesey, Gwynedd, Conwy, Denbighshire, Powys, Ceredigion, Pembrokeshire, Carmarthenshire, and Monmouthshire.

Valleys authorities. The five authorities that have parts of the Heads of the Valleys action area.:

Rhondda Cynon Taff, Merthyr Tydfil, Caerphilly, Blaenau Gwent, and Torfaen.

- Urban authorities. Local authorities containing the three largest settlements in Wales: Swansea, Cardiff and Newport.

- Other authorities not included above. Flintshire, Wrexham, Neath Port Talbot, Bridgend, and Vale of Glamorgan.

Wales is also relatively ethnically homogenous – according to the 2011 census, 93% of the population of Wales are White British and non-White ethnic groups comprise only 4% of the population (Welsh Government, 2012). There is some variation in the rates of population density and deprivation which are higher in south of the country, including Cardiff and the surrounding south Wales valleys. The more urban areas of the country also comprise the highest proportion of non-White ethnic minorities.

To summarise, Wales provides a unique study setting which can hopefully offer new insights into the group density effect. To date, most of the group density literature has been conducted in large cities in England and the Netherlands (Baker *et al.*, 2021). The Welsh context provides the opportunity to tease apart potential density associations for linguistic status and mental health, if this was explored in London for example, ethnic minority status and linguistic minority position are more conflated in these urban areas. Further, there is a dearth of group density studies that have been carried out in a more rural context – this will also address a key gap in the literature.

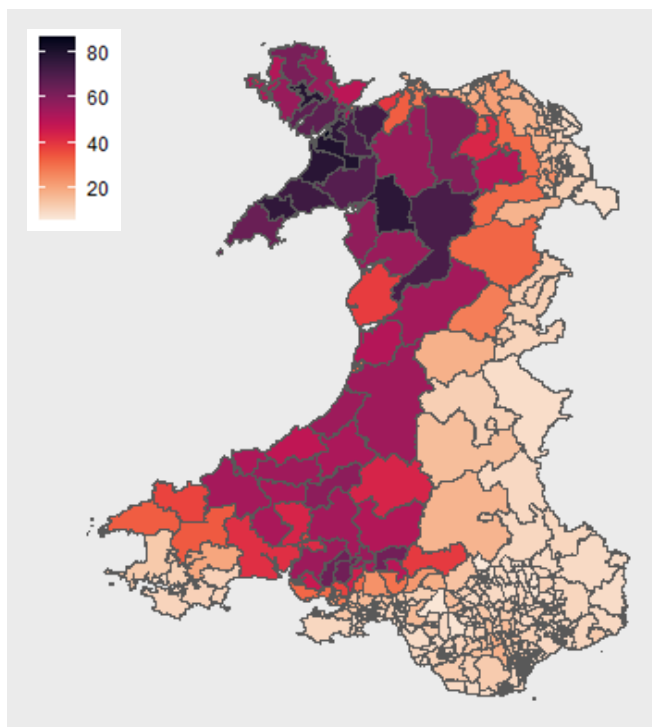


Figure 7. Map of Wales showing the proportion of people in each MSOA who reported that they “can speak Welsh” in the 2011 UK census.

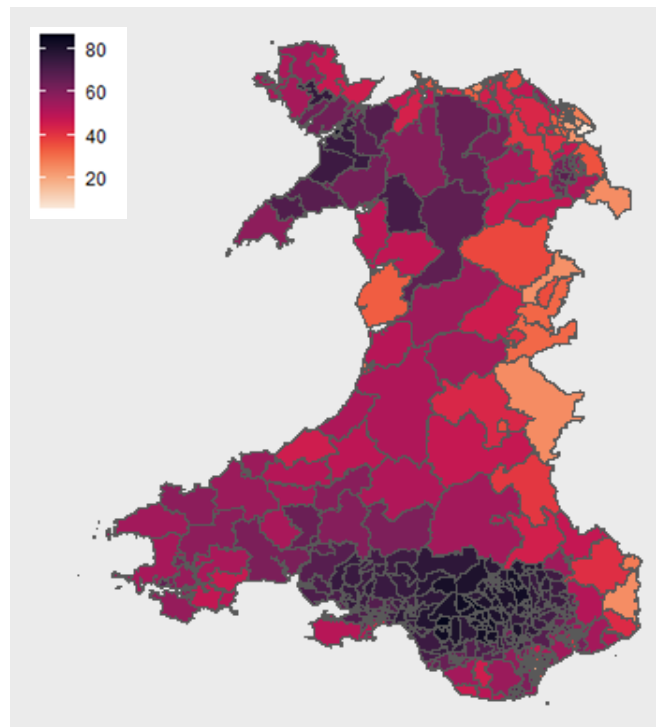


Figure 8. Map of Wales showing the proportion of people in each MSOA who reported having a Welsh only national identity in the 2011 UK census.

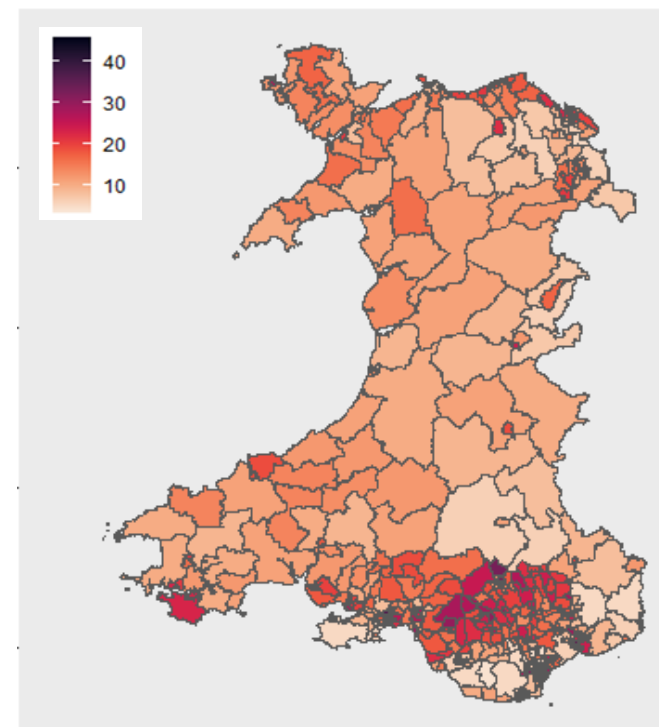


Figure 9. Map of Wales showing the proportion of income deprivation in each MSOA.

¹⁸ Maps made using R packages (R Core Team, 2021) ggplot2 (Wickham, 2016) and viridis colour maps (Garnier *et al.*, 2021).

1.10 THE FIVE-WALES MODEL

Issues of language, identity and status are complicated in Wales – in political science, Balsom’s (1985) influential three-Wales model separated the country into three distinct regions based on their national identity and whether or not they speak Welsh. The first region, “Y Fro Gymraeg” (the Welsh speaking country) comprises the Welsh-speaking heartlands situated in the West of the country – these areas are predominantly rural and strong Welsh identifying, and more associated with support for the Welsh nationalist political party, Plaid Cymru. The second area, “Welsh Wales” consists of the capital city, Cardiff, and the surrounding south Wales valleys, covering many of the country’s former coalmining communities. This area also has a strong sense of Welsh identity but is more working class and associated with voting for the Labour party. The final region “British Wales” comprises Pembrokeshire and the East of the country closer to neighbouring England. These places are less Welsh identifying and are more likely to subscribe to other national identities (*e.g.*, English or British). British Wales is more associated with support for the Conservative and Liberal Democrat parties (Saville, 2020).

Building on Balsom’s three-Wales model (1985), Saville (2022) used latent class analysis to delineate identity groups in Wales and examine the geographical distribution of these groups. This study was also the first to examine identity-based health disparities in Wales. Five distinct groups were identified – Anglophone Welsh, British, Cymry Cymraeg (Welsh-speaking Welsh), English and Ethnically Diverse. The geographical distribution of these groups can be found in Figure 10.

The Anglophone Welsh were the largest group – comprising mostly of Welsh identifying English speakers. A minority of this group were Welsh speakers but did not use Welsh regularly. The British group was mostly British identifying English monolinguals with a small amount reporting a Welsh or English national identity. The Cymry Cymraeg group chiefly consisted of Welsh speakers who spoke Welsh regularly and reported a Welsh only national identity. The English group were mostly English monolinguals who more often identified as English only. This group were older, more clustered in deprived areas and had lower income. Finally, the Ethnically Diverse group were more likely to identify as British than Welsh or English and very few of this group spoke Welsh. This group mostly comprised ethnic minority individuals who identified as White Other, followed by Asian, and then Black, Arab

or other ethnicities.

In terms of the demographic characteristics of these groups, the Cymry Cymraeg and British groups were typically the most socially advantaged while the Anglophone Welsh and English groups were more disadvantaged – they typically had lower educational attainment and income, higher material deprivation, and were more concentrated in deprived areas. The Ethnically Diverse group were relatively polarised, they had higher educational attainment but were over-represented in both the highest and lowest income bands. They were also more materially deprived and more clustered in urban, deprived areas.

This study found significant group disparities in health with the Cymry Cymraeg and Ethnically Diverse group demonstrating significantly better general and mental health, particularly in relation to the Anglophone Welsh and English groups. These associations held after adjustment for individual and area-level confounding variables.

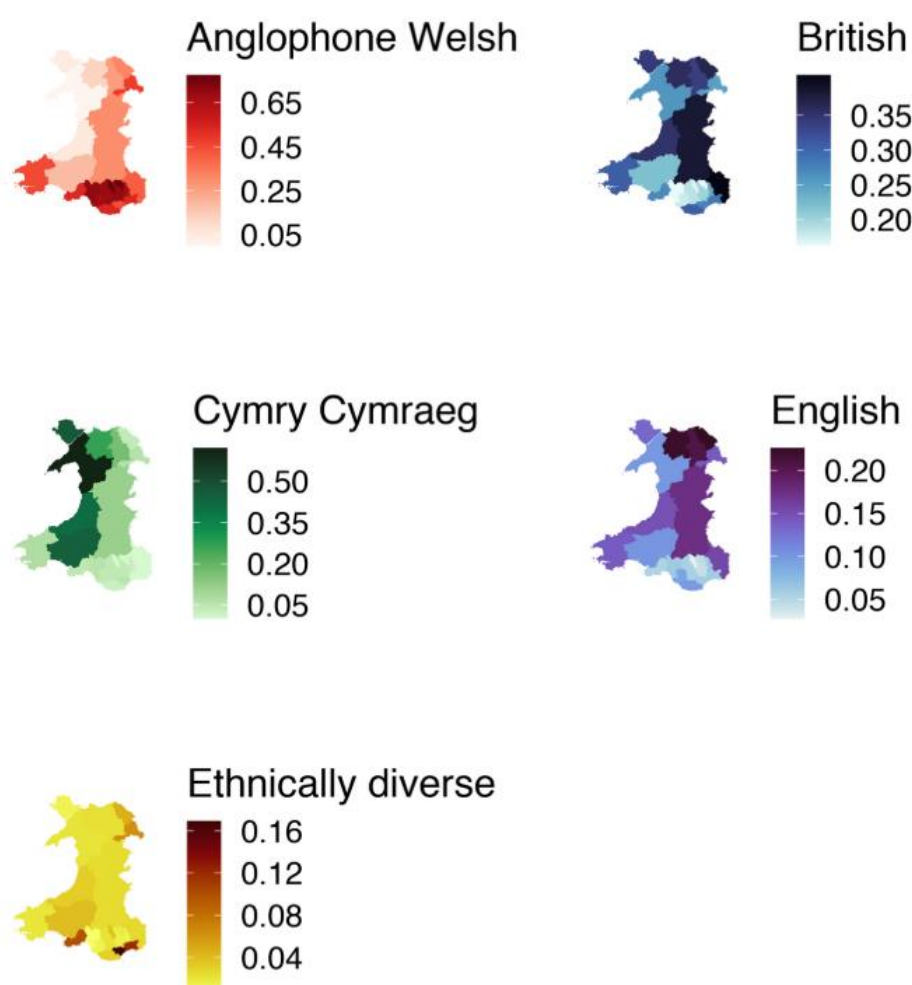


Figure 10. The Five-Wales model – taken from Saville (2022).

1.11 A BRIEF HISTORY OF THE WELSH LANGUAGE

The aim of this section is to provide further context to this thesis by providing a brief overview of the history of the Welsh language. This will include a summary of key events that influenced the trajectory of the Welsh language and Welsh-English relations.

1.11.1 Origins of the Welsh language

Welsh is one of the oldest languages in Europe originating from Brythonic which was the predominantly spoken language of Wales, England, and Southern Scotland during the Roman invasion of 43AD. It is thought that Welsh became a distinct language between the period of 400-700 AD (Dysgu Cymraeg, 2023). Welsh is an Indo-European language and one of six of the living Celtic languages, along with Irish (Ireland), Breton (Brittany), Scottish Gaelic (Scotland), Cornish (Cornwall), and Manx (Isle of Man).

1.11.2 English invasion of Wales

As is often the case with minority languages, the decline of Welsh speaking was not naturally occurring, rather, brought about by deliberate attempts of language minoritisation by England (May, 2012). This began in the thirteenth century when Wales was invaded and annexed by Edward I of England (Smith, 1981). Following a series of mostly unsuccessful Welsh uprisings, in the early sixteenth century, Henry VIII passed the 1536 Act of Union which saw Wales governed by English law with Section 20 of the Act explicitly discriminating against the Welsh language. Part of this act read:

“From henceforth, no person or persons that use the Welsh speech or language shall have or enjoy any manner office or fees...unless he or they use and exercise the speech or language of English” (cited in Williams and Raybould 1991, p.2).

Davies (2007) points out that this was the beginning of notions of Welsh speakers being perceived as lower class while English speakers were seen as higher class with Welsh speakers being offered government roles for opting to speak English instead over their native Welsh. Section 20 was only definitively repealed in 1993 following the introduction of the Welsh Languages Act. The Welsh language was thought to

experience some revival when the bible was translated into Welsh by Bishop William Morgan in 1588.

1.11.3 The industrial revolution, the treachery of the blue books, and the Welsh Not

This period was one of social upheaval for Wales – from the beginning of the industrial revolution in 1760 (Dysgu Cymraeg, 2023), in the early 19th century, there was a surge in the population of Wales, with significant English and Irish in-migration to the South Wales Valleys (Davies, 2007). Following industrialisation, conflicts arising between Welsh workers and English landowners resulted in a series of riots, including the Newport Rising and the Rebecca Riots (Davies & Jenkins, 2008; Williams, 2009). A significant event during this era was “the treachery of the blue books” in 1847 – which refer to the publication of Westminster commissioned report into the “state of education in Wales” which stated that the Welsh language is:

“a vast drawback to Wales, and a manifold barrier to the moral progress and commercial prosperity of the people. It is not easy to overestimate its evil effects” (cited in the Open University, retrieved March 2023).”

The Welsh language was actively discouraged throughout the 19th century. Schools were reported to have used the “Welsh Not” – a “token” made from wood that a child would wear round their neck as punishment if they were caught speaking Welsh in school (Khleif, 1979). Despite significant population changes and continued English oppression, the Welsh language remained the majority spoken language in the early 1800s up until 1911 when the percentage of Welsh speakers dropped to 43.5%, dropping again to 37.1% in 1921 (British Broadcasting Corporation [BBC] Wales, 2023). In 1925, the Welsh nationalist political party, Plaid Cymru were established with the aim of establishing a Welsh government and preserving the Welsh language (Christiansen, 2003). Welsh language campaigners brought about several positive changes for the Welsh language from the 1930s, including the first Welsh medium schools, broadcasting in Welsh, and the repealing of the Welsh Courts Act 1942 which meant that people had the right to speak Welsh in a court of law.

1.11.4 Flooding of Tryweryn

Another significant event was the flooding the small Welsh speaking community of Capel Celyn in 1965. In 1957, Liverpool City Council sought permission from Parliament to deliberately submerge the Tryweryn valley to create a reservoir to supply

water to Liverpool and the Wirral. Despite protests (see Figure 11) and Welsh Members of Parliament voting against the bill, this was not enough for it to be stopped. When the valley was submerged, homes, schools, churches, and shops were destroyed and all those who lived in the valley were displaced (Williams, 2009).



Figure 11. A photograph the protests against the flooding of Tryweryn – image taken from North Wales Live.¹⁹

1.11.5 Devolution

In the 1970s-80s, Welsh language media outlets were established including BBC Radio Cymru in 1977 and Welsh language TV channel S4C in 1982. Also, during this period, a referendum was held in 1979 to decide on the formation of a devolved Welsh Assembly Government which would give Wales more power over how the country is governed. Wales initially voted against this but in 1997, narrowly voted in favour of devolution. Votes in support of the Welsh Assembly were markedly higher in the Welsh-speaking heartlands (Williams, 2009).

Despite the resurgence of the Welsh language in the 1990s, anti-Welsh rhetoric remained prevalent. For example, the English journalist A.N. Wilson, wrote in the *Evening Standard* in 1994:

¹⁹ <https://www.dailypost.co.uk/news/local-news/protests-over-drowning-tryweryn-remembered-2638329>

“The Welsh have never made any significant contribution to any branch of knowledge, culture or entertainment. Choral singing – usually flat – seems to be their only artistic achievement. They have no architecture, no gastronomic tradition, and, since the Middle Ages, no literature worthy of the name. Even their religion, Calvinistic Methodism, is boring” (Cited in Moss, 1994, p.26).

1.11.6 Present day

Another point of contention between England and Wales revolves around the loss of European Union [EU] Structural Funds following the UK’s decision to leave the EU in 2016. This funding was allocated to disadvantaged areas of Wales to support economic development and reduce regional disparities. Despite the overall vote favouring leave in Wales, there is evidence suggesting that Welsh-speaking communities, many of whom benefit from these funds, predominantly voted in favour of remaining. Moreover, there are indications that areas with large English communities played a role in influencing the vote towards leaving the EU.²⁰ Additionally, the Shared Prosperity Fund – the funding offered by the UK Government to Wales in lieu of EU funding – does not match the previous funding levels and is significantly lower. The diminished influence of the Welsh government in the implementation of this funding has resulted in a negative impact on Welsh organisations that rely on European funding.

Another issue that continues to face Welsh communities is the second home crisis – which relates to increasing house prices in rural Wales because of English buyers purchasing property for retirement or as holiday homes. The increases in house prices, often in high Welsh speaking communities means that it is becoming increasingly difficult for local people to get on the property ladder.

In 2021, the Welsh Government introduced “Cymraeg 2050” – a strategy targeted at boosting the Welsh language by aiming for one million Welsh speakers in Wales by 2050 (Welsh Government, 2021). As of the most recent 2021 UK census, rates of Welsh speakers dropped slightly from 19% percent of the population in 2011 to 17.8% in 2021. See Figure 12. for rates of Welsh speaking from 1921-2021.

²⁰ Professor Danny Dorling, a geographer at Oxford University, presented this evidence during the British Science Association’s annual meeting at Warwick University:
<https://www.theguardian.com/uk-news/2019/sep/22/english-people-wales-brexit-research>

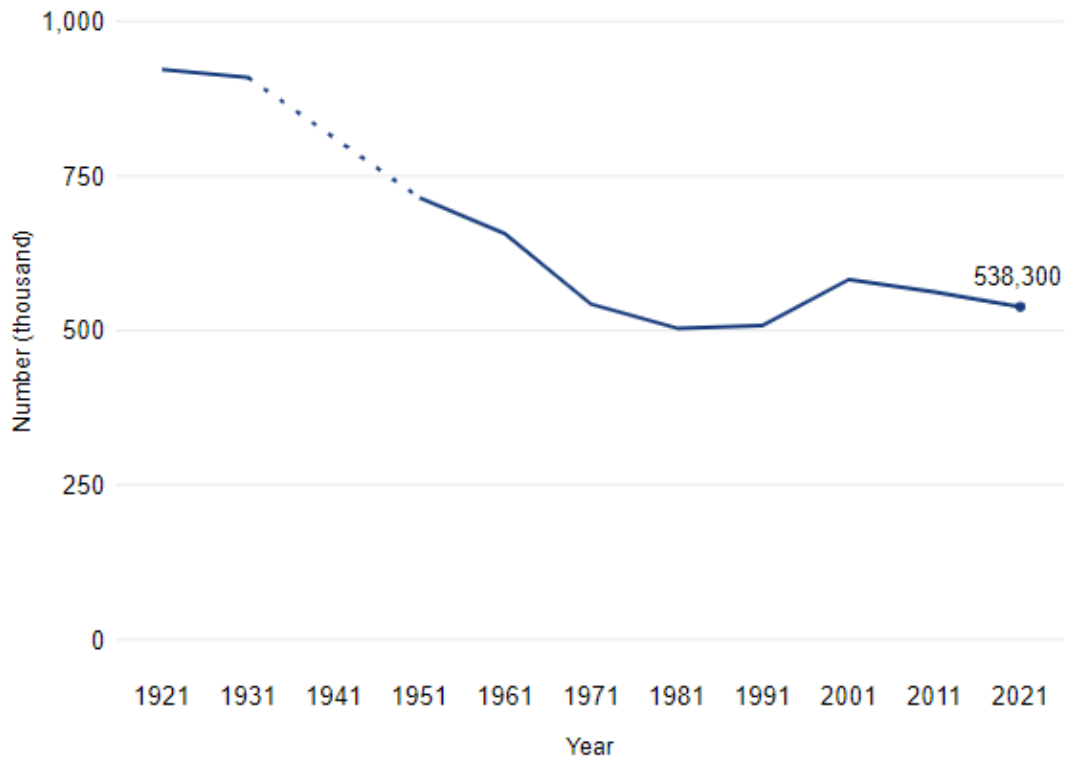


Figure 12. Graph showing the trajectory of Welsh speakers over time (from 1921-2021). Taken from Welsh Government report, Welsh language in Wales (Census 2021)²¹

1.12 EVIDENCE GAPS

With reference to Mile's (2017) taxonomy of research gaps, the thesis aims to address three main gaps in the group density evidence-base:

1. Knowledge gap: the evidence-base primarily comprises studies that have examined group density relationships in racially minoritised groups and migrants. Studies have examined linguistic identity as a risk factor for mental illness but there is a dearth of studies exploring this at a more local level. This thesis will address these gaps by examining whether group density associations extend to socially salient linguistic identities in Wales.
2. Methodological gap: Most group density studies have used epidemiological methods. While these studies are valuable, these methods are not well-equipped to capture the subjective experience of group density. This thesis will therefore incorporate a qualitative component which will involve exploring

²¹ Welsh government (2022) report Welsh language in Wales (Census 2021) can be accessed here: <https://www.gov.wales/sites/default/files/pdf-versions/2022/12/3/1671609478/welsh-language-wales-census-2021.pdf>

own linguistic group density from the perspective of individuals with experience of psychosis.

3. Theoretical gap: Group density relationships in mental health are well-established, however, little is known about the processes driving these associations. Building on existing theoretical frameworks, this thesis will use study findings to generate new insights into possible mechanisms which will hopefully pave the way for future research.

1.13 RESEARCH QUESTIONS

This thesis has two main research questions:

1. Is there evidence of a linguistic group density association for mental illness in Wales?
2. What are the possible mechanisms behind these associations?

1.14 THE STRUCTURE OF THIS THESIS

Chapter 2. Reports the findings of a systematic review and multilevel meta-analysis of the group density effect in psychosis. This review aims to gain an in-depth understanding of the group density effect and its possible moderators. This will provide the foundation for this thesis.

Chapter 3. Explores the subjective experience of linguistic group density from the perspective of individuals with experience of psychosis to gain insights into possible mechanisms.

Chapter 4. Tests the presence of a linguistic density association for mental illness. Mixed effects modelling will be used to examine whether the risk of mental illness in Welsh and non-Welsh speakers is moderated by the linguistic composition of their local area. Mental health outcome measures include self-report of a mental health condition and a psychosis analogue variable (conspiratorial beliefs about Covid-19.)

Chapter 4. The general discussion will tie the thesis findings together, this will include comparisons with previous research, a proposal of a group density model, an overview of the implications, strengths and limitations, and suggested avenues for future research.

Chapter 2: A systematic review and multilevel meta-analysis of the group density effect in psychosis

This review has been published and this chapter is a slightly modified version of the published article:

Baker, S. J., Jackson, M., Jongsma, H., & Saville, C. W. (2021). The ethnic density effect in psychosis: a systematic review and multilevel meta-analysis. *The British Journal of Psychiatry*, 219(6), 632-643. DOI: [10.1192/bjp.2021.96](https://doi.org/10.1192/bjp.2021.96)

2.1 INTRODUCTION

Compared to their majority counterparts, racially minoritised and migrant groups are at greater risk of mental health difficulties (WHO Regional Office for Europe, 2010), particularly psychosis (Jongsma *et al.*, 2019; Leane *et al.*, 2019; Selten *et al.*, 2019; Selten & Termorshuizen, 2017). This excess risk is not observed in migrant groups' countries of origin (Dykxhoorn & Kirkbride, 2019), nor can it be explained by diagnostic biases or genetic risk factors (Morgan, Knowles & Hutchinson, 2019). Interestingly, this elevated risk appears to be somewhat context-dependent, such that minority group members living in neighbourhoods with a low proportion of their group are more likely to experience psychosis than those residing in areas where their group is well-represented (Anglin, 2020). This association, termed the “ethnic” or “group” density effect, operates in a dose-response manner (Boydell *et al.*, 2001), holds after adjustment for socioeconomic deprivation (Bosqui, Hoy & Shannon, 2014), and is proposed to act as a buffer against the disproportionate levels of social disadvantage experienced by minorities (Das-Munshi *et al.*, 2012). Most studies have focussed on minorities classified by their ethnicity or migratory background, but poorer mental health has also been observed in minority groups defined by other characteristics including LGBTQIA+ status (Hatzenbuehler *et al.*, 2011; Post & Veling, 2019), political affiliation (Saville, 2020), and religion (Murphy & Vega, 1982). As the present review will include minorities grouped by other ‘non-ethnic’ social characteristics in addition to ethnic minorities and migrants, hereafter we will use the

term “group density” instead of “ethnic density”.

So far, there have been three reviews of the group density effect in psychosis (Bécares *et al.*, 2018; Bosqui, Hoy, & Shannon, 2014; Shaw *et al.*, 2012), all of which examined associations in groups defined by minoritised ethnic or migrant status. At present, it is unclear whether lower own group density areas confer the same risk across different minority groups. The most recent meta-analysis found that ethnic group did not moderate group density associations (Bécares *et al.*, 2018). However, narrative reviews noted that studies examining pooled ethnic minority samples tended to report more consistent effects than studies assessing specific minorities, which yielded mixed results (Bosqui, Hoy, & Shannon, 2014; Shaw *et al.*, 2012). Specific minoritised groups have different social experiences so investigating group density relationships in combined samples might mask important group differences (Bosqui, Hoy, & Shannon, 2014; Das-Munshi *et al.*, 2012). Identifying heterogeneity in effect sizes between different minoritised groups, ethnic and otherwise, may elucidate potential causal mechanisms (Schofield *et al.*, 2016). More broadly, identifying moderators of this phenomenon is important for understanding the aetiological underpinnings of psychotic disorders and for providing targeted clinical and policy interventions for minorities (Bécares *et al.*, 2018; Bosqui, Hoy & Shannon, 2014; Morgan, Knowles, & Hutchinson, 2019). In this review, we aim to conduct a comprehensive systematic review and meta-analysis of the group density effect in psychosis and examine potential moderators, particularly those associated with specific minority groups.

2.2 METHOD

This review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses [PRISMA] (Moher *et al.*, 2009) and Meta-analysis of Observational Studies in Epidemiology [MOOSE] guidelines (Stroup *et al.*, 2000). The protocol for this review was pre-registered on PROSPERO (reference: CRD42019139384). Deviations from protocol can be found in Appendix 1.

2.2.1 Search strategy

In May 2019, SJB conducted electronic searches of four databases (PsycINFO, Web of Science, PubMed, & CINAHL Plus). Searches were repeated in August 2020. We consulted with Bangor University’s Academic Support Librarian for the College of Human Sciences for assistance with designing the search strategies. The search

strategies were piloted before the final search was executed. Each search utilised truncation and thesaurus tools to find related terms and enhance retrieval of relevant articles. The full list of search terms and an example search strategy for one database can be found in Appendix 2 and 3. Below is an example of the organisation of search terms:

- A) Population *e.g.*, Psychosis OR Psychotic OR Schizophrenia OR Bipolar
 - B) Ethnic density related terms *e.g.*, “Ethnic density” OR “Group density” OR “Ethnic composition” OR “Ethnic enclave”
 - C) Outcome measures *e.g.*, Incidence OR Prevalence OR Symptom* OR “Ultra-high risk”
 - D) Geographical terms *e.g.*, Neighbo* OR Municipal OR “Electoral ward” OR “Output area”
- A AND B AND C AND D.

2.2.2 Eligibility criteria

For the narrative review, we included any peer-reviewed primary study examining the group density effect in psychosis. For the meta-analysis, additional criteria were applied, as follows:

- Primary epidemiological studies assessing a within-group density association *i.e.*, compared psychosis risk within minority groups between different levels of group density.
- Geographical units averaged 50,000 people or less.
- Group density exposure quantified using census data or similar.
- Validated quantitative instrument(s) used to measure psychosis outcomes, including incident cases, psychosis experiences, prodromal psychosis, or symptomatology.
- Studies reported Odds Ratios [ORs], Incidence Rate Ratios [IRRs], Hazard Ratios [HRs] or Relative Risks [RRs] effect size measures [ESs] and 95% confidence intervals [CIs].
- Studies used multilevel modelling to account for non-independence of data.

- Studies adjusted for individual- and area-level confounds (minimally age, sex, and area-level deprivation).

2.2.3 Study selection and data extraction

Articles were exported to Mendeley citation management software. After removing duplicates, SJB and CWNS independently assessed all titles and abstracts for eligibility and any papers that either author deemed relevant were carried forward to the next stage of screening. Kappa indicated substantial agreement between authors ($k=.754$).

Full texts of remaining articles were independently screened by SJB and CWNS with 100% agreement regarding which studies should be included in the narrative review and meta-analysis components of the review. Uncertainties concerning eligibility were resolved through discussion or contacting authors where clarification was needed. Reference sections were hand-searched to identify any further papers. For potentially relevant articles that were not available in English, we assessed eligibility by translating the article or contacting the first author of the paper (see Appendix 4). Study characteristics and meta-data from included studies were extracted. Authors were contacted for additional data where necessary. For studies with overlapping datasets, only the study with the largest sample was included in the meta-analysis. If samples were equally large, we included the study where group categories were most compatible with other studies.

2.2.4 Data analysis

A narrative review was conducted and studies meeting inclusion criteria were included in the meta-analysis. As group density studies often include dependent effect sizes - multiple samples (level 2) nested within studies (level 3), we used “multilevel” meta-analysis (Harrer *et al.*, 2019; Moeyaert *et al.*, 2017; van den Noortgate *et al.*, 2013), as implemented using the `rma.mv` function in the R package Metafor (R Core Team, 2021; Viechtbauer, 2010) to appropriately control error rates (Harrer *et al.*, 2019).

ESs with CIs were extracted from the fully adjusted models in each paper. As studies quantified exposure differently, ES were rescaled to reflect ten percentage-point decreases in group density. ESs and CIs were then converted to their natural logarithmic form, from which log standard errors and sampling variances were computed.

To rescale ESs, percentages for each level of group density were extracted from the studies. Taking the African group in Schofield and colleagues' study as an example – the reference group and highest quintile was 3.7-18.5%, followed by 1.7-3.7% (4th quintile), 0.9-1.7% (3rd quintile), 0.4-0.9% (2nd quintile), and <0.4% (1st/lowest quintile) (Schofield *et al.*, 2017). A mid-point was then calculated for each level of group density (in this case: 11.1, 2.7, 1.3, 0.65, 0.3) and each of these values was subtracted from the reference category. For example, for the 4th quintile, 2.7 (midpoint for 4th quintile) was subtracted from 11.1, giving 8.4. To rescale the raw effect size to reflect the response in risk to a ten-percent reduction in ethnic density, the following formula was used:

$$Exp [Log [1.20] *(10/8.4)]$$

This calculates the rescaled effect size as 1.24. The same formulae were used to calculate the confidence intervals (0.77-2.01). These values were then converted to their natural logarithmic form, from which log standard errors and sampling variances were computed. These steps were followed to rescale all 75 effect sizes unless of course, the papers already reported effect sizes associated with a ten-percentage point decrease in ethnic density *e.g.*, Das-Munshi *et al.*, (2012).

The three-level model was fitted to estimate the overall pooled ES. To assess fit, we reran the analysis twice, holding the variance component of level 2 or level 3 constant (Harrer *et al.*, 2019). Akaike Information Criteria for full and reduced models were compared to assess fit.

The overall pooled ES comprised all samples. Separate pooled ESs were computed for groups defined by ethnicity or migratory background, minority groups classified by other characteristics, and neighbourhood studies only.

We additionally examined a priori hypothesised moderators and the effect of removing individual studies and samples on the pooled effect. For each moderator test, the most common grouping was used as the reference category. To derive subgroups, the 18-group self-ascribed classification system for ethnic groups used by the 2011 UK Census (Office for National Statistics, 2012) was used to allocate samples into "Crude minority groups" (the UK was the most common study setting). Subgroups for the 'Specific minority groups' moderator test were informed by the most specific minority group categories reported by the authors of the studies. To assess the moderating effect of area sizes, we calculated area size quartiles using reported

average area sizes. If average area sizes were not available, census data were used to derive an estimate. We also stratified data by the geographic unit used: Lower Super Output Area [LSOA] or smaller and all other area sizes.

We used a quality assessment tool developed for ethnic density studies specifically which has been used in a previous review (Bécares *et al.*, 2018), see Appendix 5. We additionally conducted GRADE assessments to evaluate the evidence for each psychosis outcome and crude minority subgroup (Appendix 6).

2.3 RESULTS

The search identified 2652 unique articles and thirty-two studies were included in the narrative review (Figure 1). Ten studies met inclusion criteria for the meta-analysis, comprising 75 samples. Each sample contributed <2% weighting to the overall pooled ES. See Figure 2 for forest plot.

2.3.1 Narrative review

Study characteristics

Fourteen studies were conducted (44%) in the UK (Bécares *et al.*, 2009; Bécares & Das-Munshi, 2013; Bhavsar *et al.*, 2014, and others²²), nine (28%) in the Netherlands (Eilbracht *et al.*, 2015; Horrevorts *et al.*, 2014; Stouten *et al.*, 2018, and others²³), and four (13%) in Sweden (Dykxhoorn *et al.*, 2020; Mezuk *et al.*, 2015; Terhune *et al.*, 2020; Zammit *et al.*, 2010). Of the remaining five (16%), two were conducted in Denmark (Schofield *et al.*, 2017, 2018), and one each in the USA (Anglin *et al.*, 2020), Canada (Menezes *et al.*, 2011), and Australia (O'Donoghue *et al.*, 2015).

The majority were retrospective epidemiological studies (n=26, 81%) (Bécares *et al.*, 2009; Bécares & Das-Munshi, 2013; Bhavsar *et al.*, 2014, and others²⁴). Of these, most were cross-sectional but six (four datasets) were longitudinal (Das-Munshi

²² Boydell *et al.*, 2001; Das-Munshi *et al.*, 2012, 2019; Halpern & Nazroo, 2000; Heslin *et al.*, 2018; Kirkbride *et al.*, 2008; Kirkbride *et al.*, 2014, 2007; Richardson *et al.*, 2018; Schofield *et al.*, 2016; Schofield *et al.*, 2011.

²³ Termorshuizen *et al.*, 2014, 2018; van Os *et al.*, 2000; Veling *et al.*, 2014, 2016; Veling *et al.*, 2008.

²⁴ Boydell *et al.*, 2001; Das-Munshi *et al.*, 2012, 2019; Dykxhoorn *et al.*, 2020; Halpern & Nazroo, 2000; Heslin *et al.*, 2018; Kirkbride *et al.*, 2008; Kirkbride *et al.*, 2014, 2007; Menezes *et al.*, 2011; Mezuk *et al.*, 2015; O'Donoghue *et al.*, 2015; Richardson *et al.*, 2018; Schofield, Ashworth, & Jones, 2011; Schofield *et al.*, 2016, 2017, 2018; Terhune *et al.*, 2020; Termorshuizen *et al.*, 2014, 2018; van Os *et al.*, 2000; Veling *et al.*, 2008; Zammit *et al.*, 2010.

et al., 2019; Dykxhoorn *et al.*, 2020; Schofield *et al.*, 2017, 2018 and others²⁵). All these studies were conducted in a neighbourhood context except one, which used a school setting (Zammit *et al.*, 2010). The other six studies examined Virtual Reality [VR] environments (Veling *et al.*, 2014, 2016), perceived ethnic density (Anglin *et al.*, 2020), symptomatology (Eilbracht *et al.*, 2015; Stouten *et al.*, 2018) and remission (Stouten *et al.*, 2018), and “bully climate” (Horrevorts *et al.*, 2014).

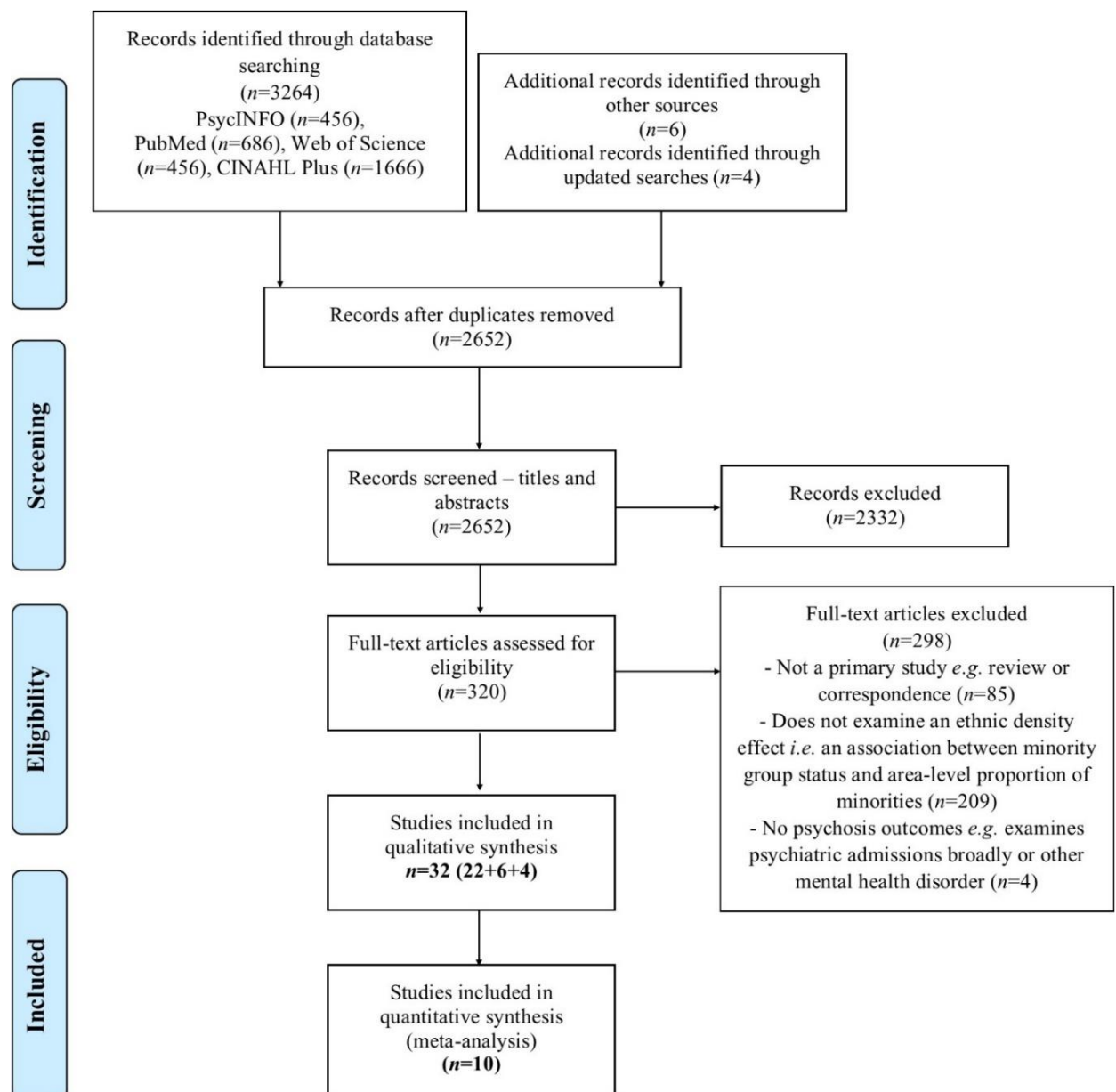


Figure 1. PRISMA diagram outlining study selection procedure.

²⁵Terhune *et al.*, 2020; Zammit *et al.*, 2010.

Around half of the studies (n=15, 47%) examined first incident cases (Bhavsar *et al.*, 2014; Boydell *et al.*, 2001; Dykxhoorn *et al.*, 2020 and others²⁶) and seven (22%) used measured of subclinical psychosis (Anglin *et al.*, 2020; Bécares *et al.*, 2009; Bhavsar *et al.*, 2014 and others²⁷). The others assessed symptomatic outcomes (Eilbracht *et al.*, 2015; Stouten *et al.*, 2018; Veling *et al.*, 2008; Veling *et al.*, 2016), mortality rates (Das-Munshi *et al.*, 2019), length of admission (Heslin *et al.*, 2018), compulsory admission (Terhune *et al.*, 2020), individuals meeting ultra-high risk [UHR] criteria (O'Donoghue *et al.*, 2015), dispensed antipsychotic medication (Termorshuizen *et al.*, 2018), lifetime prevalence of psychosis (Menezes *et al.*, 2011), psychophysiological outcomes (Veling *et al.*, 2014), and interpersonal distance (Veling *et al.*, 2014; Veling *et al.*, 2016). Study characteristics are summarised in Table 1.

2.3.2 Summary of results by minority group sample

Combined ethnic minority or migrant groups

Seventeen studies (fifteen datasets) reported associations for aggregated minority ethnic or migrant groups (Bécares *et al.*, 2009; Boydell *et al.*, 2001; Das-Munshi *et al.*, 2012, 2019 and others²⁸). In combined minority groups in the UK (Bécares *et al.*, 2009; Boydell *et al.*, 2001; Das-Munshi *et al.*, 2012 and others²⁹) and migrant groups in Sweden (Dykxhoorn *et al.*, 2020; Mezuk *et al.*, 2015; Zammit *et al.*, 2010), the Netherlands (Termorshuizen *et al.*, 2014; Veling, *et al.*, 2008), and Canada (Menezes *et al.*, 2011), all but one study (Mezuk *et al.*, 2015) found associations in the expected direction for clinical (Boydell *et al.*, 2001; Dykxhoorn *et al.*, 2020; Kirkbride *et al.*, 2007 and others³⁰) and non-clinical outcomes (Bécares *et al.*, 2009; Das-Munshi *et al.*, 2012; Halpern & Nazroo, 2000), with many finding significant relationships (Boydell

²⁶ Heslin *et al.*, 2018; Kirkbride *et al.*, 2008; Kirkbride *et al.*, 2014; Mezuk *et al.*, 2015; van Os *et al.*, 2000; Richardson *et al.*, 2018; Schofield, Ashworth, & Jones, 2011; Schofield *et al.*, 2017; Schofield *et al.*, 2018; Termorshuizen *et al.*, 2014; Veling *et al.*, 2008; Zammit *et al.*, 2010.

²⁷ Das-Munshi *et al.*, 2012; Schofield *et al.*, 2016; Halpern & Nazroo, 2000; Horrevorts *et al.*, 2014.

²⁸ Dykxhoorn *et al.*, 2020; Halpern & Nazroo, 2000; Heslin *et al.*, 2018; Kirkbride *et al.*, 2007; Kirkbride *et al.*, 2008; Menezes *et al.*, 2011; Mezuk *et al.*, 2015; O'Donoghue *et al.*, 2015; Richardson *et al.*, 2018; Terhune *et al.*, 2020; Termorshuizen *et al.*, 2014; Veling *et al.*, 2008; Zammit *et al.*, 2010.

²⁹ Halpern & Nazroo, 2000; Kirkbride *et al.*, 2008; Kirkbride *et al.*, 2007; Richardson *et al.*, 2018.

³⁰ Kirkbride *et al.*, 2008; Menezes *et al.*, 2011; Richardson *et al.*, 2018; Termorshuizen *et al.*, 2014; Veling *et al.*, 2008; Zammit *et al.*, 2010.

et al., 2001; Das-Munshi *et al.*, 2012; Dykxhoorn *et al.*, 2020 and others³¹). Between-group density effects tended to be stronger than within-group effects (Kirkbride *et al.*, 2007; Termorshuizen *et al.*, 2014) and one study found a significant association for affective but not non-affective psychosis (Richardson *et al.*, 2018). For other outcomes, significant associations were observed for mortality rates (Das-Munshi *et al.*, 2019) and compulsory admission (Terhune *et al.*, 2020), but not for duration of admission (Heslin *et al.*, 2018) or meeting UHR criteria (O'Donoghue *et al.*, 2015).

Black populations

Fourteen studies (twelve datasets) included Black individuals (Bécares *et al.*, 2009; Bécares & Das-Munshi, 2013; Bhavsar *et al.*, 2014 and others³²). Significant group density associations were found in aggregated Black clinical and non-clinical samples in the UK (Schofield *et al.*, 2016; Schofield *et al.*, 2011). In Black Caribbean populations (Bécares *et al.*, 2009; Bécares & Das-Munshi, 2013; Bhavsar *et al.*, 2014 and others³³), significant results were observed for subclinical psychosis (Halpern & Nazroo, 2000; Schofield *et al.*, 2016) and schizophrenia first incident cases in the UK (Bhavsar *et al.*, 2014), and strong associations were consistently observed in Antillean individuals for non-affective psychosis (Termorshuizen *et al.*, 2014) and prescribed antipsychotics (Termorshuizen *et al.*, 2018) in the Netherlands. Other UK studies reported weaker or no evidence of associations in Caribbean groups for subclinical psychosis (Bécares *et al.*, 2009; Bécares & Das-Munshi, 2013; Das-Munshi *et al.*, 2012), non-affective psychosis (Kirkbride *et al.*, 2014), and mortality rates (Das-Munshi *et al.*, 2019). In Black African individuals (Bhavsar *et al.*, 2014; Das-Munshi *et al.*, 2019; Kirkbride *et al.*, 2014 and others³⁴), a strong association between ethnic density during adolescence and later psychosis was observed in Denmark (Schofield *et al.*, 2017, 2018) and Sweden (Dykxhoorn *et al.*, 2020), with one study finding stronger associations in second-generation (Schofield *et al.*, 2018) and the other, first-generation African migrants (Dykxhoorn *et al.*, 2020). In the UK, a significant

³¹ Halpern & Nazroo, 2000; Termorshuizen *et al.*, 2014; Veling *et al.*, 2008; Zammit *et al.*, 2010.

³² Das-Munshi *et al.*, 2012, 2019; Dykxhoorn *et al.*, 2020; Halpern & Nazroo, 2000; Kirkbride *et al.*, 2014; Schofield, Ashworth, & Jones, 2011; Schofield *et al.*, 2016, 2017, 2018, Termorshuizen *et al.*, 2014, 2018.

³³ Das-Munshi *et al.*, 2012, 2019; Halpern & Nazroo, 2000; Kirkbride *et al.*, 2014; Schofield *et al.*, 2016.

³⁴ Schofield *et al.*, 2016, 2017, 2018; Terhune *et al.*, 2020.

relationship was found for Black African individuals and non-affective psychosis (Kirkbride *et al.*, 2014). Other UK studies found no significant associations in Black African groups (Bhavsar *et al.*, 2014; Das-Munshi *et al.*, 2019; Schofield *et al.*, 2016), though one found weak evidence of an association for all-cause mortality ($p=0.068$) (Das-Munshi *et al.*, 2019).

Asian populations

Eight studies (seven datasets) examined Asian populations (Bécares *et al.*, 2009; Bécares & Das-Munshi, 2013; Das-Munshi *et al.*, 2012, 2019 and others³⁵). In combined Asian groups, consistent associations between own group density and non-affective psychosis were observed in Denmark (Schofield *et al.*, 2017) and Sweden (Dykxhoorn *et al.*, 2020), with the latter demonstrating a stronger relationship in first-generation Asian migrants (Dykxhoorn *et al.*, 2020). There was also a strong association with all-cause mortality rates in the UK (Das-Munshi *et al.*, 2019). When considering Asian subgroups, UK studies (Bécares *et al.*, 2009; Bécares & Das-Munshi, 2013; Das-Munshi *et al.*, 2012; Halpern & Nazroo, 2000; Kirkbride *et al.*, 2014) found associations in the expected direction in Indian and Bangladeshi groups for subclinical psychosis (Bécares *et al.*, 2009; Bécares & Das-Munshi, 2013; Das-Munshi *et al.*, 2012; Halpern & Nazroo, 2000), however, one study examining first incident psychosis cases reported no evidence of a relationship in Bangladeshi individuals (Kirkbride *et al.*, 2014). Only one study included African Asian and Chinese samples (Halpern & Nazroo, 2000), no significant correlations were found for either group. In Pakistani individuals, no study found evidence of an association (Bécares *et al.*, 2009; Bécares & Das-Munshi, 2013; Das-Munshi *et al.*, 2012; Halpern & Nazroo, 2000), with two studies noting detrimental relationships (Bécares *et al.*, 2009; Halpern & Nazroo, 2000).

White Other populations

Seven studies (five datasets) reported results for White Other samples (Bécares & Das-Munshi, 2013; Das-Munshi *et al.*, 2012, 2019 and others³⁶). In the UK, associations were in the expected direction but non-significant in Irish individuals for subclinical psychosis (Bécares & Das-Munshi, 2013; Das-Munshi *et al.*, 2012), and no evidence

³⁵ Dykxhoorn *et al.*, 2020; Halpern & Nazroo, 2000; Kirkbride *et al.*, 2014; Schofield *et al.*, 2017.

³⁶ Dykxhoorn *et al.*, 2020; Kirkbride *et al.*, 2014; Schofield *et al.*, 2017, 2018.

for a relationship was observed in Irish individuals for mortality rates (Das-Munshi *et al.*, 2019) or in a non-British White sample for non-affective psychosis (Kirkbride *et al.*, 2014). There was also no association in non-Swedish Nordic or Non-Nordic European migrants in Sweden (Dykxhoorn *et al.*, 2020). However, in Denmark, significant relationships were found in non-Scandinavian European groups for non-affective psychosis (Schofield *et al.*, 2017), with negligible differences between first- and second-generation migrants (Schofield *et al.*, 2018).

Other ethnic groups

Seven studies (six datasets) included other ethnic minority and migrant groups (Dykxhoorn *et al.*, 2020; Mezuk *et al.*, 2015; Schofield *et al.*, 2017, 2018 and others³⁷). Longitudinal analyses in Denmark found significant relationships in Middle Eastern individuals for non-affective psychosis (Schofield *et al.*, 2017), with stronger associations for second-generation migrants (Schofield *et al.*, 2018). However, in a Middle Eastern and North African sample in Sweden, there was no significant relationship between own group density at age fifteen and later risk of psychosis (Dykxhoorn *et al.*, 2020). The same study found no associations in North American, South American, Swedish, and Mixed migrants, with some groups in fact showing (non-significant) detrimental relationships (Dykxhoorn *et al.*, 2020). Another Swedish study found no difference in non-affective psychosis risk between Iraqi migrants living in ethnic enclaves and those in predominantly Swedish areas (Mezuk *et al.*, 2015). In migrant groups in the Netherlands, associations were consistently strong for a combined Surinamese/Antillean group and a Surinamese only sample for both non-affective psychosis (Termorshuizen *et al.*, 2014) and antipsychotic usage (Termorshuizen *et al.*, 2018) respectively. However, results were mixed for Turkish and Moroccan groups (Termorshuizen *et al.*, 2014, 2018; Veling *et al.*, 2008).

Other social characteristics

Three studies included minority groups classified by characteristics other than ethnicity or migratory background (Schofield *et al.*, 2016; van Os *et al.*, 2000; Zammit *et al.*, 2010), namely single marital/household status (Schofield *et al.*, 2016; van Os *et al.*, 2000), disadvantaged social class (Schofield *et al.*, 2016; Zammit *et al.*, 2010), social fragmentation (Zammit *et al.*, 2010), and low academic grades (Zammit *et al.*,

³⁷ Termorshuizen *et al.*, 2014, 2018; Veling *et al.*, 2008.

2010). Significantly increased risk of schizophrenia was observed in single individuals living in neighbourhoods with fewer single people in the Netherlands (van Os *et al.*, 2000). This was also observed in individuals in single households in a later UK study, but the relationship was non-significant (Schofield *et al.*, 2016). A longitudinal study in Sweden assessing associations between school-level own group density on clinical psychosis found a significant association in socially fragmented groups, but not in those with low grades or deprived status, though the latter approached significance ($p=0.057$) (Zammit *et al.*, 2010). A relationship for disadvantaged status was not found in the UK neighbourhood-level study, which showed a (non-significant) reverse association (Schofield *et al.*, 2016).

Virtual reality, symptomatology, perceived ethnic density, and bully climate

Six studies used different methods: two used VR (Veling *et al.*, 2014, 2016), two looked at symptom profiles (Eilbracht *et al.*, 2015; Stouten *et al.*, 2018) and remission (Stouten *et al.*, 2018), one examined perceived ethnic density (Anglin *et al.*, 2020) and one considered ‘bully climate’ (Horrevorts *et al.*, 2014). VR studies³⁸ simulated high and low group density environments by manipulating the ethnicity of avatars (Veling *et al.*, 2014, 2016). Compared to control participants, individuals with psychosis had higher galvanic skin responses in low own group density conditions (Veling *et al.*, 2014). The second study found no effect of virtual group density on distress or paranoid thoughts (Veling *et al.*, 2016).

In symptom studies, an ethnic density interaction for paranoia was observed in ethnic majority, but not ethnic minority, adolescents in a Dutch classroom setting (Eilbracht *et al.*, 2015), whilst another study found no association between group density and symptomatic outcomes (Stouten *et al.*, 2018).

The *perceived* ethnic density study found that Black, Latino, and Asian individuals in the USA who recalled growing up in neighbourhoods with higher proportions of out-group ethnic minority groups reported more psychotic-like symptoms than those who grew up in ethnically concordant or predominantly White neighbourhoods (Anglin *et al.*, 2020). Further, Black individuals who perceived a

³⁸ Veling and colleagues used the VR experiment from Veling *et al.*, (2016) to examine the effect of virtual social stressors (including minority status) on individuals with differing psychosis liability using additional outcomes such as autonomic balance (Counotte *et al.*, 2017), Th17/T regulator cell balance and Natural Killer cell numbers (Counotte *et al.*, 2018), and interpersonal distance (Geraets *et al.*, 2018). Moderators including cognitive biases (Pot-Kolder *et al.*, 2018), self-esteem (Jongeneel *et al.*, 2018), and childhood trauma (Veling *et al.*, 2016) have also been investigated.

change in the ethnic density of their neighbourhood during childhood reported more psychotic experiences than those who did not (Anglin *et al.*, 2020). The remaining study examined a group density association for bullying in a classroom setting. Compared to bullies, victims, and children not involved in bullying, individuals who both bullied others and were victims of bullying reported the highest subclinical psychotic experiences. The association between bully-victim status and psychosis was attenuated by a higher “bully climate” *i.e.*, classrooms with higher proportions of other children involved in bullying in some capacity (Horrevorts *et al.*, 2014).

2.3.3 Meta-analysis

Ten studies were eligible for meta-analysis (Bécares *et al.*, 2009; Das-Munshi *et al.*, 2012; Dykxhoorn *et al.*, 2020; Menezes *et al.*, 2011; Richardson *et al.*, 2018; Schofield *et al.*, 2016; Schofield *et al.*, 2011, 2017; Termorshuizen *et al.*, 2018; Zammit *et al.*, 2010). Of the twenty-two studies excluded, six studies (Bécares & Das-Munshi, 2013; Bhavsar *et al.*, 2014; Kirkbride *et al.*, 2008; Kirkbride *et al.*, 2007; Schofield *et al.*, 2018; Termorshuizen *et al.*, 2014) used overlapping or potentially overlapping datasets (Das-Munshi *et al.*, 2012; Schofield, Ashworth, & Jones, 2011, Schofield *et al.*, 2017; Termorshuizen *et al.*, 2018), five used non-eligible outcomes (Das-Munshi *et al.*, 2019; Eilbracht *et al.*, 2015; Heslin *et al.*, 2018; Stouten *et al.*, 2018; Terhune *et al.*, 2020), four used non-eligible exposures *i.e.*, VR simulation (Veling *et al.*, 2014, 2016), perceived ethnic density (Anglin *et al.*, 2020), and ethnic enclaves (Mezuk *et al.*, 2015). Four did not adjust for the specified individual and area-level confounds (Horrevorts *et al.*, 2014; Kirkbride *et al.*, 2014; O’Donoghue *et al.*, 2015; van Os *et al.*, 2000), two only examined between-group density effects (Boydell *et al.*, 2001; Veling *et al.*, 2008), and one did not use multilevel modelling (Halpern & Nazroo, 2000). While Schofield and colleagues (Schofield *et al.*, 2018) were the first to examine generational differences in the group density effect, this study used the same cohort as another study (Schofield *et al.*, 2017) and, as per the eligibility criteria, we included their earlier study as it comprised an additional minority group sample (Asian) (Schofield *et al.*, 2017). This meant that Dykxhoorn *et al.*, (2020) was the only included paper that stratified results by generational status, so only data for migrants were extracted from this study (Dykxhoorn *et al.*, 2020).

Pooled group density effects

The three-level model was the best fit for the data (Appendix 7). The overall meta-analytic effect indicated a ten percentage-point decrease in group density was associated with a 20% increase in psychosis risk [OR=1.20 (95% CI=1.09-1.32), $p<0.001$]. A separate effect using only minority groups defined by ethnicity or migratory background was also significant [OR=1.23 (95% CI=1.14-1.33), $p<0.001$]. There was no significant effect in minority groups defined by other characteristics [OR=1.02 (95% CI=0.86-1.20), $p=0.848$]. Results were similar after removal of the one school-based study (Zammit *et al.*, 2010) [OR=1.25 (95% CI=1.15-1.36), $p<0.001$].

Moderator tests

In line with the narrative review, there were moderating effects of crude [$F_{6,68}=6.86$, $p<0.001$] and specific minority groups [$F_{25,49}=7.26$, $p<0.001$]. Said moderator tests were also significant when conducted on ethnic minority and migrant samples only (Appendix 8). Further analyses examining whether associations differed when minority groups were self-ascribed or defined by birthplace, were non-significant [$F_{1,59}=0.60$, $p=0.443$].

When assessing crude minority groups, the strongest association was observed in the Black group [OR=1.71 (95% CI=1.43-2.03), $p<0.001$], relative to the reference group (“Other ethnic group”). There was also a stronger association in the White Other group [OR=1.23 (95% CI=1.03-1.48, $p=0.024$]. There was weak evidence of a stronger association in Asian populations [OR=1.19 (95% CI=0.98-1.45, $p=0.074$]. Moderator tests for specific minority groups showed the strongest associations in Black Antillean migrants in the Netherlands [OR=3.60 (95% CI=2.22-5.83), $p<0.001$] relative to the reference group (“Combined migrant group”). This was followed by Black or Black British [OR=1.84 (95% CI=1.24-2.74), $p=0.003$] and Black African [OR=1.48 (95% CI=1.10-2.00, $p=0.011$] groups in the UK and Denmark. There was also a stronger association in the Non-Scandinavian European group [OR=1.43 (95% CI=1.06-1.92), $p=0.020$] and a significant detrimental association in a South American sample [OR=0.37 (95% CI=0.14-0.99, $p=0.048$]. See Table 3 for moderator test results including crude minority groups, and Appendix 9 for specific minority group results.

Moderator tests for country, time, and area size were non-significant, though there was some evidence for stronger group density associations at smaller geographic

units. There was also a significant moderating effect of psychosis outcome used [$F_{5,69}=2.36$, $p=0.049$], with evidence for stronger associations in studies using clinical outcomes, namely non-affective psychosis cases [OR=1.15 (95% CI=1.04-1.28), $p=0.008$] and cases with a first diagnosis of any psychotic disorder [OR=1.66 (95% CI=1.22-2.27), $p=0.002$].

Table 1. Characteristics of the included studies (n=32), meta-analysis (n=10). Studies included in the meta-analysis are in **bold**.

Author & setting	Datasets & time period	Minority group classification	Psychosis outcome	Geographic unit (<i>n</i> areas/av. pop.)	Group density exposure	Individual & area-level covariates	Statistical analysis	Minority groups (cases/total minority group sample)	Results
Anglin, Lui, Schneider & Ellman, (2020) Northeastern USA	Public university system. Students recruited via a participant recruitment website. Time period: 2011-2016	Self-ascribed Black/African American/African descent or as a 1 st or 2 nd gen immigrant, answers grouped into USA census categories.	The positive subscale of the Prodromal Questionnaire-Likert [PQ-Likert]	Neighbourhood (NA)	Perceived racial composition of neighbourhood prior to age 12 and after age 12 (<i>e.g.</i> , mostly Black, mostly Latino, mostly Asian...)	Individual [I]: Immigrant status, poverty index, age, racial & ethnic group, & lifetime cannabis use Area [A]: None	ANCOVA, post-hoc Bonferroni-corrected t-tests	Combined (NR/1330) Black (NR/427) Hispanic/Latino (NR/429) Asian (NR/474) 1 st generation migrants (NR/560) 2 nd generation migrants (NR/657) Non-immigrant (NR/112) Mean no. of psychotic experiences endorsed=12.25	For both before and after age 12, the highest psychotic experiences were reported by ethnic & racial minorities who recounted living in racially discordant neighbourhoods compared to minorities who grew up in racially concordant, mixed, or majority White areas. Ethnic minority individuals who perceived change in the racial composition of their neighbourhood after age 12 reported more psychotic experiences than those who perceived no change - in stratified analysis, this was only sig. in the Black group [$F_{1,425}=5.08, p=.025$],
Bécares, Nazroo & Stafford (2009) England & Wales, UK	Fourth National Survey on Ethnic Minorities [FNS] & 1991 UK Census. Time period: 1994 (1 year).	Self-ascribed	Psychosis Screening Questionnaire [PSQ]	Electoral ward [EW] (9527, 5327)	10% increase	I: Age, sex, and socioeconomic position A: Deprivation	Multiple logistic regression	Combined (NR/4277) Black Caribbean (NR/1215) Indian (NR/1278) Pakistani (NR/1190) Bangladeshi (NR/594)	OR=0.99 OR=0.83 OR=0.90 OR=1.44 [SS] OR=0.81
Bécares & Das-Munshi (2013) Das-Munshi, Bécares, Boydell <i>et al.</i>, (2012) England, UK	Ethnic Minority Psychiatric Illness Rates in the Community [EMPIRIC], merged dataset of the English samples from the 2005 and 2007 Citizenship Survey [CS] & 2001 UK census. Time period: 2005 & 2007 (2 years).	Self-ascribed (Irish – place of birth or parent's place of birth)	PSQ	Middle Super Output Area [MSOA] (7193, 7200)	10% decrease	I: Age, sex, social class, marital status, education, and generational status A: Deprivation <i>n.b. only 2013 study adjusted for generational status</i>	Multiple logistic regression	Combined (305/3444) Irish (59/733) Black Caribbean (83/694) Indian (58/643) Pakistani (72/724) Bangladeshi (33/650) White British (majority) (50/837)	OR=1.07 [SS] OR=5.44 OR=1.05 OR=1.38 [SS] OR=1.17 OR=1.26 OR=0.91 <i>n.b., effect sizes from 2012 study</i>

Bhavsar, Boydell, Murray & Power (2014)	Lambeth Early Onset [LEO] case register & 2001 UK census.	NR	Schizophrenia [SZ] first incident cases [RDC criteria]	EW (21, NR)	100% increase	I: Age & sex A: Deprivation	Multilevel Poisson regression	Black Caribbean (NR) Black African (NR)	IRR= 0.003 [SS] IRR=0.04
Lambeth, South London, UK	Time period: January 2000 – December 2007 (8 years).								
Boydell, van Os, McKenzie <i>et al.</i> , (2001)	Bethlem Royal & Maudsley NHS Trust & 1991 UK census	Any self-ascribed ethnicity other than White (if not available, place of birth, parents place of birth, and any description of colour)	SZ first incident cases [RDC criteria, ICD-9 & ICD-10]	EW (15, 10,000)	Thirds of non-white ethnic density	I: Age & sex A: Deprivation	Multilevel Poisson regression	Non-white ethnic minority (126/NR)– comprising Black Caribbean, Black African, and other	Lowest third (8-22.8%) IRR=4.40 [SS] Middle third (23-28.1%) IRR=3.63 [SS] Highest third (28.2-57%) IRR=2.38 [SS]
Camberwell, South London, UK	Time period: 1988 – 1997 (9 years)								
Das-Munshi, Schofield, Bhavsar <i>et al.</i> , (2019)	South London & Maudsley NHS Trust Clinical Record Interactive Search [CRIS] system & 2011 UK census	Self-ascribed ethnicity grouped using UK Office for National Statistics [ONS] ethnic group classifications	All-, natural, and unnatural-cause mortality in individuals with ICD-10 SMI diagnoses (schizophrenia-spectrum disorders (F2*) and bipolar disorders (F30 and F31)	Lower Super Output Area [LSOA] (NR/1614)	Highest and lowest own minority group density	I: Age, sex, diagnosis, marital status, substance use disorders, ethnicity*own ethnic density interaction A: Deprivation, urbanicity, & social fragmentation	Multilevel Poisson regression	Combined (637/9154) Black African (106/2510) Black Caribbean (332/4840) South Asian (95/1256) Irish (104/548) White British (majority) (1130/9047) <i>n.b., above refer to all-cause deaths/sample</i>	IRR=0.96, IRR=0.52 [SS] Interaction: $p=0.036$ [SS] IRR=0.79, IRR=0.25 [SS] Interaction: $p=0.068$ IRR=0.70 [SS], IRR=0.58 [SS] Interaction: $p=0.62$ IRR=1.08, IRR=0.07 [SS] Interaction: $p=0.015$ [SS] IRR=0.97, IRR=1.80 Interaction: $p=0.65$ REF <i>n.b., 1st IRR =lowest own group density (0%), 2nd IRR=highest ethnic density (95% for combined, 50%, 30%, 90%, & 11% respectively for specific minority groups). Data for specific groups taken from paper's supplementary material</i>
Dykxhoorn, Lewis, Hollander, Kirkbride & Dalman, (2020)	Register of the Total Population, the immigration and emigration register (STATIV), the Multi-Generation register, and the National Patient Register. (Linked by Psychiatry Sweden)	Place of birth & parents place of birth (born outside of Sweden: 1 st gen, born in Sweden, at least one parent born outside of	NAP (F20-29) [ICD-10]	Small Areas for Market Statistics [SAMS] (9208/726)	5% decrease & effect at different quintiles (highest=REF) <i>n.b., migrant density exposure measured at age 15 or after</i>	I: Age, sex, calendar year, generation status, lone dwelling, time since migration, family disposable income, receipt of social welfare	Multilevel Cox proportional hazards regression	Nordic 1 st gen (103/131882) 2 nd gen (644/766149) European 1 st gen (693/880211) 2 nd gen (270/310934) Asian 1 st gen (297/365971) 2 nd gen (61/92699)	HR=1.01 HR=0.97 HR=0.98 HR=1.06 HR=1.42 [SS] HR=1.15 HR=1.03
Sweden									

	Time period: January 1982 – December 2016 (35 years)	Sweden: 2 nd gen)			<i>immigration to Sweden</i>	& family unemployment A: Population density, proportion of lone dwelling households & deprivation		Middle Eastern & North African 1 st gen (693/796928) 2 nd gen (349/471962)	HR=1.00
								Sub-Saharan African 1 st gen (550/261899) 2 nd gen (127/72516)	HR=1.28 [SS] HR=0.94
								North American 1 st gen (50/55558) 2 nd gen (6/6338)	HR=1.77 HR=0.89
								South American 1 st gen (79/102857) 2 nd gen (66/84025)	HR=0.67 HR=1.15
								Swedish migrant 2 nd gen (390/456995)	HR=0.83
								Mixed migrant 2 nd gen (201/153726)	HR=1.17
								<i>n.b., second value refer to person-years</i>	Combined migrant density: Quintile 1 (lowest) HR=1.36 [SS]; Q2 HR=1.14 [SS]; Q3 HR=1.11; Q4 HR=1.07; Q5 (highest)=REF
Eilbracht, Stevens, Wigman, van Dorsselaer & Vollebergh (2015)	Dutch Health Behaviour in School-Aged Children [HBSC] Time period: 2005 (<1 year)	Father, mother, or both parents born in a non-Western country	The Community Assessment of Psychotic Experiences [CAPE] positive experiences subscale	Classroom (NR, 21)	Assoc. between class proportion of minority group pupils & PEs	I: Age, sex, education, family wealth A: Class size	Multilevel multivariate regression	Combined (NR/769) Moroccan (NR/228) Turkish (NR/182) Surinamese or Antillean (NR/178) Other non-Western (NR/181) Dutch (majority) (NR/3606)	Sig. increase in paranoia with increasing ethnic density in the Dutch majority pupils ($b = 0.16, p < 0.05$) but no sig. effects in the combined minority group ($b = -0.05, p = 0.99$) or for specific minority groups (data NR). No sig. ethnic density effects for any other PEs (AVHs, delusions, grandiosity, or paranormal beliefs)
Halpern & Nazroo (2000)	Policy Studies Institute [PSI] National Community Survey in England & Wales 1993/94 & 1991 UK census Time period: 1993 – 1994 (1 year)	Self-ascribed	PSQ	EW (NR)	Correlation between own group density and subclinical psychotic symptoms	I: Age, sex, hardship, migration & language A: None	Multivariate linear regression	Combined (5226/5196) Black Caribbean (1215/1205) Indian (1278/1273) African Asian (733/728) Pakistani (1190/1185) Bangladeshi (594/591) Chinese (216/214) White (majority) (NR/2867) <i>n.b., 1st value refers to number of PSQ symptoms reported, 2nd value is the sample size.</i>	$b = -.071, p < 0.001$ [SS] $b = -.058, p < 0.05$ [SS] $b = -.126, p < 0.001$ [SS] $b = -.043$ $b = .043$ $b = -.140, p < 0.001$ [SS] $b = -.044$ $b = -.040, p < 0.05$ [SS]

Heslin, Khondoker, Shetty <i>et al.</i> , (2018)	South London & Maudsley NHS Trust Clinical Record Interactive Search [CRIS] system & 2011 UK census Time period: January 2007 – December 2010 (~4 years)	Ethnicity recorded in patient records according to UK ONS ethnic group classifications	Inpatient days following an ICD-10 diagnosis of any psychotic disorder	LSOA (NR, 1500)	Regression of inpatient days over 5 years and overall ethnic density	I: Length of time with service, age, sex, & BME status	Negative binomial regression	Combined (NR/1515), Black African (NR/430), Black Other (NR/228), Black Caribbean (NR/209), Indian (NR/32), Pakistani (NR/25), Chinese (NR/21), Bangladeshi, (NR/14), Other Asian (NR/95), Irish (NR/48), White & Black, Caribbean (NR/20), White & Black African (NR/12), White & Asian (NR/7), Other mixed (NR/12), Any other ethnic group (NR/161), White other (NR/201), White (majority) (NR/632)	$b=0.59$ (overall ethnic density) Overall ethnic density was not associated with days as an inpatient
Horrevorts, Monshouwer, Wigman & Vollebergh (2014) The Netherlands	The Dutch health behaviour in school-aged children survey [HSBC] October – November 2005 (<1 year)	Self-ascribed. Children were asked if they had bullied or been a victim of bullying in the past 2 months.	CAPE	Classroom (NR)	Interaction between classroom-level bullying status x bully climate, continuous measure of group density	None	Multilevel regression	Bully (NR/333) Victim (NR/216) Bully-victim (NR/55) Non-involved (NR/3978) Mean scores on subclinical psychotic experiences (CAPE): Bully=1.45 Victim=1.53 Bully-victim=1.59 Non-involved=1.34	Bully climate x bully $b=-0.002$ Bully climate x victim $b=-0.004$ [SS] Bully climate x bully-victim $b=-0.006$ The association between bully-victim status and subclinical psychosis was attenuated in classes with higher bully climate
Kirkbride, Morgan, Fearon, Dazzan, Murray & Jones (2007) Kirkbride, Boydell, Ploubidis <i>et al.</i> , (2008) Lambeth & two-thirds of Southwark, South London, UK	Aetiology and Ethnicity in Schizophrenia and Other Psychoses [AESOP] study & 2001 UK census Time period: September 1997 – August 1999 (2 years)	Self-ascribed, place of birth, & parents place of birth, grouped using UK ONS ethnic group classifications	First incident cases of SZ and other non-affective psychoses [NAP] [ICD-10]	Census Area Statistic [CAS] wards (33/5880)	1% increase & between-groups at each third of combined minority group density	I: Age, sex A: Area-level variables not included in model <i>n.b., in Kirkbride et al., (2008) voter turnout replaced with social cohesion & trust and social disorganisation</i>	Multilevel Poisson regression	Combined (163/201720) Black Caribbean (NR) Black African (NR) Asian (NR) Mixed ethnicity (NR) White other (NR) Other ethnicity (NR) White British (majority) (55/363856) <i>n.b., 2nd value refers to person-years</i>	Within groups: IRR=1.00 (SZ) Interaction: $p=0.19$ IRR=1.04 (Other NAP) Interaction: $p=0.43$ Between groups: Lowest third (24.8-47.1%) IRR=6.50 Middle third (47.2-56.1%) IRR=2.13 Upper third (56.4-74.3%) IRR=3.81 <i>n.b., effect sizes from 2007 study</i>

Kirkbride, Jones, Ullrich, & Coid (2014)	The East London first-episode psychosis [ELFEP] study & 2001 UK census	Self-ascribed, place of birth, & parents place of birth, grouped using UK ONS ethnic group classifications	First incident cases of NAP [DSM-IV]	Super Output Area [SOA] (56, 6195)	1-SD increase of own group density	I: Age, sex, social class A: None	Bayesian Hierarchical Modelling	Black African (49/NR) Black Caribbean (55/NR) Bangladeshi (53/NR) Non-British White (38/NR) White British (majority) (68/NR)	RR=0.70 [SS] NR NR NR <i>n.b., RR shows effect for NAP. Data NR but associations not sig. for Black Caribbean, Bangladeshi, & non-British White groups</i>
City & Hackney, Newham, & Tower Hamlets, East London, UK	Time period: December 1996 – November 1998 (2 years – City & Hackney) December 1998 -November 2000 (2 years – Newham & Tower Hamlets)								
Menezes, Georgiades, & Boyle (2011)	Canadian Community Health Survey [CCHS] & 2001 Canadian census	Immigrant status assigned if individual was born outside Canada and not born a Canadian citizen	Self-reported lifetime prevalence [LTP] of SZ	Dissemination area [DA] (8145, 400-700)	Immigrant status x immigrant concentration	I: Age, sex, income, marital status, education A: Disadvantage (% with low income, rentals, & that moved in the last year)	Multilevel logistic regression	Immigrant status (born in Asia, Oceania, or Europe) (31/7784)	Immigrant status x concentration interaction: OR=0.81 <i>n.b., lower SZ in immigrants. Additional protective effect of migrant group density but this was not sig.</i>
Canada	Time period: 2002 (1 year)								
Mezuk, Li, Cederin <i>et al.</i> , (2015)	Nationwide psychiatric inpatient and outpatient registries. & 2005 Swedish census	Place of birth & parents place of birth (born outside of Sweden: 1 st gen, born in Sweden, at least one parent born outside of Sweden: 2 nd gen)	NAP & AP first incident cases [ICD-10]	SAMS (1490, 1000)	Psychosis risk living in an ethnic enclave compared to majority Swedish area	I: Age, sex, education, income, & 1 st or 2 nd gen status A: Deprivation (% with low educational attainment, low income, unemployed, & receiving social welfare)	Multilevel logistic regression	Iraqi (NR/19975) Other (NR/232356) Swedish-born (majority) (NR/698648) <i>n.b., 'Other' group comprised migrants from Finland, Asia (excluding Turkey, Iran or Iraq), countries in Africa, former Yugoslavia, Iran, Poland, Turkey, Bosnia, Chile, and other nations in South America (other than Chile)</i>	OR=1.66 [NAP], OR=1.04 [AP] OR=0.93 [NAP], OR=0.93[AP] OR=1.36 [NAP], OR=1.12 [AP] [SS] <i>n.b., results for broadly defined AP & NAP</i>
Stockholm, Gothenburg, & Malmö, Sweden	Time period: 2005 - 2010 (5 years)								
O'Donoghue, Yung, Wood <i>et al.</i> , (2015)	The Personal Assessment and Crisis Evaluation [PACE] clinic & 2001 Australian census	Place of birth & parents place of birth (born outside of Australia: 1 st gen, born in Australia, at least one parent born outside of Australia: 2 nd gen)	Meet criteria for at least one of the three Ultra High Risk [UHR] groups	Postcode Area [PA] (57, 13527)	Quartiles of ethnic density (highest=REF)	I: None A: Social deprivation	Poisson regression	Total migrants (59/NR) 1 st generation migrants (10/NR) 2 nd generation migrants (49/NR)	Total migrants: Low (7.7-23.2%) IRR=0.77 Below av. (24.4-32.5%) IRR=1.46 Above av. (32.7-40%) IRR=1.86 High (42-50.9%) [REF] 1 st generation migrants: Low (7.7-23.2%) IRR=0.72 Below av. (24.4-32.5%) IRR=0.93 Above av. (32.7-40%) IRR=1.29 High (42-50.9%) [REF] <i>n.b. above data from supplementary material (adjusted for deprivation).</i>
Melbourne, Australia	Time period: 2000-2006 (6 years)								

									Percentages for migrant density quartiles provided by author.
Richardson, Hameed, Perez, Jones & Kirkbride (2018)	Social Epidemiology of Psychoses in East Anglia [SEPEA] study & 2011 UK census	Self-ascribed ethnicity grouped using UK ONS ethnic group classifications	NAP & AP first incident cases [ICD-10]	Statistical Ward [SW] (530, 3992)	1% increase	I: Age, sex, socioeconomic status, ethnicity A: Deprivation, urbanicity, & social isolation (all psychoses). Ethnic diversity, deprivation, social isolation (NAP). Ethnic fragmentation (AP)	Multilevel Poisson regression	Combined (160/398511), Black African (21 NAP, 1 AP/17193), Black Caribbean (6 NAP, 3 AP/5973), Mixed white & black Caribbean (5 NAP, 2 AP/13100), Mixed Other (11 NAP, 6 AP/30927), Indian (2 NAP, 0 AP/27911), Pakistani (13 NAP, 3 AP/20126), Bangladeshi (5 NAP, 1 AP/8403), Arab (4 NAP, 0 AP/4838), Other ethnic group (13 NAP, 2 AP/62875), White Other 50 NAP, 12 AP/207165), White British (majority) (418 NAP, 53 AP/1623285)	OR=1.00 (all psychoses) OR=0.99 (NAP) OR=0.98 (AP) [SS]
East Anglia, England, UK	Time period: August 2009 – February 2013 (3.5 years)							<i>n.b., 2nd value refers to person-years</i>	
Schofield, Ashworth & Jones (2011)	Electronic GP patient records (the Lambeth DataNet) & 2001 UK census	Patient ethnicity codes were grouped using UK ONS ethnic group classifications (Black or Black British)	Psychosis first incident cases [DSM-IV]	LSOA (NR, 1500) CAS wards (NR, 6000)	High & low ethnic density. Associations at quintiles of ethnic density (highest=REF)	I: Age & sex A: Deprivation	Multilevel Poisson regression	Black (109/23693) White British (majority) (87/37278)	Between groups (LSOA): High (25-62%) IRR=1.48 Low (0-24%) IRR=2.88 [SS] Within groups (LSOA): Highest (43%) [REF] High (31%) IRR=2.50 [SS] Mid (24%) IRR=3.59 [SS] Low (19%) IRR=5.39 [SS] Lowest (11%) IRR=5.24 [SS] Within groups (CAS ward): Highest (37%) [REF] High (30%) IRR=1.06 Mid (26%) IRR=1.63 Low (22%) IRR=1.90 Lowest (11%) IRR=1.14 <i>n.b., CAS ward data provided by author. Within groups model at CAS level was non-sig. The same within-groups models for White British sample were non-sig.</i>
Lambeth, South London, UK	Time period: January 1996 – November 2006 (10 years)								

Schofield, Das-Munshi, Bécaries <i>et al.</i>, (2016)	South East London Community Health [SELCoh] study: 2008-2010 & 2011 UK census Lambeth & Southwark, South London, UK Time period: 2008-2010 (2 years)	Self-ascribed Black Caribbean or Black African from UK ONS ethnic group classifications	PSQ	LSOA (322,1500)	10% decrease	I: Age & sex A: Deprivation	Multilevel logistic regression	Black combined (98/377) Black African (NR/234) Black Caribbean (NR/143) Single household status (51/212) Disadvantaged social class (101/421)	OR=1.34 [SS] OR=1.15 OR=1.99 OR=2.18 OR=0.88 <i>n.b., effects for Black African & Black Caribbean are from paper's supplementary material</i>
Schofield, Thygesen, Das-Munshi <i>et al.</i>, (2017)	Danish Civil Registration System dataset, the Danish Psychiatric Central Register, & Integrated Database for Longitudinal Labour Market Research Schofield, Thygesen, Das-Munshi <i>et al.</i> , (2018)	Place of birth & parents place of birth (born outside of Denmark: 1 st gen, born in Denmark, both parents born outside of Denmark: 2 nd gen)	NAP first incident cases [ICD-10]	Parish units (1167, 3564)	Quintiles of ethnic density (highest=REF) <i>n.b. variables measured at age 15</i>	I: Age, sex, calendar period, parental psychiatric history & income A: Urbanicity	Multilevel Poisson regression	African (362/13118) 1 st gen (236/7187) 2 nd gen (80/4593) Non-Scandinavian European (1175/58939) 1 st gen (585/24436) 2 nd gen (410/25984) Asian (415/24512) Middle Eastern (529/28762) 1 st gen (412/17983) 2 nd gen (102/10293) Danish (majority) (24410/1921874)	Lowest (<0.4%) IRR=1.94, low (0.4-0.9%) IRR=2.17, mid (0.9-1.7%) IRR=1.11, high (1.7-3.7%) IRR=1.20, highest (3.7-18.5%) [REF] Lowest (<2.3%) IRR=1.99, low (2.3-3.9%) IRR=1.60, mid (3.9-5.9%) IRR=1.39, high (5.9-9.4%) IRR=1.43, highest (9.4-26.4%) [REF] Lowest (<0.6%) IRR=1.63, low (0.6-1.2) IRR=1.00, mid (1.2-2.1%) IRR=0.93, high (2.1-3.9%) IRR=1.00, highest (3.9-14.3%) [REF] Lowest (<0.8) IRR=1.68, low (0.8-1.7%) IRR=1.29, mid (1.7-3.3%) IRR=1.04, high (3.3-6.7%) IRR=1.23, highest (6.7-40%) [REF] <i>n.b. sig differences between highest and lowest quintiles for all minority groups, strongest for African sample. Generational differences (Schofield, Thygesen, Das-Munshi <i>et al.</i>, 2018): African IRR=1.33 [SS], Non-Scandinavian European IRR=1.08 [SS], Middle Eastern IRR=1.25 [SS]</i>
Stouten, Veling, Laan, & Van der Gaag (2016)	Centre for Early Psychosis referrals & the Central Bureau of Statistics, the Netherlands The Hague, the Netherlands	Place of birth & parents place of birth (born outside of the Netherlands: 1 st gen, born in the Netherlands, at least one parent born outside of	NAP first incident cases [DSM-IV], symptom dimensions & remission [PANSS & SCI-SR]	Neighbourhoods (44, max. 38000)	Baseline ethnic density as a predictor of symptomatic outcomes at 12 months follow up	I: Age, income & education A: None	Backwards regression models	1 st gen (60/NR) 2 nd gen (56/NR) (Comprising migrants from Morocco, the Netherlands Antilles, Surinam, Turkey, other Western & other non-Western countries)	Baseline ethnic density was not a sig. predictor of any psychosis outcome at follow up.

Terhune, Dykxhoorn, Mackay, Hollander & Kirkbride (2020) Sweden	Psychiatry Sweden anonymised database of linked national registers 1985 – December 2016 (~32 years)	the Netherlands: 2 nd gen) Place of birth & parents place of birth (born outside of Sweden: 1 st gen, born in Sweden, at least one parent born outside of Sweden: 2 nd gen)	Compulsory admission status at the time of the first diagnosis of psychotic disorder.	SAMS (7416/ 1000-2000)	1-SD increase	I: Age, sex, region of origin A: Population density (no other variables improved the final model fit)	Multilevel logistic regression	Combined (1800 1 st gen, 2605 2 nd gen)	OR=1.12 [SS]
								European 1 st gen 2 nd gen	OR=1.25 OR=2.19
								Asian & Oceanic 1 st gen 2 nd gen	OR=1.24 OR=1.87
								Middle Eastern & North African 1 st gen 2 nd gen	OR=1.45 OR=2.22
								Sub-Saharan African 1 st gen 2 nd gen	OR=1.99 OR=3.59
								North & South American 1 st gen 2 nd gen	OR=1.47 OR=2.31
								Swedish-Nordic 2 nd gen Swedish-migrant 2 nd gen Mixed Migrant 2 nd gen	OR=2.41 OR=2.10 OR=1.54
								Turkish (81/12309)	Between groups [SS]: Low (<6.5%) RR=1.39, mid (6.5–9.6 %) RR=1.19, high (≥9.6%) RR=0.78. Within groups: Low [REF], mid RR=0.97, high RR=0.63
Termorshuizen, Smeets, Braam & Veling (2014) Utrecht, the Netherlands	Psychiatric Case Register Middle Netherlands [PCR- MN] & Dutch population registry (Central Bureau of Statistics, the Netherlands) Time period: January 2000 - December 2009 (9 years)	Assigned by country of birth of parent(s) born outside of the Netherlands. If both parents were born in different countries, maternal country of birth used.	NAP first incident cases [DSM-IV]	Districts (10, 27525) Neighbourho ods (98, 2808)	Thirds of ethnic density (lowest=REF)	I: Age & sex A: Socioeconomic status (mean income of area)	Multilevel Poisson regression	Moroccan (222/21409)	Between groups [SS]: Low (<11.3 %) RR=2.18, mid (11.3–27.6%) RR=1.79, high (≥27.6) RR=1.01. Within groups: Low [REF], mid RR=1.02, high=0.64
								Surinamese/Antillean (155/13404)	Between groups [SS] Low (<3.2 %) RR=3.44, mid (3.2–4.9%) RR=2.32, high (≥4.9%) RR=2.12. Within groups [SS]: Low [REF], mid RR=0.91, high RR=0.51
								Other non-Western (127/20230)	Between groups [SS] Low (<3.5 %) RR=2.74, mid (3.5–6.3%) RR=2.09, high (≥6.3%) RR=1.35. Within groups: Low [REF], mid RR=0.88, high RR=0.67
								Dutch (majority) (1242/284747)	

<p>Sig. increased NAP risk in Dutch majority group with increasing overall ‘Non-Western’ minorities and ‘Other Non-Western’ group at the neighbourhood level <i>n.b., for combined ‘all non-Western minority group’, sig. between-group effects found at the neighbourhood and district level but effects not sig. for within-groups analyses</i></p>									
Termorshuizen, Heerdink & Selten (2018) Amsterdam, Rotterdam, the Hague, & Utrecht, the Netherlands	The Health Care Institute Netherlands & Dutch population registry (Central Bureau of Statistics, the Netherlands) Time period: 2013 (1 year)	Assigned by country of birth of parent(s) born outside of the Netherlands. If both parents were born in different countries, maternal country of birth used.	Dispensed anti-psychotic medication [ATC code N05A, including N05AN01, Lithium]	Neighbourhoods (NR/2808)	Quintiles of ethnic density (lowest=REF)	I: Age, sex, & household composition A: Socioeconomic status (At least 138 per 1000 households in a neighbourhood are dependent on the social welfare system)	Multivariable logistic regression	Turkish (3775/105460)	Lowest (<4.9%) [REF], low (4.9–9.4%) OR=1.15, mid (9.4–14%) OR=1.16, high (14–22.5%) OR=1.10, highest (>22.5%) OR=1.05 p=0.0375 [SS]
								Moroccan (5207/115455)	Lowest (<5.7) [REF], low (5.7–10.7%) OR=0.99, mid (10.7–15.8%) OR=1.05, high (15.8–22.1%) OR=0.96, highest (>22.1%) OR=0.93 p=0.0777
								Surinamese (4252/147123)	Lowest (<5.5%) [REF], low (5.5–8.9%) OR=0.84, mid (8.9–11.8%) OR=0.86, high (11.8–18.9%) OR=0.85, highest (>18.9%) OR=0.64 p<0.001[SS]
								Antillean (949/41430)	Lowest (<1.1%) [REF], low (1.1–2.3%) OR=0.90, mid (2.3–4%) OR=0.73, high (4–5.9%) OR=0.64, highest (>5.9%) OR=0.49 p<0.001 [SS]
								Dutch (majority) (21918/1043732)	Sig. increase in antipsychotic use in Dutch majority with increasing minority group density (for all minority groups)
van Os, Driessen, Gunther & Delespaul (2000)	Maastricht Mental Health Case Register [MHCR] & Municipal authority register	Marital status reported in the MHCR	SZ/related disorders incident cases [ICD-9]	Neighbourhoods (35/2804)	Interaction between single marital status x neighbourhood where the proportion of others living alone is below the city-level mean	I: Age, gender, marital status, age-by-gender interaction and marital-status-by-gender interaction. A: None	Multilevel Poisson regression	Single (141/NR)	RR=10.33, p<0.001 [SS]

<p>Veling, Susser, van Os, Mackenbach, Selten & Hoek (2008)</p> <p>The Hague, the Netherlands</p>	<p>Cases ascertained by Psychiatric residents at the early psychosis department & The Hague municipal population register</p> <p>Time period: 1997-1999, 2000-2007 (7 years)</p>	<p>Assigned by country of birth of parent(s) born outside of the Netherlands. If both parents were born in different countries, maternal country of birth used</p>	<p>First incident cases of a psychotic disorder [DSM-IV]</p>	<p>Neighbourhoods (44, max. 38000)</p>	<p>High and low ethnic density</p>	<p>I: Age, sex, & marital status A: Socioeconomic level</p>	<p>Multilevel Poisson regression</p>	<p>Combined (240/413586)</p> <p>Moroccan (91/88249)</p> <p>Surinamese (94/203088)</p> <p>Turkish (55/122249)</p> <p>Dutch (majority) (226/1056172) <i>n.b., second value refers to person-years</i></p>	<p>Low IRR=2.36, high IRR=1.25 Continuous: IRR=0.95, $p=0.0001$ [SS] Low IRR=4.43, high IRR=1.56 Continuous: IRR=0.93, $p=0.002$ [SS] Low IRR=1.88, high IRR=1.19 Continuous: IRR=0.98, $p=0.334$ Low IRR=1.74, high IRR=1.12 Continuous: IRR=0.97, $p=0.109$ REF <i>n.b., effect sizes for ethnicity stratified as two highest ethnic density neighbourhoods and all other neighbourhoods</i></p>
<p>Veling, Brinkman, Dorrestijn & van der Gaag (2014)</p> <p>The Hague, the Netherlands</p>	<p>Participants with FEP [DSM-IV] recruited from a specialist service for early psychosis in the Hague; Controls recruited from Delft University of Technology staff and students</p> <p>Time period: NR</p>	<p>NR</p>	<p>Green Paranoid Thoughts Scale, the Social Interaction Anxiety Scale, the Davos Assessment of Cognitive Biases Scale, the Self-Esteem Rating Scale, distance from avatars, Heart rate & galvanic skin response, subjective distress, & State Social Paranoia scale</p>	<p>VR café</p>	<p>95% of the avatars appeared White European or 75% North African depending on ethnic background of the participant.</p>	<p>NR</p>	<p>Nonparametric tests and linear mixed model analyses</p>	<p>Non-Dutch origin (11 FEP) Dutch origin (majority) (6 FEP, 24 controls)</p>	<p>Sig. higher galvanic skin response in FEP participants in 'other' compared to 'own' ethnicity condition [$F_{1,32}=9.82$, $p=0.004$]. This was not observed in controls. Overall, participants positioned themselves sig. further away from avatars in the 'other' ethnicity condition, but only in the low population density environments [$F_{1,39}=5.08$, $p=0.030$]. No sig. effects for other outcomes.</p>
<p>Veling, Pot-Kolder, Counotte, van Os & van der Gaag (2016)</p> <p>The Hague, the Netherlands</p>	<p>UHR [CAARMS], FEP [DSM-IV], and sibling groups were recruited from five psychiatric institutes. Controls were recruited via flyers which were distributed to schools, dentist offices, and Psychiatric institutes in the Hague</p> <p>Time period: NR</p>	<p>NR</p>	<p>Green Paranoid Thoughts Scale, Social Interaction Anxiety Scale, Community Assessment of Psychic Experiences, distance from avatars, subjective distress, & State Social Paranoia Scale</p>	<p>VR bar</p>	<p>80% of the avatars appeared Dutch or North African depending on ethnic background of the participant.</p>	<p>I: Age, sex, education & psychosis liability A: NA</p>	<p>Chi square tests, ANOVA & multilevel random intercept regression models</p>	<p>Non-Dutch origin (16 controls, 11 siblings, 5 UHR, 26 FEP) Dutch origin (majority) (37 controls, 31 siblings, 15 UHR, 29 psychosis)</p>	<p>Compared with participants with low psychosis liability, individuals with high psychosis liability had sig. higher paranoia [$b=3.62$ (95% CI 1.39-5.84)] and distress [$b=17.94$ (95% CI 10.99-24.90)] in response to social stress in VR. However, no sig. association between ethnic density and either outcome.</p>
<p>Zammit, Lewis, Rasbash, Dalman, Gustafsson & Allebeck (2010)</p>	<p>The Swedish National Patient Register, Multi- Generation Register, National Schools register, & the Swedish Census</p>	<p>Being foreign-born, Deprived status (parents unemployed/on benefits/low</p>	<p>Cases of a psychotic disorder [ICD-8:10]</p>	<p>School (1264, 161)</p>	<p>10% increase</p>	<p>I: Foreign-born, social fragmentation, grade</p>	<p>Multilevel logistic regression</p>	<p>Foreign-born (NR) Deprived status (NR) Social fragmentation (NR)</p>	<p>OR=0.95 [SS] Interaction: $p=0.016$ OR=0.92 Interaction: $p=0.057$ OR=0.92 [SS]</p>

Sweden	Time period: residents born between January 1972 & December 1977 & residing in Sweden on their 16 th Birthday followed up until December 2013 (~31 years)	income), Social fragmentation (single parent family/moved municipality/im migrated during childhood), Low grade (lower than av. School-level grade)	A: As above & variance components at school, municipality & county levels	Low grade (NR) Total sample (328 SZ, 741 other NAP, 355 AP, 953 Other psychoses/203829)	Interaction: $p=0.004$ OR=1.04 Interaction: $p=0.554$ <i>n.b., above are interaction effects for 'any psychosis'. Effects broken down by SZ, NAP, AP & 'Other' psychoses can be found in the paper's supplementary material</i>
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Table 2. Moderator tests

Variable	<i>n</i> samples	<i>n</i> studies	Pooled OR (Lower 95% CI–Upper 95% CI)	Standard error	<i>p</i> value
Country	-	-	$F_{4,70}=0.18$	-	0.946
Sweden [REF]	23	2	1	-	-
United Kingdom	19	5	1.13 (0.81-1.58)	0.17	0.456
Canada	1	1	1.01 (0.56-1.82)	0.30	0.983
Denmark	16	1	1.15 (0.73-1.81)	0.23	0.550
The Netherlands	16	1	1.07 (0.68-1.68)	0.23	0.774
Median time cases collected	-	-	$F_{2,72}=1.25$	-	0.292
90s and earlier [REF]	43	4	1	-	-
2010s	18	2	1.04 (0.82-1.32)	0.12	0.752
2000s	14	4	1.19 (0.95-1.49)	0.11	0.121
Area size	-	-	$F_{3,71}=2.50$	-	0.066
1 st Quartile (<920) [REF]	24	3	1	-	-
2 nd Quartile (920-2532)	8	2	1.38 (1.08-1.77)	0.12	0.011*
3 rd Quartile (2532-4993)	18	2	1.14 (0.95-1.37)	0.09	0.168
4 th Quartile (4993-7200)	25	3	1.06 (0.89-1.25)	0.84	0.513
LSOA or larger	-	-	$F_{1,73}=0.13$	-	0.723
≤ LSOA	32	5	1	-	-
>LSOA	43	5	0.96 (0.78-1.19)	0.11	0.723
Psychosis outcome	-	-	$F_{5,69}=2.36$	-	0.049*
Non-affective psychosis [REF]	33	5	1	-	-
Subclinical psychosis experiences	13	3	0.97 (0.80-1.17)	0.10	0.753
Antipsychotic prescriptions	16	1	1.02 (0.84-1.25)	0.10	0.817
Any psychosis	4	1	1.66 (1.22-2.27)	0.16	0.002*
Affective psychosis	5	2	1.04 (0.84-1.30)	0.11	0.695
Other psychoses	4	1	0.97 (0.78-1.22)	0.11	0.818
Clinical or non-clinical outcome	-	-	$F_{1,73}=0.59$	-	0.444
Clinical	62	7	1	-	-
Non-clinical	13	3	0.92 (0.73-1.15)	0.12	0.444
Crude minority groups	-	-	$F_{6,68}=6.86$	-	<0.001*
Other ethnic group [REF]	19	3	1	-	-
Asian	11	4	1.19 (0.98-1.45)	0.10	0.074
Black	17	7	1.71 (1.43-2.03)	0.09	<0.001*
Combined ethnic minority group	2	1	1.17 (0.83-1.65)	0.17	0.355
Combined migrant group	5	2	1.09 (0.86-1.39)	0.12	0.476
Other social characteristic	14	2	1.09 (0.87-1.37)	0.12	0.463
White other	7	3	1.23 (1.03-1.48)	0.09	0.024*
Minority group allocation	-	-	$F_{1,59}=0.60$	-	0.443
Birthplace of individual or parents	44	5	1	-	-
Self-ascribed ethnic minority	17	5	1.08 (0.88-1.33)	0.10	0.443

2.3.4 Sensitivity analyses

Leave-one-out analysis indicated that removing each study produced negligible changes to the overall pooled effect (Table 3). This was also the case when the 75 effect sizes within the studies were individually removed (see Appendix 10).

Table 3. Effect sizes by study and leave-one-out analysis.

Study, setting	Minority groupings: crude group (specific group, cases/total)	Study quality	Pooled OR (Lower 95% CI–Upper 95% CI)	Pooled OR (Lower 95% CI – Upper 95% CI) if study removed	p value if study removed
All studies (n=10)	-	-	1.20 (1.09-1.32), p<0.001	-	-
Bécares, Nazroo & Stafford (2009), UK	Black (Black Caribbean, NR/1215.) Asian (Indian, NR/1278. Pakistani, NR/1190. Bangladeshi, NR/594.)	14	1.04 (0.84-1.27)	1.22 (1.10-1.35)	<0.001
Das-Munshi, Bécares, Boydell <i>et al.</i> , (2012), UK	Black (Black Caribbean, 83/694.) Asian (Indian 58/643. Pakistani 72/724. Bangladeshi 33/650.) White other (Irish, 59/733.)	15	1.63 (0.87-3.05)	1.20 (1.08-1.33)	0.001
Dykxhoorn, Lewis, Hollander, Kirkbride & Dalman (2020), Sweden	Black (Sub-Saharan African, 550/261899 person-years.) Asian (Asian, 297/365971.) Other ethnic group (Middle Eastern & North African, 693/796928. North American, 50/55558. South American, 79/102857.) White other (Nordic, 103/131882, Non-Nordic European, 693/880211.)	14	1.25 (0.51-3.06)	1.20 (1.08-1.34)	0.001
Menezes, Georgiades, & Boyle (2011), Canada	Combined migrant group (Combined migrant group, 31/7784.)	11	1.12 (1.05-1.19)	1.20 (1.09-1.33)	<0.001
Richardson, Hameed, Perez, Jones & Kirkbride (2018), UK	Combined ethnic minority group (Combined ethnic minority group, 160/398511 person-years.)	12	1.16 (1.00-1.36)	1.20 (1.09-1.34)	<0.001
Schofield, Ashworth & Jones (2011), UK	Black (Black or Black British, 109/23693.)	11	1.94 (1.34-2.82)	1.15 (1.08-1.23)	<0.001
Schofield, Das-Munshi, Bécares <i>et al.</i> , (2016), UK	Black (Black African, NR/234. Black Caribbean, NR/143. 98/377.) Other social characteristic (Deprived or disadvantaged, 101/421. Single marital status, 51/212.)	11	1.45 (0.81-2.57)	1.21 (1.09-1.34)	<0.001
Schofield, Thygesen, Das-Munshi <i>et al.</i> , (2017), Denmark	Black (African, 362/13118.) Asian (Asian, 415/24512.) Other ethnic group (Middle Eastern, 529/28762.) White other (Non-Scandinavian European, 1175/58939.)	12	1.28 (0.94-1.75)	1.19 (1.07-1.33)	0.002
Termorshuizen, Heerdink & Selten (2018), The Netherlands	Black (Antillean, 949/41430.) Other ethnic group (Turkish, 3775/105460. Moroccan, 5207/115455. Surinamese, 4252/147123.)	11	1.49 (0.96-2.34)	1.19 (1.06-1.33)	0.005
Zammit, Lewis, Rasbash, Dalman, Gustafsson & Allebeck (2010), Sweden	Combined migrant group (Combined migrant group, NR.) Other social characteristic (Deprived or disadvantaged, NR. socially fragmented, NR. low grades, NR.)	13	1.07 (0.92-1.24)	1.25 (1.15-1.36)	<0.001

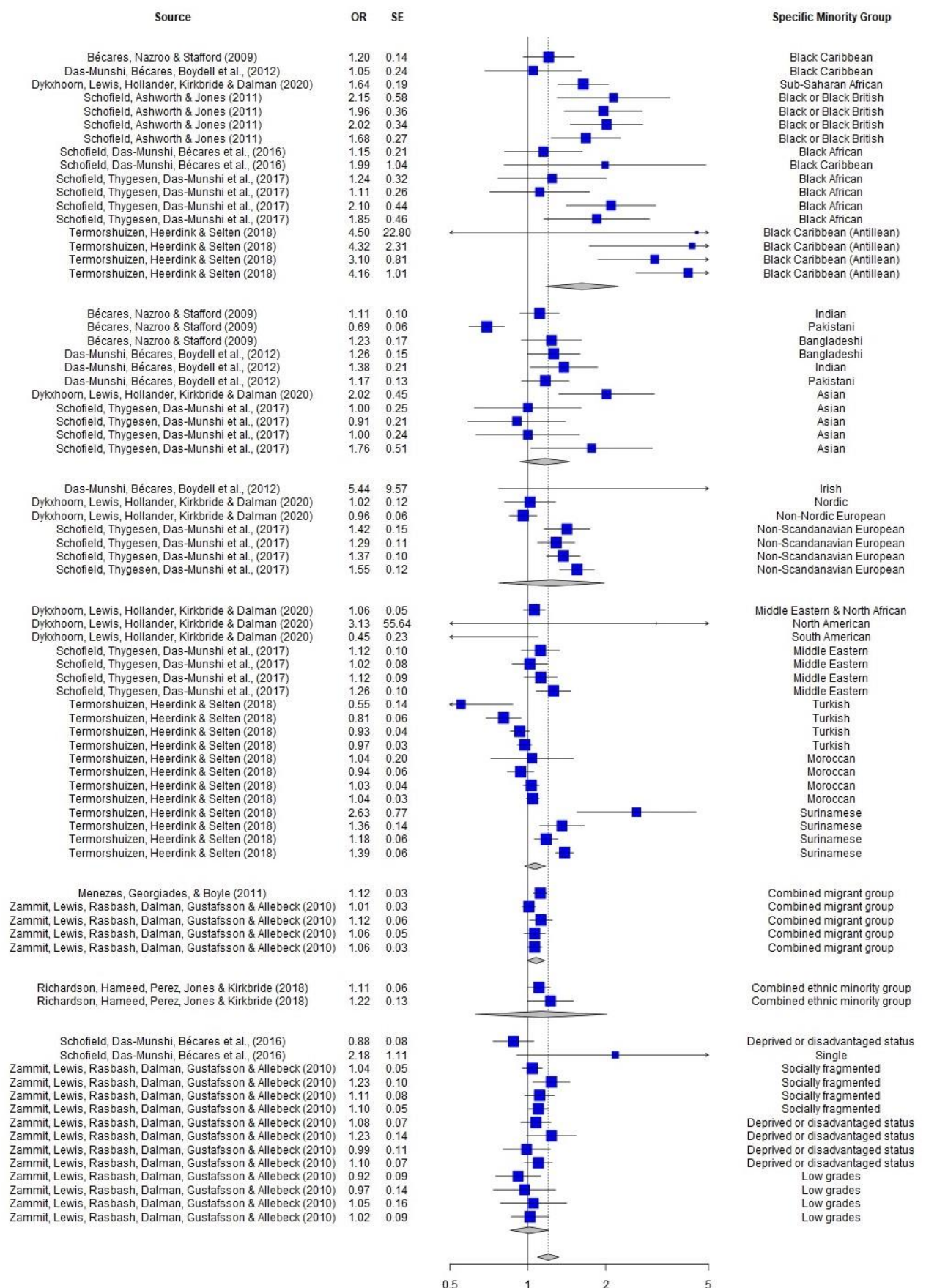


Figure 2. Forest plot of the association between a ten percentage-point decrease in group density and psychosis risk.

2.4 DISCUSSION

2.4.1 Summary

This is the first review providing quantitative evidence that the risk of psychosis posed by lower own group density areas varies across minority groups. Overall, a ten percentage-point decrease in own group density was associated with a 20% increase in risk of psychosis, but this effect was strongly moderated by minority group.

2.4.2 Comparisons with previous reviews

Our overall pooled effect was similar in magnitude to a previous within-groups meta-analysis (Bécares *et al.*, 2018) but weaker than one examining between-group effects (Bosqui, Hoy, & Shannon, 2014). However, contrary to previous analyses (Bécares *et al.*, 2018), we observed a strong moderating effect of minority group, particularly when more fine-grained classifications were tested.

In line with previous narrative reviews (Bosqui, Hoy, & Shannon, 2014; Shaw *et al.*, 2012), we observed the strongest group density associations in Black individuals. A significantly stronger association was also found in the White Other group, driven by strong associations in Non-Scandinavian European individuals in Denmark (Schofield *et al.*, 2017). A reverse relationship was noted in South American migrants to Sweden (Dykxhoorn *et al.*, 2020). Such heterogeneity in effect sizes may reflect distinctive social experiences of specific minority groups (Anglin, 2020; Das-Munshi *et al.*, 2012).

2.4.3 Strengths and limitations

A strength of this review is our use of a multilevel meta-analytic model. In the group density literature, it is common to examine multiple groups and so accounting for nesting by study is vital. Another strength is that we used relatively specific minority groupings. It is common practice for group density studies to amalgamate minority samples (*e.g.*, Black and minority ethnic groups), for reasons of statistical power (Schofield *et al.*, 2016). As we show, aggregating groups may conceal considerable heterogeneity in risk. This likely reflects distinct social experiences of different minority groups, in turn providing clues to likely mechanisms. For example, the narrative review and meta-analysis indicate that reduced ethnic density confers greater risk to Black populations compared to other groups. However, within the Black group, associations appear stronger in Black Caribbean individuals in the Netherlands than in the UK, highlighting the importance of the varied experiences of different migrant

groups (Das-Munshi *et al.*, 2012).

We also acknowledge some limitations. Firstly, regarding the categorisation of ethnic groups, although we attempted to use the same categories as the original studies, our moderator analyses required some judgements about how to combine groups. We sought to be as non-arbitrary as possible by using UK census classifications and author definitions, but clearly no scheme is definitive. This question of how to categorise groups on the meta-analytic level also applies on the study level. The authors of original studies will have had to make these decisions too and may have used a variety of criteria to do so – UK studies tended to use self-ascribed ethnicity, whilst studies in other countries classified groups by birthplace. Further, composition of apparently uniform groups differs by country, *e.g.*, the ethnic subgroups that comprise “Asian” samples. As well as these conceptual issues, when stratifying data into specific groups, there is a trade-off between aggregating and splitting groups in terms of statistical power and error control. These issues, stemming from race’s social construction (Sen & Wasow, 2016), make synthesising studies inescapably complicated.

In terms of exposure, rather than exclude studies that quantified group density differently, we attempted to rescale effects so that they all reflected a ten percentage-point decrease. This allowed us to synthesise more evidence than previous reviews, however, it may have resulted in imprecision and extrapolation. Additionally, the quantification of group density by geographical unit is subject to the modifiable areal unit problem (Arcaya *et al.*, 2017).

Furthermore, studies varied in how they quantified psychosis. Rather than exclude studies based on their psychosis outcome, we decided to use this as an opportunity to examine whether group density associations differ for non-clinical *vs.* clinical outcomes. Formal moderator tests indicated some evidence that associations were stronger for the latter. This should be considered when observing differences between minority groups (also see Appendix 6). Moderator analyses were also useful for checking the robustness of the meta-analysis, for example, there was no evidence of a moderating effect of country – which justifies the decision to pool and compare group density data from different countries.

In terms of the evidence-base, there are broader issues of temporality and consistency, which are key criteria for assessing causation in epidemiological studies (Gordis, 2013; Pickett & Wilkinson, 2015). Most studies were conducted in similar settings and time periods; there is a dearth of research from outside Europe, for

example (Anglin, 2020a). As such, a reduced range of minority groups were included and given that a disproportionate number of studies in the meta-analysis were conducted in the UK, generalising findings must be approached with caution.

Our review of group density associations in non-ethnic minorities was also limited by the lack of studies including such samples. This is an important priority for future research in terms of elucidating mechanisms.

Finally, most reviewed studies were cross-sectional, hereafter, potential mechanisms will be discussed but there is a clear need for further longitudinal studies to identify causal pathways (Saville, 2020).

2.4.4 Proposed mechanisms

Racism and discrimination

The attenuated risk and impact of racial harassment experienced by minority groups in higher own group neighbourhoods, has been proposed as a key mechanism underpinning group density relationships (Bécares *et al.*, 2009; Bécares & Das-Munshi, 2013; Das-Munshi *et al.*, 2012). Evidence from Europe and the USA suggests that visible minorities (Dykxhoorn *et al.*, 2020), particularly Black individuals, are at especially high risk of experiencing discrimination and coercive pathways to psychiatric treatment (Das-Munshi *et al.*, 2012; McKenzie, 2006; Morgan, Knowles, & Hutchinson, 2019; Oh *et al.*, 2016). Evidence suggests that minorities living in lower-own group density areas also anticipate more discrimination from healthcare services (Bécares & Das-Munshi, 2013). Combined with findings that ethnic minorities experience greater mental health-related stigma (Clement *et al.*, 2015), this may exacerbate delays in help-seeking (Memon *et al.*, 2016) and has important implications for early intervention services.

Some evidence indicates that changes to neighbourhood ethnic composition can drive anti-immigration sentiment, especially areas that have experienced rapid rates of change (Goodwin & Milazzo, 2017; Hopkins, 2010; Inglehart & Norris, 2017), but this has not been examined in the context of group density associations. The perceived loss of power associated with the prospect of becoming a minority has been suggested to drive majority group individuals' exclusionary and hostile treatment of minorities (Eilbracht *et al.*, 2015; Outten *et al.*, 2012). As such, some minority groups may in fact be at elevated risk of psychosis in newly high ethnic density areas. This may explain detrimental own group density relationships observed in some

populations (Bécares *et al.*, 2009; Dykxhoorn *et al.*, 2020; Halpern & Nazroo, 2000). It is also important to contextualise studies in terms of their socio-political context, *e.g.*, there has been a stark increase in anti-Asian discrimination during the COVID-19 pandemic (Chen *et al.*, 2020). This may be an important influence in post COVID-19 group density studies including Asian populations.

Deprivation

In addition to overt discrimination, disproportionate poverty, or the propensity to ‘drift’ into more deprived areas were thought to be key drivers of the excess psychosis risk in ethnic minorities (Barnard & Turner, 2011; Dykxhoorn & Kirkbride, 2019; Read & Dillon, 2013). However, ethnic density associations tend to persist after adjustment for deprivation (Bécares *et al.*, 2018; Bosqui *et al.*, 2014). Furthermore, given that areas with higher density of ethnic minorities are often more deprived (Heinz *et al.*, 2013; Heslin *et al.*, 2018), any residual confounding might be expected to operate in the opposite direction to density effects in minority groups (Bécares *et al.*, 2018; Bosqui *et al.*, 2014). There is, however, evidence that social drift prior to diagnosis may artifactually produce ethnic density associations in majority groups (Termorshuizen *et al.*, 2014) which may explain between-group density effects (Bosqui *et al.*, 2014) appearing larger than within-group effects (Bécares *et al.*, 2018).

Social capital

Social capital is thought to have a key role in the protective effects of own group density (Das-Munshi *et al.*, 2012; Kirkbride *et al.*, 2007). It has been defined as “connections among individuals – social networks and the norms of reciprocity and trustworthiness that arise from them” (Putnam, 2000, p.19). The increased access to social capital garnered by minorities living in high own group areas is proposed to weaken the impact of social adversity such as discrimination (Bécares *et al.*, 2009; Das-Munshi *et al.*, 2012) and deprivation (Handley *et al.*, 2020). There is evidence that the association between social capital and psychosis risk is non-linear, with neighbourhoods characterised by high and low levels of social capital conferring the highest risk of psychosis (Kirkbride *et al.*, 2008). High social capital, particularly bonding social capital (Putnam, 2000) may increase risk in individuals who experience or perceive exclusion from the networks that it represents (McKenzie *et al.*, 2002; Saville, 2020), such as ethnic minorities in lower own group density areas (Kirkbride *et al.*, 2008).

Migration and “acculturation”

Studies have indicated that the stress of migration and adaptation to the host culture contribute to the excess risk of psychosis in minorities, though this risk may be reduced in those who speak the host language and have higher educational and employment prospects (Morgan, Knowles & Hutchinson, 2019; Selten & Termorshuizen, 2017). Whilst we did not find moderation by country, there is some evidence to support this notion, with some studies finding lower psychosis prevalence and weaker or absent group density associations in studies in Canada (Menezes *et al.*, 2011) and Australia (O’Donoghue *et al.*, 2015), countries where immigration policy gives preference to individuals with these characteristics.

Factors related to low “acculturation” (*e.g.*, majority language ability) are more prevalent in first-generation migrants than their children, who are commonly more “assimilated” with the host culture (Anglin, 2020; Dykxhoorn *et al.*, 2020; Veling *et al.*, 2010). Recent evidence suggests that linguistic factors confer greater risk of psychosis in first-generation migrants, whilst social disadvantage (Jongsma *et al.*, 2020) and the stress of alienation from both identities (marginalisation) or rejecting culture of origin in favour of the host culture (assimilation) are proposed to underpin risk in subsequent generations (El Bouhaddani *et al.*, 2019; Schofield *et al.*, 2018; Veling *et al.*, 2010). Generational differences in the group density effect could therefore shed light on the processes driving the increased risk, however, to date literature examining this is mixed (Bécares *et al.*, 2018; Dykxhoorn *et al.*, 2020; Schofield *et al.*, 2018) and there were too few studies stratifying by generation to allow for meaningful moderator analysis in the present review.

Pathways to psychosis

Both material and psychological processes likely drive group density associations, and these may not be mutually exclusive. Material processes refer to factors preventing individuals from accessing the resources and capacities required for autonomy (Marmot, 2006; Qureshi, 2019), *e.g.*, individuals who do not speak the majority language may find it harder to find work or access appropriate mental health services in low own group density areas (Memon *et al.*, 2016). This also includes deliberate attempts to exclude minority groups and restrict their access to opportunities and support networks (McKenzie, 2006; Qureshi, 2019). This explains why some density effects are observed in marginalised groups including ethnic minorities (Bécares *et al.*,

2018; Bosqui *et al.*, 2014; Shaw *et al.*, 2012), isolated single people (Schofield *et al.*, 2016; van Os *et al.*, 2000), people with deprived social status (Schofield *et al.*, 2016; Zammit *et al.*, 2010), and LGBTQ+ individuals (Hatzenbuehler *et al.*, 2011), while there is evidence that minority groups with a greater share of power do not experience the same degree of risk to their mental health (Selten & Termorshuizen, 2017; Suvisaari *et al.*, 2014). That said, there has been limited investigation into group density associations in these groups. To identify key mechanisms, it would be theoretically useful to examine whether group density is an important social determinant of psychosis in less marginalised minority groups *e.g.*, Swedish speakers in Finland who comprise a linguistic minority but generally occupy a higher socioeconomic position and live longer than the Finnish-speaking majority (Suvisaari *et al.*, 2014).

Psychological processes relate to the mental consequences of belonging to a disempowered group. There are several theoretical frameworks for conceptualising the psychological sequelae of marginalised minority group membership, including the minority stress model (Meyer, 1995), social defeat (Selten *et al.*, 2013), and social identity theory (McIntyre *et al.*, 2018; Tajfel & Turner, 1979). These mechanisms may be especially important in the aetiology of psychotic disorders given that group density effects appear to have a degree of specificity to psychosis (Bécares *et al.*, 2018; Shaw *et al.*, 2012). More specifically, negative evaluations of self and others (Fowler *et al.*, 2006) (exacerbated by experiences of racism), appear to have a unique role in paranoia, but not hallucinations (Janssen *et al.*, 2003; McIntyre *et al.*, 2018). Supporting neurobiological evidence from non-clinical samples indicates that Black individuals in lower own group density areas perceive greater social threat in response to White faces (McCutcheon *et al.*, 2018), suggesting a possible pathway to paranoia (McCutcheon *et al.*, 2018). Conversely, the social deafferentation hypothesis suggests that social isolation has stronger links with hallucinations (Hoffman, 2007). As such, perhaps the former is a more common pathway in Black individuals, and the latter in groups who experience greater linguistic and cultural barriers *e.g.*, first-generation migrants (Anglin *et al.*, 2020; Dykxhoorn *et al.*, 2020; Jongsma *et al.*, 2020).

These social processes highlight the importance of contextualising psychotic experiences in minority groups and considering to what extent these are understandable responses to chronic experiences of discrimination and social exclusion (Johnstone & Boyle, 2018).

Implications

There has been limited discussion of the implications of group density findings, particularly with regards to policy. This is understandable given that these findings could be viewed as arguments in favour of ethnic segregation. However, residential segregation has instead been associated with poorer health (Maguire *et al.*, 2016; Pickett *et al.*, 2008). Further, it is plausible that the risks associated with low own group density areas are a manifestation of disempowerment experienced by that group and as such, the effect might be attenuated if minority groups experienced less social disadvantage. To appropriately address these issues, the underpinning individual-level and systemic factors must be examined (Anglin, 2020).

It has been argued that focusing on assimilating migrants into host cultures exacerbates the dominant culture's "othering" of minority groups (Simonsen, 2016), creating greater disconnect between their parental and host cultures (Schofield *et al.*, 2018) which is likely to have unfavourable mental health consequences (Schofield *et al.*, 2018; Veling *et al.*, 2010). As an alternative, strategies to create cross-cutting identities may be efficacious in increasing access to protective bridging social capital (Kunst *et al.*, 2015; McKenzie *et al.*, 2002). Establishing positive intergroup contact may be especially challenging for individuals prone to psychosis, who may be more likely to perceive others as a threat (Reininghaus *et al.*, 2016), however, facilitating positive contact may help foster stable social identities, in terms of minority groups' connectedness with both their cultural group and wider community (Schofield *et al.*, 2018). That said, creating the social conditions to enable minorities to form strong civic identities and access bridging social capital will only be achieved by systemic changes to reduce community-level social inequality and crucially, the structural racism which sustains inequities in the social, economic, and living circumstances of minority groups (Anglin, 2020; Morgan, Knowles, & Hutchinson, 2019). As well as these wider systemic issues, useful targets for clinical intervention might include strategies to improve clinicians' cultural competence (Anglin, 2020; Edge *et al.*, 2018) and understanding of the disempowerment experienced by minority groups, and this may be amplified in low own group density areas. To better inform interventions, further investigation is needed to determine when in life low own group density confers the greatest risk (Kirkbride *et al.*, 2007). Therapeutic approaches that aim to develop strong social identities might also be efficacious.

Future research

The logic of group density designs assumes that individuals living in low and high own group density areas can be straightforwardly compared (Saville, 2020). Given that the reasons for large minority group populations in particular areas are not arbitrary, rather linked with factors such as family, housing cost, and employment (Selten & Termorshuizen, 2017), it is difficult to disentangle the contextual and compositional effects of own group density (Maxwell, 2019). There is a clear need for longitudinal designs (Shaw *et al.*, 2012), and demonstrations that associations persist across different settings and time periods (Selten & Termorshuizen, 2017).

The present review suggests that the group density effect is complex and appears to vary by minority group, with the strongest associations observed in Black populations. To substantiate our findings and elucidate mechanisms, more studies examining specific ethnic minorities are required. Future work should also test for group density associations in minorities defined by other characteristics. In addition to epidemiological studies, proposed avenues for future research should be explored using different methodologies, such as qualitative interviews (Whitley *et al.*, 2006), experience-based approaches (Söderström *et al.*, 2016), neurobiological studies (McCutcheon *et al.*, 2018), and VR (Veling *et al.*, 2016) to better capture the subjective experiences driving group density effects (Anglin, 2020).

Conclusions

We provide meta-analytic evidence that the risk of psychosis posed by lower own group density environments is not uniform across groups and is particularly marked in Black populations. This is reflected in narrative review findings. Group density designs are a powerful tool for identifying health inequalities, but methodological refinements to improve causal inference and identification of mechanisms would be welcome.

Chapter 3: Exploring sense of belonging in individuals with psychosis living in linguistically similar and dissimilar communities in North Wales

3.1 INTRODUCTION

Where an individual lives has been found to be an important determinant of their risk of mental illness (March, 2008). Evidence supporting this comes from group density studies, which have found that minority group individuals living in areas with a small percentage of their own group are at higher risk of mental illness compared to minorities residing in communities where their group makes up a larger proportion of the local population (Bécares *et al.*, 2018; Bosqui, Hoy & Shannon, 2014; Shaw *et al.*, 2012). There is some indication that group density relationships are stronger and more consistently observed in psychosis as opposed to common mental health disorders such as anxiety and depression (Bécares *et al.*, 2018; Shaw *et al.*, 2012). This suggests that the social processes behind these associations might be particularly important in terms of understanding psychosis specifically. However, to date, the group density evidence-base largely consists of epidemiological studies and the mechanisms behind these associations remain poorly understood (Bosqui, Hoy, & Shannon, 2014; Baker *et al.*, 2021). Qualitative approaches to exploring the subjective experience of individuals with psychosis could provide a valuable insight into possible mechanisms underpinning group density phenomena (Baker *et al.*, 2021).

van Os, Kenis & Rutten (2015, p.203) have described psychoses as “disorders of adaptation to social context.” People with psychosis experience the world differently (Sass *et al.*, 2017) – there is strong evidence that psychosis is preceded by significant psychosocial stress which in turn changes the way that the person perceives themselves and their social environment (Longden & Read, 2016). It has been suggested that adversity alters a person’s emotional and cognitive processing making them more susceptible to interpreting social experiences more negatively, *e.g.*, perceiving others as a threat (Howes & Murray, 2014; Pot-Kolder *et al.*, 2018). There has been growing interest in exploring the way that individuals with psychosis navigate

their social milieu, as this can offer insights into the possible processes behind their experiences of psychosis (Baumann *et al.*, 2022; Sass, Pieknos, & Fuchs, 2017). For example, Sass *et al.*, (2017) developed the Examination of Anomalous World Experience [EAWEx], which is a semi-structured interview that aims to capture rich qualitative data about how individuals with psychosis navigate their lived environment. The interview taps into six domains of subjective experience that have been found to be perceived differently by people with psychosis: “Space and objects, Time and events, Other persons, Language, Atmosphere, and Existential orientation.” (Sass *et al.*, 2017, p.11). One such experience observed in people with psychosis is “feelings of social paranoia or social anxiety” which is “feeling as though others are unusually focused on oneself, whether commenting, judging, or simply staring in a way that makes the subject feel self-conscious, guilty, ashamed, or anxious” (Sass *et al.*, 2017, p.27). This perhaps has relevance in terms of how low own group density environments are experienced by individuals with psychosis.

Other studies have used experience-based approaches. For example, the Camberwell walk pilot study assigned participants with psychosis to either a mindfulness condition or a ten-minute walk around a busy shopping street in a deprived area of London. Compared to participants in the mindfulness condition, post-exposure to the urban environment, participants reported significantly higher anxiety, negative beliefs about others, jumping to conclusions cognitive bias, and paranoia (Ellett, Freeman & Garety, 2008). Freeman and colleagues (2015) conducted a similar study and found that compared to those in the control condition, participants exposed to the urban milieu exhibited higher anxiety, depression, and negative views about the self and others, as well as increases in paranoia and hallucinations. There was also some modest evidence that paranoia was mediated by negative schemata, anxiety, and depression (Freeman *et al.*, 2015). These studies demonstrated how brief exposure to social stress can set in motion the emotional and cognitive processes that drive psychotic experiences, however the specific characteristics of the social environment that the participants found distressing were not explored.

Other experience-based studies have taken a qualitative approach to identify the aspects of the lived environment that induce stress in individuals with psychosis (Söderström *et al.*, 2019; Valladares *et al.*, 2022; Winz *et al.*, 2022). Söderström and colleagues (2016) used a video elicitation technique which involved the participant taking a video-recorded walk around their city and later viewing the video with a

researcher and discussing their experiences in a qualitative interview. Much of the stress was centred around the crowdedness of cities, this caused disorientation and sensory overload in participants e.g., one individual felt he had to be “vigilant about everything.” (Söderström *et al.*, 2016, p.108).

Some studies have used experimental methods to elucidate the mechanisms behind exposure to social stress, including low own group density. Veling and colleagues used a Virtual Reality [VR] task whereby participants were exposed simulations of high and low group density through manipulation of the ethnicities of the avatars in the virtual social environment. Individuals with higher psychosis liability had an elevated physical stress response in low own group density conditions compared to control participants (Veling *et al.*, 2014), although a later study found no association between virtual group density and distress of paranoia (Veling *et al.*, 2016).³⁹ More generally, exposure to increasing social stressors exacerbated distress and paranoia (Veling *et al.*, 2016) and there was evidence that the deleterious effect of virtual social stress on psychotic symptoms was moderated by cognitive biases⁴⁰ and low self-esteem (Jongeneel *et al.*, 2018; Pot-Kolder *et al.*, 2018).

A study by McCutcheon *et al.*, (2018) aimed to identify neurobiological mechanisms behind the group density effect. In a sample of clinically healthy participants, this study used fMRI to examine right amygdala response to outgroup faces in Black and White participants. The right amygdala is a key area of the brain involved in threat responses and heightened amygdala responses are associated with paranoia (Goghari *et al.* 2010). This study found that Black individuals had a stronger right amygdala response to outgroup white faces. Further, Black people living in lower own group density areas exhibited greater right amygdala activity in response to White faces than was observed in Black individuals in higher own group density areas.

The studies discussed have shed some light on the mechanisms linking exposure to socially stressful environments and experiences of psychosis. Evidence suggests that stressful environments *e.g.*, busy urban settings and low own group density are perceived as socially threatening in non-clinical samples (McCutcheon *et*

³⁹ The authors note that this could have been because the majority of the participants were Dutch (66%) and ethnic density associations are typically observed in minoritised ethnic groups. Also, the avatars in the VR environments had a North African appearance and most of the non-Dutch ethnic minority participants had a different ethnic background to North African (Veling *et al.*, 2016).

⁴⁰ Attention to threat and external attribution bias (Pot-Kolder *et al.*, 2017).

al., 2018). However, individuals with psychosis experience heightened stress responses in such scenarios which precipitate alterations in cognitive and emotional processes that have been found to drive psychotic experiences (Ellet, Freeman, & Garety, 2008; Freeman *et al.*, 2015; Veling *et al.*, 2014, 2016). Because individuals with psychosis are more likely to have negative schemas about the self and others and heightened threat anticipation, the experience of low own group density might be particularly harmful for them (Humphrey *et al.*, 2021).

A notable gap in the literature is that no studies have used a qualitative approach to gather in depth accounts of the subjective experience of own group density from the perspective of individuals with psychosis – this could aid understanding of the social processes behind these associations. There has been one qualitative exploration of group density, but this was conducted with a non-clinical sample. Whitley *et al.*, (2006) carried out qualitative interviews and participant observations in Gospel Oak – an inner-city area of London comprising a low proportion of ethnic minorities. Findings revealed that ethnic minority residents perceived more exclusion from their community networks – some noted that they felt they had little in common with the majority white working-class population and others commented that they did not engage in community activities. Instead, participants sought out opportunities to engage with people with a shared background and whom they perceived to be more like them based on their values, cultural and linguistic characteristics. Participant accounts also suggested that compared to their White majority counterparts, ethnic minority interviewees were subject to greater verbal and physical harassment and were more fearful of being “singled out” based on their ethnic background (Boydell, 2001). The authors suggested everyday racism and discrimination directed at racially minoritised residents might be less likely to be challenged in areas where they comprise a smaller proportion of the population.

Findings from Whitley *et al.*, (2006) can be understood within the context of Selten and colleagues (2005, 2013, 2023) social defeat hypothesis. Social defeat relates to how an individual perceives themselves in relation to others around them – the experience of “unwanted outsider status or subordinate position” has been proposed as a key mechanism behind the increased risk of psychosis in minority groups (Selten & Ormel, 2023). This is similar to other theoretical frameworks such the social comparison component of the social identity approach (Tajfel & Turner, 1979) status

anxiety (Layte & Whelan, 2014), social evaluative threat (Dickerson, 2008), status syndrome (Marmot, 2004) and fear of negative evaluation (Colins *et al.*, 2005).

Humans are social animals with an intrinsic need to belong (Baumeister & Leary, 1995). A sense of belonging is achieved through a person's connections with other social groups which are incorporated into their social identity (McIntyre *et al.*, 2018). According to the social identity approach, people are motivated to view their group as a positive and unique entity (Hornsey, 2008). This involves a process of social comparison – when this results in the individual evaluating their group positively in relation to the outgroup this strengthens their sense of belonging and bolsters self-esteem, conferring psychological benefits (Haslam *et al.*, 2009). However, when a person makes negative comparisons, and the positive distinctiveness of their group is threatened, this depletes self-esteem, having a detrimental impact on mental health (McIntyre *et al.*, 2018).

Negative perceptions about the self (low self-esteem) are more prevalent in persons with psychosis and individuals who are more vulnerable to developing psychosis (Room *et al.*, 2011). Low self-esteem has also been found to exacerbate experiences of psychosis (Fowler *et al.*, 2012) particularly paranoia (McIntyre *et al.*, 2018). For example, McIntyre *et al.*, (2018) found that having a positive identity (which included having a sense of neighbourhood belonging) was associated with decreased reporting of paranoia in a non-clinical sample, with self-esteem partly mediating this relationship.

Issues of identity and belonging are a double-edged sword – while having a strong affiliation with a particular social group can confer mental health benefits, at the extreme end of the continuum this can also provide the basis for “othering” whereby “insiders” and “outsiders” are delineated leading to negative perceptions or treatment of outgroups (Søraa *et al.*, 2020).

As alluded to in Whitley *et al.*, (2006), another potentially important factor in the context of group density associations is social capital which can be broadly defined as the networks within a community or the “glue” that holds a community together. Putnam (2001, p.19) conceptualises social capital as “connections among individuals – social networks and the norms of reciprocity and trustworthiness that arise from them.” Putnam (1993, p.36) describes five elements of social capital: “(1) community networks, voluntary, state, personal networks, and density; (2) civic engagement, participation, and use of civic networks; (3) local civic identity—sense

of belonging, solidarity, and equality with other members; (4) reciprocity and norms of cooperation, a sense of obligation to help others, and confidence in return for assistance; (5) trust in the community.”

Social capital is further demarcated into bridging (inclusive) and bonding (exclusive) social capital (Putnam, 2000). The former is “outward looking” and describes inter-group connections that cut across social and cultural group divisions such as social class, ethnicity, or religion. Whereas the latter is “inward looking” and strengthens exclusive identities and ingroup loyalty.

Having access to social capital is thought to be protective via its “stress-buffering” properties (Kirkbride *et al.*, 2007), however, studies that have aimed to examine relationship between social capital and psychosis have revealed mixed findings (Rotenberg, Anderson, & McKenzie, 2020). This is likely due to cross-study differences in the way social capital is defined and measured (McKenzie, Whitley & Weich, 2002). Additionally, understanding social capital’s influence is complicated and individual-level characteristics are likely to have a role (Baum, 1999; Kirkbride 2007).

Kirkbride and colleagues (2007, 2008) conducted studies examining the association between neighbourhood social capital and psychosis incidence with the first using voter turnout as a measure of social capital and the second looked at social cohesion and trust and social disorganisation. The first study found that increased neighbourhood-level social capital was associated with reduced psychosis incidence (Kirkbride *et al.*, 2007), while the latter found a U-shaped relationship, such that psychosis risk was elevated in neighbourhoods with high and low social cohesion and trust compared to areas with average levels (Kirkbride *et al.*, 2008). Mixed findings around social capital and psychosis highlight the importance of exploring how individuals with psychosis perceive social capital at the local area to better understand its harmful and protective properties. There has been limited exploration of identity and social capital in the context of group density associations, but these could be key explanatory mechanisms.

In Chapter 1 questions were raised as to how these social processes might operate at a local community level. Allport (1954) made a distinction between “psychological minorities” and “mere actuarial minorities” – the former referring to minority groups that are subject to negative treatment on the basis of their minority position and the latter relating to groups that merely comprise a numerical minority.

Studies have suggested that the negative psychological effect of social inequalities arise through individuals perceiving themselves as lower status in relation to others. Citing Adler's work on inferiority (Adler & Wolfe, 1927), Pickett and Wilkinson (2010, p.40) said "to be human means being highly sensitive about being regarded as inferior." For psychological minorities *e.g.*, marginalised minority groups, it could be argued that the experience of living amongst fewer people with a similar social position could exacerbate existing negative evaluations of the self, having a negative mental health impact. However, this process of negative evaluation is perhaps less likely for mere actuarial minorities who are positioned higher in the social hierarchy – For these individuals, living in an area with fewer people in a similar position is perhaps not as psychologically harmful.

However, another possibility is that low own group density also presents a risk for any outgroup position, including "mere actuarial minorities". Even if their group is held in higher esteem more generally, their identity might be evaluated differently in a neighbourhood where it is relatively uncommon. What is driving the risk of individuals living in low own group density areas might be the salient reminder that they are different to others and excluded from the ingroup. Feeling excluded from social capital could be a cause or a consequence of feeling like an outsider, and whether exclusion from community networks is real or perceived, the absence of the stress buffering benefits of social capital could exacerbate feelings of alienation and exclusion (Kirkbride *et al.*, 2008).

Chapter 2 sought to shed light on this by exploring whether group density associations are observed in minorities grouped by other social characteristics. However, most studies included racially minoritised groups and associations were found to be particularly strong for Black populations (Baker *et al.*, 2021). Some studies did examine characteristics other than ethnic or migratory background, specifically, single marital/household status (Schofield *et al.*, 2016; van Os *et al.*, 2000), disadvantaged social class (Schofield *et al.*, 2016; Zammit *et al.*, 2010) social fragmentation, and low academic grades (Zammit *et al.*, 2010). Although, all of these groups occupy a relatively marginalised position in society and there were too few studies to draw any meaningful conclusions about whether associations extend to other social characteristics. There is, however, some evidence that group density associations are observed for other identities, *e.g.*, political affiliation and social class

(Saville, 2020; Saville & Mann, 2022) but these studies looked at mental health more broadly and not psychosis specifically.

As discussed in Chapter 1, there is strong theoretical justification that group density relationships might extend to linguistic groups, but this has not yet been explored in depth. Language is an extremely identity-laden characteristic – it is a salient marker of group membership and has the potential to present practical barriers in terms of connecting with others and accessing social capital. Languages also differ in power and status – the linguistic majority in a given context can be defined as the language with “greater power, prestige, influence and/or communicative reach” (May (2012, p.1). Studies have examined linguistic minority status as a risk factor for mental illness yielding mixed results (Hallett *et al.*, 2007; Saville, 2022; Vasiliadis *et al.*, 2012). For psychosis specifically, Suvisaari *et al.*, (2014) found lower risk of schizophrenia in the Swedish speaking minority in Finland – a group that generally occupy a higher socioeconomic position than to the Finnish speaking majority. However, no studies have examined linguistic status at a more local level where perhaps the relationship between minority status, identity and social capital becomes more complicated.

North Wales provides a useful social context to explore whether the social processes thought to underpin the group density effect extend to linguistic groups. In Wales, Welsh (and English) are national languages, but Welsh is only spoken by approximately 19% of the population (Office for National Statistics, 2012). However, when considered at smaller units of geography, Welsh speakers comprise a majority in many areas. The below map of Wales (Figure 1) shows that Welsh speakers are more prevalent in West Wales, particularly in the North-western local authorities of Ynys Môn (Isle of Anglesey) and Gwynedd where Welsh speakers comprise the majority. Balsom’s (1985) “three-Wales model” has defined these high Welsh speaking and identifying regions as “Y Fro Gymraeg” which translates to “the Welsh language country.”

Issues of language and identity are particularly socially salient in Welsh-speaking communities. As discussed in Chapter 1, the Welsh has survived many deliberate attempts of language minoritisation and the English language on the other hand, is the more powerful language in terms of its “greater power, prestige, influence and/or communicative reach”. That said, a recent study has shown that in Wales, Welsh speakers tend to occupy a more socially advantaged position than English

speakers and Welsh speakers generally reported better mental health (Saville, 2022). There is therefore a somewhat ambiguous balance of power between the two linguistic groups, and it is unclear how this will play out at the neighbourhood level.

Alherz (2022) has argued that examining sociolinguistic characteristics as risk factors for psychosis typically presents a range of challenges, for example, language is often conflated with other known risk factors for psychosis, *e.g.*, ethnic minority position. However, the areas within Ynys Môn and Gwynedd provide a good opportunity to qualitatively explore the participants' experience of group density because Welsh- and non-Welsh speakers typically share a common White ethnic identity. Further, the study setting has high density of Welsh speakers but is relatively racially homogenous and similar in terms of rates of deprivation. Further, these areas are predominantly rural, therefore providing a unique take on the possible processes behind group density relationships given that the group density evidence-base mostly comprises of studies conducted in large European cities (Baker *et al.*, 2021).

The aim of this study is to use a qualitative approach to explore the subjective experience of group density in individuals with psychosis living in linguistically similar and dissimilar communities in Ynys Môn and Gwynedd. The study will have a particular focus on issues relating to identity, belonging, and social capital with the aim of shedding light on the possible social processes behind group density associations.

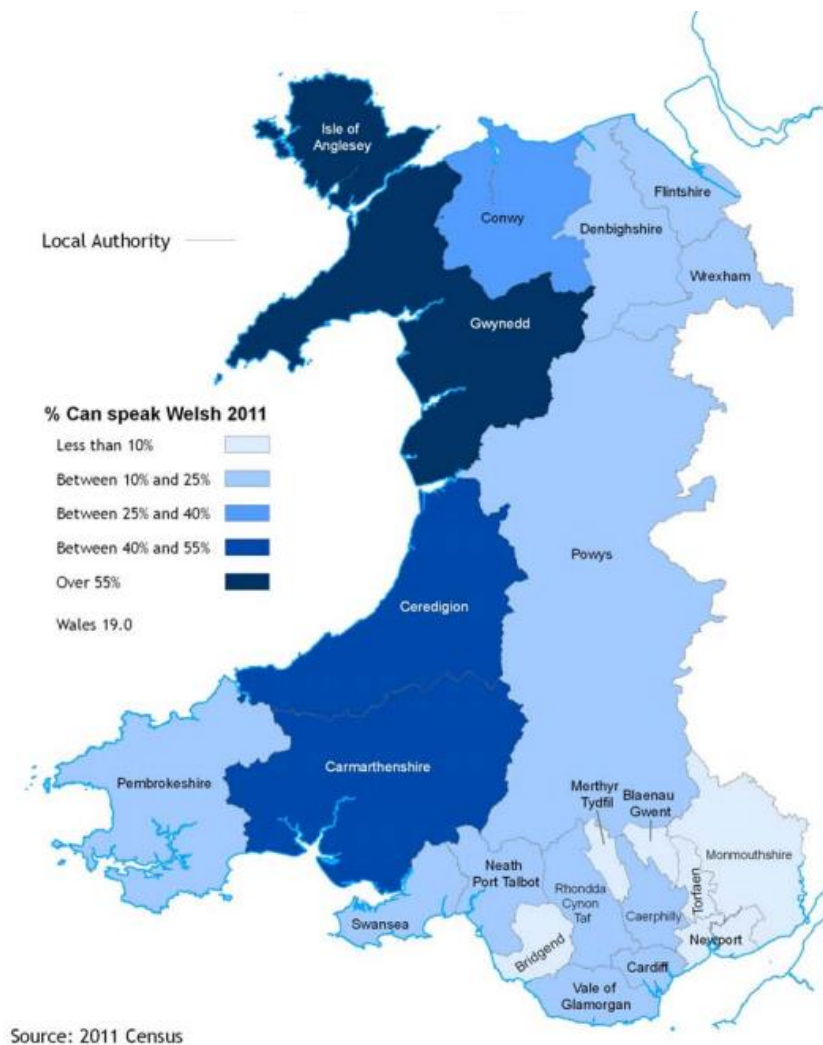


Figure 1. Map showing the proportion of Welsh speakers in each local authority of Wales. In the areas of Gwynedd Ynys Môn (Isle of Anglesey) Welsh speakers comprise a majority. Map taken from Welsh Government report, “2011 Census: First Results on the Welsh Language”⁴¹

⁴¹ Welsh Government (2012) report, “2011 Census: First Results on the Welsh Language” can be accessed here: <https://www.gov.wales/sites/default/files/statistics-and-research/2019-03/121211sb1182012en.pdf>

3.2 METHOD

3.2.1 Ethical approval

This study was reviewed and granted ethical approval by the ethics committee of the School of Psychology, Bangor University. Given that this study involved recruiting a clinical sample, ethical approval was also approved by Betsi Cadwaladr University Health Board [BCUHB] NHS research and development department. (IRAS ref: 239866, REC ref: 18/WA/0026).

3.2.2 Sampling and recruitment

Recruitment for this study commenced in May 2018 and ended in May 2022. Participants were recruited through BCUHB Early Intervention for Psychosis Service [EIPS] and Community Mental Health Teams [CMHTs] based in Gwynedd and Ynys Môn, North Wales. The study aimed to recruit current BCUHB service users with experience of psychosis (any diagnosis) who were aged eighteen or over, and permanent residents of a Gwynedd or Ynys Môn address. Full eligibility criteria are shown in Table 1.

While any service users living in Gwynedd or Ynys Môn were considered eligible to take part, this study was interested in the social experiences of participants living in high density Welsh speaking communities, therefore purposive sampling was used to maximise the recruitment of participants living in Middle Super Output Level Areas [MSOAs] where >50% of residents reported that they could “Speak Welsh” according to the 2011 UK census (Office for National Statistics). The study consisted of two groups of participants – the “non-Welsh speaking” group comprised individuals who were linguistically dissimilar to their local area. These individuals were dominant English speakers – English is the language they are most proficient in and use most often. Participants who were learning Welsh or reported that they can speak Welsh as a second language were also included in this group. The “Welsh speaking” group consisted of participants who whose first and preferred language was Welsh or who considered themselves balanced bilinguals – learned both languages simultaneously and are equally proficient in both. The study aimed to recruit n=10 participants per group.

To identify potential participants, English and Welsh language recruitment letters (Appendix 11) and participant information sheets [PISs] (Appendix 12) were distributed to EIPS and CMHTs and mental healthcare providers were routinely

contacted. To facilitate recruitment from high-density Welsh speaking areas, the recruitment letter included a map of Gwynedd or Ynys Môn highlighting in green the MSOAs comprising >50% Welsh speaking residents (Figure 2) and specifying that the study was particularly interested in interviewing service users living in these areas. Mental healthcare professionals [HCPs] contacted service users who met inclusion criteria, provided information about the study, and asked whether they consented to being contacted by a researcher to discuss the study in further detail.

Table 1. Study eligibility criteria.

Inclusion
<ul style="list-style-type: none"> - Aged 18 or over - Has experience of psychosis* - Current service users of Betsi Cadwaladr University Health Board (community or inpatient services) - A permanent resident of Gwynedd or Ynys Môn **
Exclusion
<ul style="list-style-type: none"> - Assessed by care team as not having capacity to participate in the study - Identified by care team as high risk to self or others - Aged under 18 - Has had no experience of psychosis - Not a current service user of Betsi Cadwaladr University Health Board (community or inpatient services) - Temporary resident of Gwynedd or Ynys Môn ***
<p><i>*The participant has accessed mental health services as a result of their experience of psychosis.</i></p> <p><i>**Year-round resident of a Gwynedd or Ynys Môn address.</i></p> <p><i>***Temporary, short-term resident e.g., only residing in Gwynedd or Ynys Môn address during term-time or address is used as a second/holiday home.</i></p>

3.2.3 Procedure

From May 2018 – April 2022, data collection was conducted in-person, with participants having the option to either complete the study at their home or on university premises. Due to the Covid-19 pandemic, from March 2020 – May 2022, interviews were carried out remotely via telephone or video-calling platforms (Microsoft Teams or Zoom). The data collection process took between 1-1.5 hours and participants were reimbursed for their time. Individuals who consented to contact from a researcher were telephoned and provided with more information about the study and if they were eligible and interested in taking part, a meeting was arranged. In these

meetings, the PIS was read to the participant, and they were provided with an opportunity to ask any questions about the study. If the service user was interested in taking part, they then completed an informed consent form (Appendix 13). The data collection process involved completing a sociodemographic questionnaire (Appendix 14) and an audio-recorded interview. The interview was semi-structured, guided by a schedule and questions were designed to tap into issues related to identity, belonging and social capital (Appendix 15). The interview also included broader open-ended questions about participants' residential history and their experiences living in their past and present addresses to explore other potentially important avenues. The final set of questions asked participants about their experiences of living in a high-density Welsh speaking area, and explicitly asked whether the participant believed that their linguistic status influenced their experiences living in their local area, including their sense of belonging and their relationships with others in their community. I developed the initial semi-structured interview schedule which was later revised in collaboration with CWNS and MJ. Prior to conducting interviews with participants, a pilot interview was undertaken with a fellow PhD student from my cohort with the objective of troubleshooting any ambiguities or problems with the questions. Subsequently, MJ assessed the recording to ensure the interview's suitability and efficacy. Digital recordings of interviews were transcribed verbatim and any identifiable information was removed from the transcripts to protect participants' anonymity. Participant data was stored in accordance with the Data Protection Act (1998).

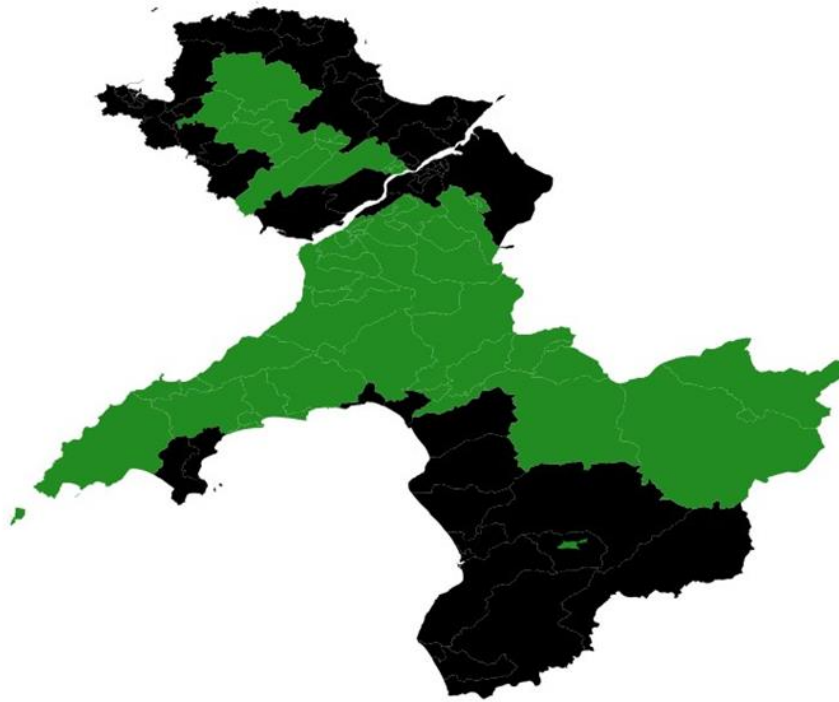


Figure 2. A map of Gwynedd and Ynys Môn, North Wales. Areas coded in green represent MSOAs where >50% of the population reported that can speak Welsh according to the 2011 UK census (Office for National Statistics, 2012).

3.2.4 Data analysis

Interview transcripts were managed using NVivo software (QSR, 2014) and data were analysed using Reflexive Thematic Analysis [TA] (Braun & Clarke, 2021). TA is defined as: “a method for developing, analysing and interpreting patterns across a qualitative dataset which involves systematic processes of data coding to develop themes – themes are your ultimate analytic purpose.” (Braun & Clarke, 2021, p.5). TA was conducted separately for the non-Welsh speaking and the Welsh speaking group. From stage three onwards, themes were discussed and refined in collaboration with the two supervisors on this project (CWNS and MJ).

There are six phases of TA (Braun & Clarke, 2021):

1. ***Familiarising yourself with the dataset:*** This is the process of becoming immersed in the data which involves actively listening to audio-recordings and repeatedly reading interview transcripts. At this stage, NVivo was used to make brief annotations to each transcript which pertained to any potentially interesting insights that might have relevance to each participant (data item) or across the whole dataset.

2. **Coding:** At this stage, the dataset was scrutinised in a more systematic way. This involves identifying segments of text from each data item that have relevance to the specific research aim. These segments are assigned code labels which are concise, “analytically meaningful” descriptions with the aim of capturing single concepts or meanings. During this phase, latent or semantic codes can be generated. The former pertains to more “surface level” descriptions, while the latter relates to more of a theoretical take on the data. Upon completion of this process, data extracts are collated within each code. For this process, NVivo coding stripes were used to identify potential patterns in the data and organise initial codes.
3. **Generating initial themes:** This involves the identification of patterns across the dataset. With the study aim in mind, codes that relate to similar concepts and experiences are grouped together. This is the initial stage of the researcher making sense of the data and thinking about how the data can shed light on the research question. Braun and Clarke (2021, p.35) describe theme development as “an active process; themes are constructed by the researcher, based around the data, the research questions, and the researcher’s knowledge and insights.” Coded data are then collated within the initial themes generated at this phase which are referred to as “candidate themes.” NVivo was used to facilitate this process – coded extracts were compiled within “nodes” which were then grouped to create candidate themes.
4. **Developing and reviewing themes:** During this phase, each candidate theme is scrutinised to assess the extent of the fit of their coded extracts. This involves checking that the themes make sense and ensuring they have relevance to both the whole data set and the aims of the study. This stage of the analysis might involve significant reorganisation of themes – candidate themes that appear to capture more than one important concept may be split into two separate themes or similar candidate themes might be grouped into one larger theme. Themes that are limited in terms of their relevance to the dataset and the research questions are discarded. During this stage, the researcher begins to think of the “core focus or idea” behind each theme, which is referred to as the central organising concept (Braun & Clarke, 2021, p.35). Further, the connection between themes is considered as well as the relationship the themes have with

the researcher's knowledge and/or practice and the broader research context within which this work fits. In NVivo this process was completed by the reorganisation and refinement of candidate theme nodes. This involved moving coded extracts to other nodes, collapsing nodes into one theme using the Aggregate Coding from Children function, and discarding any redundant nodes.

5. ***Refining, defining and naming themes:*** This stage involves fine-tuning of the analysis – This means checking that each theme is its own discrete entity that captures a strong central organising concept. This means inspecting each theme in terms of its significance to the dataset and research question and how it fits within the whole “story about the data” (Braun & Clarke, 2021, p.36). During this phase, the researcher will also write a short description of each theme and think of final names that capture the essence of each of the theme in a succinct but informative way. NVivo was used to organise nodes into final themes and add final names and descriptions for each theme.
6. ***Writing up:*** The final phase is writing up the results of the TA. Informal writing tends to take place throughout the research process (*e.g.*, completing a reflexive diary) but this phase involves producing an academic report aiming to “weave together your analytic narrative and compelling, vivid data extracts, to tell your reader a coherent and persuasive story about the dataset that addresses your research question” (Braun & Clarke, 2021).

3.2.5 Justification of methodology

Reflexive TA was used because of its flexibility as a method, as noted by Braun and Clarke (2021, p.9) “you can do reflexive TA using different broad theoretical frameworks, foci for meaning, and orientation to data”. Broadly speaking, essentialist/experiential, semantic, and inductive approaches tend to coincide, and the same can be said for constructionist/critical, latent, and deductive approaches (Braun & Clarke, 2021). However, in reflexive TA the use of these approaches is not always either/or and in Reflexive TA, where the analysis sits in terms of each of these approaches can lie somewhere on a continuum (Braun & Clarke, 2021). This is useful for the aims of the present study.

Orientation to data

In terms of the orientation to the data, this study takes more of a “top-down” deductive approach in the sense that the analysis is viewed through the lens of existing theoretical frameworks (Bingham & Witkowsky, 2022). This thesis has outline that the social processes that are thought to underpin group density associations in racially minoritised groups and other minorities might also extend to linguistic groups. It has been argued throughout this thesis that concepts such as social identity and social capital are potentially important theoretical frameworks in terms of understanding the protective and harmful effects of linguistic group density. These theories have therefore been drawn upon when designing the topics to explore in the interview and in terms of theme development. However, a “bottom-up” inductive approach was also taken to provide an opportunity to explore other avenues that may have relevance to understanding the social experience of group density. For example, broad open-ended questions were also included in the interviews and any other experiences shared by the participants’ that had any relevance to understanding the “bigger picture” were also considered in the research process.

Focus of meaning

The analysis adopts more of a latent approach whereby the more implicit meanings underlying the participants’ accounts were explored as opposed to a more semantic focus of meaning in which the data are understood at a more surface and explicit level.

Qualitative frameworks

The analysis took both an experiential and a critical approach. The approach was experiential in the sense that the study aimed to understand the subjective experience of low and high group density from the perspective of the participants. This involved capturing in depth accounts of participants’ experiences within their social context as well as exploring their thoughts and opinions about where they live and how they relate to others in their local area. However, a critical approach was also taken in that the analysis focussed on elucidating the meaning behind these experiences often with reference to existing theoretical frameworks.

Theoretical frameworks

Finally, this study employs more of a contextualist approach which lies somewhere in the centre of the realist/essentialist – relativist/constructionist continuum (Braun & Clarke, 2006). A realist, essentialist approach seeks to hold a mirror to the reality as expressed through the participants' accounts or it can take a more relativist, constructionist approach which seeks to unpack and to decipher these realities (Braun & Clarke, 2021). In studies with a realist approach, the researcher acts more like an observer while in research adopting constructivist approaches, the data collected is co-constructed by the researcher and the participants and it is these interactions that shape the data and the knowledge derived from the research process (Chesebro & Borisoff, 2007). In line with a critical realist approach (Willig, 1999), a contextualist approach seeks to “acknowledge the ways individuals make meaning of their experience, and, in turn, the ways the broader social context impinges on those meanings, while retaining focus on the material and other limits of reality” (Braun & Clarke, 2006, p.81). This study aims to explore the subjective experience of participants living in high and low own linguistic density communities and the meaning they attach to their experiences. This in turn is viewed through the theoretical frameworks that have been proposed to have relevance to understanding group density associations.

3.2.6 Reflexivity

Researcher bias is an issue that is grappled with in any method of data analysis. This can be defined as “any trend or deviation from the truth in data collection, data analysis, interpretation and publication which can cause false conclusions” (Šimundić, 2013, p.12). However, in Reflexive TA, a core assumption is that the researcher cannot be detached from the research process and researcher subjectivity is an intrinsic part of the analysis (Braun & Clarke, 2021). This means that the researcher must be self-reflective and recognise that the knowledge produced is an active process shaped by many factors that must be acknowledged throughout the research process (Braun & Clarke, 2021). Wilkinson (1988), cited in Braun and Clarke, (2021), delineates the process of reflexivity into personal reflexivity, functional reflexivity, and disciplinary reflexivity. Personal reflexivity refers to characteristics about the researcher including their personal experience, ethnicity, age, gender, socioeconomic status, and worldview

(Braun & Clarke, 2021). Functional reflexivity pertains to the ways in which the theoretical perspectives, methods and design affects the research process and outcomes. Disciplinary reflexivity involves reflecting on the ways in which the field of research influences the study. Finally, the researcher must reflect on their personal characteristics and how these could influence the specific research topic. For example, how might the researcher's personal experiences, pre-existing assumptions, and position as an "insider" or "outsider" shape the outcome of the research (Braun & Clarke, 2021). "insiders" are researchers who have identity characteristics in common with the participant group while "outsiders" do not (Bukamal, 2022).

Reflexive statement

This reflexive statement was developed using Braun and Clarke's reflexivity exercise (Braun & Clarke, 2021, p16-18). In terms of my social positioning and reflexivity about my specific topic, I am a thirty-one-year-old White British cisgender female. I also identify as part of the LGBTQIA+ community. I have a left-wing, liberal political ideology and have a long-standing interest in research and issues relating to social justice and equality. Because of this I have sought out research roles that are linked to these issues. I have worked on several projects related to mental health inequities – these have included conducting research with the African-Caribbean community in Manchester and completing an internship with the Welsh Government working on a review of place-based approaches to reducing social inequalities in Wales. Through my experience I have gained substantial experience conducting qualitative interviews and analysis. These projects also strengthened my interests in the social factors that drive mental health inequalities.

This has shaped the way that I think about mental illness and its causes. I take a psychosocial rather than biomedical approach to understanding psychosis and I believe that many of the social conditions that give rise to mental health problems are systematic and avoidable, and therefore mental health inequities should be viewed as political issue. I am also familiar with the evidence base around the social and structural determinants of mental health and why minority status might be a particularly relevant risk factor for psychosis specifically. This standpoint could cause a risk of confirmation bias when conducting this study *i.e.*, asking questions and searching for participants' quotes that are consistent with my standpoint while perhaps downplaying other perspectives *e.g.*, I may have been more inclined to focus on

participant accounts that are consistent with my ideas such as experiences of alienation and not belonging in the “minority” group within this specific context – *i.e.*, the non-Welsh speakers. I may have also focussed any negative accounts shared by the participants related to psychiatric medication and other biomedically focussed ways of understanding and treating psychosis. I reflected on this throughout the research process – I asked open questions during the interview process, remained open to other ideas and perspectives, and discussed theme development with my supervisors.

In terms of functional and disciplinary reflexivity, I am a PhD student based within Bangor University’s School of Human and Behavioural Sciences. I am conducting this research for my PhD and eventual publication in a peer-reviewed academic journal. Both of my supervisors work on the Doctorate in Clinical Psychology course at the University. My primary supervisor is a clinical lecturer interested in the social epidemiology of mental health and my secondary supervisor is a senior clinical psychologist who has many years working therapeutically with people with psychosis and conducting research related to psychosis. Both of my supervisors were born in England and live in Wales and CWNS is a proficient Welsh speaker.

In the school that I am based in, qualitative research is less common, and I feel it is often viewed as a less empirically rigorous method. As well as this, my PhD draws upon perspectives from several different disciplines including psychology, epidemiology, and sociology. The multi-disciplinary nature of this work is a strength in many ways, but because my background is in Psychology, I have had concerns about my ability to apply other frameworks to my research. These factors could shape the research process in several ways – for example, a key benefit of Reflexive TA is its flexibility but my concern over the paper being perceived as high quality and publishable could have caused me to be overly meticulous and stringent with my application of the method. The research is also influenced by my supervisors’ experience – I may have been more drawn to interpreting the data to be consistent with their research findings and experiences in clinical practice. Finally, this study is one of three empirical chapters of my PhD – this runs the risk of interpreting findings to fit well within the context of the two chapters and be consistent with the “story” that I am telling in the overall thesis.

Finally, reflecting on my position as an “insider” and “outsider” in the research process, I am a monolingual English speaker who was born in England and moved to North Wales in my mid-twenties to study, so I am therefore perhaps considered more

of an insider to the non-Welsh speaking group and an outsider to the Welsh speaking group. However, I am an outsider to both groups in the sense that I have not experienced psychosis. I was acutely aware of my position throughout of the research process and had concerns about the sensitive nature of the research topic and reporting findings in a balanced and constructive way. I found it difficult to strike a balance between accurately reporting the experiences shared by the participants but not reporting or misconstruing any participant accounts in a way that could be perceived as offensive or disrespectful to either party. I was also aware that my position could have made it easier for the non-Welsh speaking to speak more transparently about issues of language, identity and belonging than might have been the case for Welsh speakers speaking to an English incomer. To address this, I took approaches to make the participants feel more comfortable, for example by conducting interviews in their home environment and establishing good trust and rapport. However, it appeared that the vast majority of participants were comfortable expressing their views and experiences relating to these issues.

3.3 RESULTS

3.3.1 Sample characteristics

All participants were identified by the mental health professional involved in their care as having experience of psychosis and all were residing at an Ynys Môn or Gwynedd address at the time of the interview – which comprise 57.2% and 64.4% Welsh speakers respectively according to the 2011 UK census (Office for National Statistics, 2012). Rates of Welsh speaking had reduced slightly by the time of the 2021 UK census to 55.8% and 64.4% respectively (Office for National Statistics, 2022). Proportions of Welsh speakers by participants' MSOAs of residence are not reported to preserve their anonymity.

The non-Welsh speaking group (n=11) comprised six males and five females with a mean age of 38 (range 20-70). The sample were mostly unemployed (n=7) and single (n=7), with two who were retired and one who was in employment. Five participants identified as White British, four as White Welsh and one non-White British. All were dominant English speakers but six described themselves as having some Welsh language ability, three described themselves as English monolinguals, and two reported that they can speak Welsh (n=2).

The Welsh speaking group (n=8) consisted of five males and three females and

had a mean age of 36 (range 19-58). Most of this group were single (n=6) and unemployed (n=5), one participant was employed, one was a student, and one retired. All participants identified as White Welsh, six participants described Welsh as their first and preferred language with the remaining two reporting that they learned English and Welsh simultaneously and describe themselves as equally proficient in both languages. Further details about the linguistic profiles of all participants are shown in Table 3 and Table 4.

3.3.2 Thematic analysis

Nineteen interviews were conducted in total comprising eleven non-Welsh speakers and eight Welsh speakers. Seven were carried out in person and twelve via video or phone call due to Covid-19 lockdown measures. The author transcribed fourteen hours of audio recorded interviews. Four themes and eleven subthemes were derived from reflexive TA of the interview transcripts (*Theme 1: Exposure to social adversity, Subtheme i: Childhood and young adulthood, Subtheme ii: Present social adversity. Theme 2: Place as a reservoir of risk or resilience, Subtheme i: Bonding social capital, Subtheme ii: Psychosis and rurality. Theme 3: Outsider status, Subtheme i: Welsh language and national identity, Subtheme ii: Experiencing psychosis, Subtheme iii: Appearance, Subtheme iv: Other minority identity. Theme 4: Protective strategies, Subtheme i: Navigating identity, Subtheme ii: Safety behaviours, Subtheme iii: Social connectedness.* The organisation of themes and subthemes is shown in Figure 3.

3.3.3 Defining belonging

At the beginning of the interview participants were asked how they would define having a sense of belonging. Belonging was conceptualised in similar ways by participants from both groups. It was defined in terms of social inclusion with many participants feeling like an important part of this was feeling wanted, accepted and like they are treated as an equal. Several participants felt that they belonged when they were in spaces where they were not judged. For example, Gwen said a sense of belonging is derived from “*knowing that people want you and they like you for what you are for what you do for them, and they feel that way about you as well.*” Owain explained:

“Belonging to me is to a place where you don’t feel that you’re judged ...and like where you can tell people your problems and they’ll listen to you... that

you're not alone in a situation, like everyone's the same and no one's better than you."

Belonging was also understood as being a part of something bigger than the self that provided a sense of comfort, familiarity, and purpose. Alex explained, *"belonging is kind of like your relationships for me with my family, my friends, my work colleagues. How I belong, fit in, contribute, whether or not I'm respected or not really."* Morgan noted, *"it's [belonging] just feeling kind of comfortable with where you are, being familiar with it, being comforted by that familiarity."* Liam commented on the importance of having a sense of belonging:

"Humans are social animals and stuff, so yeah, I think it's a massive thing [belonging], I think. If you feel like you are part of a team or a group or you've found say your people or your tribe and stuff like that, yeah doesn't make you feel alone I'd say...[you're] a part of the bigger whole and stuff, because you can't change the fact that humans need each other and stuff."

To some participants part of being understood meant being around people who were similar in terms of their interests and worldviews. For example, Morgan described this as, *"the sense that I felt like I was, like I would be amongst people that were more similar to me, you know."* Cai commented:

"...it's belonging to a community, a culture, a family, fitting in, in tradition and friends and could say people with the same values so yeah, that's about that really. Values being the most important I think."

Participants were also asked what they feel it means to not belong. Participants felt that not belonging meant feeling as though they were treated differently to others, for example, being judged, overlooked, or deliberately excluded. Catherine explained:

"I think [not belonging is] being ignored or having bad experiences and interactions with other people, knowing that there's things going on and you're deliberately excluded, and things like that...just having nobody to talk to, at all... yeah, being in a situation where if there were, was nobody like family or friends checking up on you that your community just wouldn't even know you were there, they'd just leave you, type thing"

Participants also felt that not belonging was the sense that they do not “fit in” and feeling as though others do not understand them. Sarah commented:

“I think [not belonging] it could be a sense of not feeling understood, you know or feeling very sort of different in outlook or the way you see things... I think it's that, it's just that feeling that you know, you're not quite understood, and that people don't know how to receive [you] I think it's more reaction to it, it's more reaction to being different, as opposed to being different in itself.”

Finally, several participants noted that it is difficult to achieve a sense of belonging as an individual experiencing psychosis. Fiona explained why, as a person with psychosis, it is especially important for her to feel like she belongs:

“...belonging means to me, and this is probably over the last year at the most, is kind of there's a bit of acceptability that comes into it there's a bit of safety that comes into it for me, and a bit of feeling normal as well...because that's kind of how I interpret belonging is if I belong is I fit in and if I fit in then I must be normal, which is kind of what I strive for, or I have strived for in most of my life is just to fit in, and that is kind of what I'm happy with. So kind of my thoughts of belonging as someone who has psychosis, I think it's extremely important, I think if you haven't got that belonging feeling and you have psychosis it can be extremely isolating”

Table 2. Characteristics of the non-Welsh speaking group

Participant ID and pseudonym	Age band	Gender	Self-reported language profile
P1: Freddie	25-29	Male	Can communicate in Welsh but English is most proficient language and uses English 99% of the time. Started learning Welsh at age 12. Only communicates in Welsh if talking to Welsh speaker who is not proficient in English.
P2: Jack	18-24	Male	Can communicate in Welsh but English is most proficient language and uses English 80% of the time. Started learning Welsh at age 5. Communicates in Welsh when somebody starts to speak Welsh to him first. Sometimes initiates conversation in Welsh with his friends but the recipient would always “go back to English”.
P3: Hilary	70-74	Female	Very basic Welsh language ability, some understanding of key words and phrases. Learned in adulthood from her children. Speaks English 100% of the time.
P4: Catherine	35-39	Female	Knows basic conversational Welsh – key words and phrases but not confident speaking Welsh. Started learning Welsh age ~4. Speaks English 99% of the time. Would only use Welsh phrases with people with people who are not as proficient in English, <i>e.g.</i> , elderly people.
P5: George	60-64	Male	Knows basic Welsh and “can get by” but “guess work” involved. Cannot understand the TV or radio in Welsh. Started learning Welsh at age 11. Speaks English 95% of the time. Fluent in another language (considers this his second language after English).
P6: Sarah	30-34	Female	Very basic understanding of some key Welsh words and phrases. Learned some Welsh in adulthood. Uses English 100% of the time. Fluent in another language (considers this her second language after English).

P7: Liam	25-29	Male	Very basic understanding of some key Welsh words and phrases. Learned some Welsh in adulthood. Uses English 100% of the time.
P8: Fiona	35-39	Female	“A little” understanding of Welsh words and phrases. Started learning Welsh at age 4. Uses English 95% of the time.
P11: Katie	20-24	Female	Very basic understanding of some key Welsh words and phrases. Learned some Welsh in adulthood. Uses English 100% of the time.
P14: Oscar	40-44	Male	Described himself as moderately proficient in Welsh – can hold a basic conversation in Welsh <i>e.g.</i> , “hello, how are you?” Uses English 98% of the time.
P15: Alex	45-49	Male	Described himself as having little to no Welsh language ability. Speaks English 100% of the time.

Table 3. Characteristics of the Welsh speaking group

Participant ID and pseudonym	Age band	Gender	Self-reported language profile
P9: Lowri	20-24	Female	Welsh (L1). Can speak English fluently but considers Welsh her preferred and most proficient language. Communicated exclusively in Welsh until age 5 when she started to learn English, became fluent in English around age 10. Uses Welsh 60-70% of the time.
P10: Alaw	45-49	Female	Welsh (L1) but now considers herself a balanced bilingual (equally proficient in Welsh and English). Started to learn English at age ~5. Prefers to communicate in Welsh and uses Welsh 80% of the time.
P12: Cai	30-34	Male	Balanced bilingual, equally proficient in Welsh and English, learned both languages simultaneously and neither are preferred. Communicates in Welsh 40% of the time and English, 60%.
P13: Owain	18-24	Male	Welsh (L1). Can speak English fluently but considers Welsh is preferred and most proficient language. Communicated exclusively in Welsh until age 5 when he started to learn English. Communicates in Welsh whenever he gets the opportunity to but estimates that he is only able to speak Welsh around 20% of the time.
P16: Tomos	30-34	Male	Balanced bilingual learned Welsh and English simultaneously and equally proficient in both languages. Thinks of Welsh as his L1 but now considers himself more proficient in English. Only communicates in Welsh 10% of the time, mostly with family.

P17: Dewi	25-29	Male	Welsh (L1). Welsh is his preferred and most proficient language but can now speak English well. Started learning English at ~6-7 years old but did not feel confident speaking English until adulthood. Speaks Welsh 50-60% of the time.
P18: Gwen	55-59	Female	Welsh (L1). Proficient in Welsh and English but Welsh is her preferred and most proficient language. Started learning English at age ~4. Speaks Welsh 90% of the time.
P19: Morgan	55-59	Male	Welsh (L1). Proficient in Welsh and English but Welsh is his preferred and most proficient language. Started learning English at age ~4. Speaks Welsh 90% of the time. Speaks Welsh around 50% of the time, but varies based on context, mostly speaks Welsh when at work and with family.

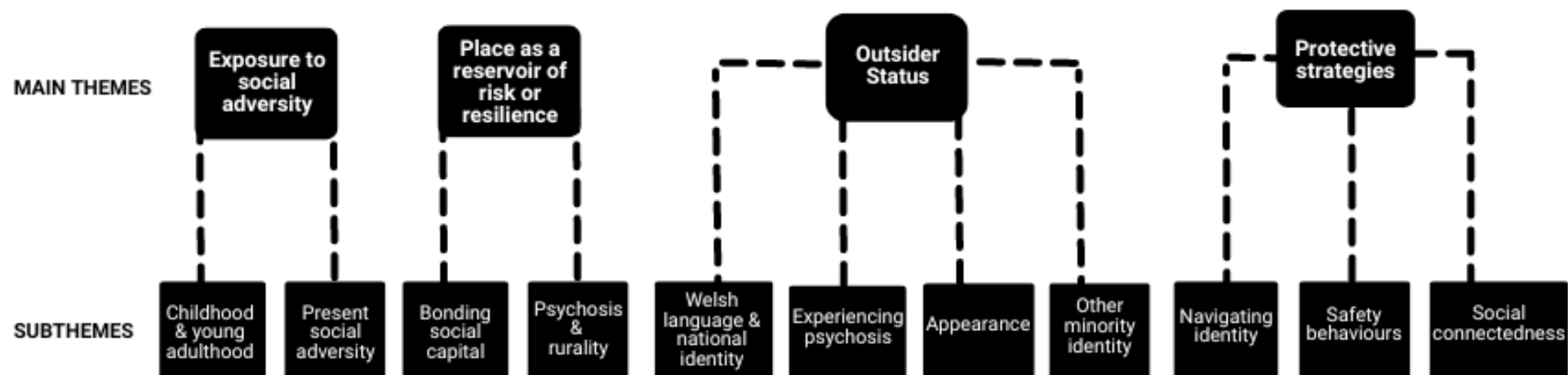


Figure 3. Thematic map showing the organisation of themes and subthemes.

3.3.4 Theme 1: Exposure to social adversity

Participants from both groups shared experiences of social adversity and reflected on the psychological impact that this had on them. The first subtheme is related to adverse experiences during childhood and young adulthood and the second subtheme is focussed on present-day social adversity.

Subtheme 1: Social adversity faced in childhood and young adulthood

Many participants alluded to past experiences of trauma (e.g., Catherine, Katie, Alaw) and others shared early experiences of alienation, exclusion and feeling different from others, with several reflecting on bullying incidents at school. Tomos said he *was “bullied a lot in school”* and Fiona described a time when she felt like she *“finally fitted in”* but then moved to another school and experienced bullying. George described notable political events that occurred around the same time that he was attending school in North Wales, including the investiture of the Prince of Wales and the intentional flooding of Tryweryn valley to provide a water supply for the English city of Liverpool. He continued:

“Nobody knew any English people, but they hated them. Because they had defiled Wales...I got the brunt of it, I got beaten up in school...I learned to be a diplomat and started learning Welsh.”

Participants talked about how difficulties relating to others has been something they have experienced from a young age, for example, Katie talked about her difficulties connecting with others, commenting, *“I’ve always felt a bit like an outsider.”* Similarly, Morgan revealed that he had a *“very difficult time in school”* and found it difficult to relate to others explaining that the people he was at school with *just weren’t interested in the same things that [he] was*. He added:

“... I was always an outsider as a kid, you know. In the village where I was brought up, I was always an outsider. I always felt like an outsider, felt different to everybody else. When I went to secondary school, that was very much sort of magnified...”

Participants shared their past experiences of adverse living circumstances – Alaw talked about being estranged from her family and Dewi felt unsafe and *“paranoid”* about being attacked when he was homeless and living in temporary accommodation. Alex spoke of his experiences living in a deprived council estate with high levels of crime, describing it as *“complete mayhem for nearly ten years of [his] life”* which he

said sent him and his neighbours “insane.” He also acknowledged the importance of environmental factors in recovery:

“... I was in a freezing cold council flat in the middle of one of these estates, my neighbours were all mainly antisocial, it was like a warzone! You know, and you’re never going to get right with [psychosis] with that kind of environment going on. So, there is the illness itself and the medications but unless your environmental factors are right, you can forget recovery if you ask me...”

Participants described experiences of stigma in young adulthood, explaining how they felt unable to speak openly about aspects of their identity because of the socio-cultural context they were brought up in. For example, Morgan explained that he has been hearing voices since a young age but did not share this with anyone until much later in life following a mental health crisis. He explained:

“...when I first started hearing voices, what was happening then was people used to get put away into hospitals and they were kind of never seen again, you know. And I was actually terrified of it... I was terrified of letting anybody know, you know.”

Similarly, Alex reflected on the challenges he has faced throughout his life related to the stigma he has experienced because of his sexuality and his mental health diagnosis. He explained that at the time he was diagnosed, “the stigma was worse than the illness” and describing life after his diagnosis, he said, “I just spent five years in [place] in my little flat and everything staring at the bedroom ceiling, counting the artex swirls on the ceiling, watching TV.” He noted how it was not possible to be “openly gay” during the era he grew up in. For this reason, he explained that he finds it difficult to relate to people from younger generations who identify as gay. He commented:

“I can’t say I identify too much with gay people that much because of the era I’m from really, you know, where I had to suppress my feelings and emotions and everything, you know. And when you talk to like a younger person, “Oh, I’m okay, it’s okay to be gay”, you want to see what it was like, what I had to go through, you know... which then contributed to the [psychosis] ... The effects and all the rest of it, the stress...”

Finally, several participants spoke of the adversities that they endured after their first episode of psychosis. Participants discussed their experiences of being sectioned,

having inadequate support from mental health services, financial hardship, and homelessness (e.g., Morgan, George, Dewi, Fiona, Alaw, Alex). Alaw talked about how she has been back and forth to hospital for much of her life and talking about his experience of being sectioned, George said, *“oh, it was the most difficult in my life... [I] was sectioned...for a month. They wanted to keep me in longer, but it was just before [time], and they wanted to empty the ward. My mother didn’t want me back, so I was homeless and in debt.”*

Some participants shared their experiences of deteriorating social support networks after they were hospitalised (e.g., George, Morgan, Lowri, Fiona). Morgan commented, *“quite a few of the people from this area that I considered to be my friends who I’d known for a long time, I’ve never seen them again.”* Lowri noted, *“when I’m alright people are quite accepting but when things get bad, everyone steps away because they don’t know what to say.”* She added, *“like people who used to call all the time, they stop calling.”* A similar experience was echoed by Fiona, she said, *“...obviously groups of friends and everything change after you’ve had an episode because it’s not to everyone’s understanding and that’s not their fault, it’s just that they haven’t experienced things...”* She continued:

“...just knowing how people are with mental health issues like that because it’s not talked about, and it’s not shared. It kind of adds to that kind of shame to it...it was like I had this big secret that I couldn’t tell anyone or else they won’t accept me...”

Lowri said that being away from home made her feel like she did not belong. She also commented on the difficulties of life in the hospital and being away from her home and friends and family, describing it as a *“fake environment.”*

“...Also, like being away from home, I’ve found. For a long time, I just never felt like I belonged anywhere. So, I think that gave me like a huge sense of not belonging, not knowing where I belonged as well. So yeah, it was like... I was in hospital for two years. So that was the time I was away from home, and they moved houses as well... So, I don’t belong anywhere because I was just stuck in this like fake environment. Which wasn’t somewhere you wanted to belong, and you didn’t have the people you cared about around all the time...”

Subtheme 2: Present social adversity

Participants reflected on their past adversity and explained that some of the negative psychological effects of these experiences had permeated into present-day. Some referred to past trauma and victimisation, commenting on how these experiences have affected their mental health and shaped how they perceive themselves and others (e.g., Liam, Catherine, Freddie, Katie, Alex, Alaw). Katie said that because of her past experiences she *“never really fully feels a hundred percent comfortable with people”* and Alex commented that he still suffers from *“PTSD, traumatic memories to this day.”* Speaking of the paranoia that stemmed from her past trauma, Alaw said, *“it makes me scared in my own home like... It’s just so real and for someone to tell me there’s nothing there, it’s like it’s a conspiracy in my eyes...”*

Participants noted that they trust people in their close circle but do not trust others in their local area (e.g., Morgan, Fiona, Freddie). When asked why, Fiona explained, *“I think it goes back to when I was bullied, that kind of outside kind of, if you like, feedback, I think I just don’t want it.”*

Morgan recollected his experiences at school and continued, *“I didn’t find making friends particularly easy in school, I always felt like an outsider...so, in terms of the community around here, I’ve never felt a particular sense of belonging...”*

Participants explained prolonged exposure to stressors had made them feel less in control of their lives (e.g., Lowri, Freddie, Liam). Lowri commented, *“No one understand the impact things get on you... I feel like sometimes people don’t understand how much it’s out of your control as well, the things that happen in your life but yeah, it does make me feel a little bit different sometimes and I just wished I’d had a normal time like everyone else...”* Freddie and Liam conveyed a sense of nostalgia for who they were before their negative life events. When talking about his reluctance to connect with others, Liam said, *“I don’t want to be like that I think, I’d prefer to be like my older self, kind of just let go of that stuff and move on.”* Similarly, Freddie explained:

“The last three years, three to five years have been an absolute nightmare, it’s just been one thing after another for five years... I was alright don’t get me wrong, I used to be much happier and more outgoing, but like, I was more in control of my mind instead of being overrun by people and their opinions...”

When discussing their general experiences living in their local area, participants spoke of a range of stressors ranging from antisocial behaviour and

unpleasant encounters with neighbours or housemates to experiences of verbal and physical abuse directed towards themselves or their families (e.g., Catherine, Lowri, Dewi, Liam, Freddie). For example, Lowri and Dewi commented on violence and crime in their local area, Lowri said, *“sometimes that doesn’t make you feel very safe”* and Dewi noted that these incidents made him feel like he did not belong to his local area.

Commenting on his interactions with people in his community, Freddie said, *“there’s a lot of people round that, they want to push you so that you lose your temper and fight because that’s how they are.”* A similar experience was shared by Liam, another young male participant who said, *“If you’ve been attacked a few times and everyone’s talking in the village or they’re mates with whoever or they know whoever, or they think they know you or something, I’ll just be like whatever, you’re not getting in anyway, type thing. Like they’re closed off, so I’ll just close off, kind of like that...”*

Social isolation is an issue that has been exacerbated by the Covid-19 pandemic, this was mentioned by participants in online interviews conducted after the lockdown measures (e.g., Alex and Cai). For example, when asked about his experiences living in his local area Cai responded, *“...in the past three years, especially with the pandemic and all that, it’s been really isolated, but it’s been also quiet and peaceful actually...”* He added that most of his social interaction in the past three years had been with his mental health team.

For Katie, her medication presented a barrier to connecting with others while at university, she explained that she was on a *“very high dose of medication”* and added, *“it acts as a sedative as well, so I was just completely dead all the time.”*

3.3.5 Theme 2: Place as a reservoir of risk or resilience

This theme relates to place as “reservoir of risk or resilience” (March *et al.*, 2008, p.96) and captures participants’ views on the detrimental and protective characteristics of where they live. This theme comprises two sub-themes – the first pertains to social capital which can broadly be defined as the relationships and social connections within a place or the “glue” that joins together a community (Putnam, 2000). More precisely, what both groups described was characteristic of bonding social capital - participants spoke of exclusive and cohesive community networks of support which bolstered a homogenous identity. The second sub-theme captures participants’ reflections on some of the positive and negative aspects of living in a rural community.

Subtheme 1: Bonding social capital

In the non-Welsh group, social capital was frequently discussed from the perspective of an outsider looking in – often participants recognised the presence of social capital in their local area, but this was perceived as inaccessible or distant to them. For example, when asked sense of community spirit in his local area whereby people look out for each other, Oscar responded, *“I’m sure there is, but I don’t experience that.”* Katie said:

“Most of what I’ve observed is kind of on my little estate...from what I see and there are a lot of people along the row over there, they kind of go in and out of each other’s houses all the time... and yes, I have seen them help each other out...”

Participants often described their community as an exclusive and cohesive group which was viewed in a negative light by the participants who perceived exclusion from the group. For example, Sarah described these communities as *“close-knit”* and *“cliquey”* and Liam remarked, *“they’re all connected as well round here like they all seem to know each other.”* This notion was echoed by Freddie, who referred to his community as a *“tight knit village”* using the negative adjective *“festering”* to describe this, *“they all know each other, and they all live in each other’s pockets...it’s like a festering community.”* Participants commonly reported feelings of alienation in their local area, with some explaining that they feel different to others and find it hard to relate to the people around them. Liam spoke of a *“longing for somewhere else”* adding, *“I think you know when you fit in and when you don’t.”* When asked why he feels he does not belong where he lives, Oscar responded, *“I don’t know, maybe I feel like an outsider.”* Similarly, when Freddie was asked how he defined belonging, he responded *“I suppose maybe like being part of a community... I don’t think that I belong to this community, but I know most of the people.”* Catherine thought that sense of belonging and the obligation to help others in her community was non-existent, she said, *“I think it’s really important [belonging], but I don’t think it’s there... for me, and I think for other people as well.”* She added:

“... it would be so nice if communities looked after each other, that people helped you know... like a sort of pay it on within the community, pay it forward in the community, but I just don’t think it exists.”

A commonly held view was that local people were not welcoming of newcomers to the area. Participants spoke of hostile body language, for example, Katie said, *“I’ve*

picked up on their kind of sort of like...they're side eyeing me" and Liam commented, *"people's body language can be quite bad, staring at you, giving you dirty looks and stuff... people not using their manners and stuff like that, people being cold and cut off."* Alex commented *"at first the neighbours were very suspicious of people coming into this house"* and Sarah remarked that residents of her previous village, *"had got a reputation of not being very welcoming to outsiders."* Freddie said, *"It's a close-knit community, they have nothing to talk about and if you're not from here, they talk about you."* Katie also explained:

"...it was quite difficult at first simply because people in these small villages, you know they're very people, who you know, sort of come in... I'm sure it's just because they've grown up here and wary of suddenly there's all these new people coming in, but you know, it was quite difficult for the first year, two years."

Freddie proposed an explanation for his community being "wary" of newcomers to the area:

"...when someone moves into the community that's English...the locals, they talk about them a lot, you know it's like: "Oh, so and so's moved in!" and usually when people move in here from a city like they don't last that long if it's like someone from some mad council estate, they're generally being moved away from the city to be kept away from someone and then that brings its own sort of bad vibes. Like ah, there must be something dodgy going on with them, they've moved from the middle of Manchester or wherever to a village in the middle of Wales."

Some participants explained that they had tried to be included in their community, but their efforts had been futile. Catherine said that she had previously tried to "immerse" herself and make positive contributions to her local community through volunteering, she explained, *"they'd like that but then they'd treat me differently outside of that."* She said, *"they'd blank me, or if we were in the pub... it would just be really awkward... You'd walk in, they'd pretend like almost like you didn't know them, they wouldn't acknowledge you..."* A similar experience was shared by Sarah:

"I think where I probably had the least sense of belonging was probably in [place]. So, there were times where I didn't get involved in events and I feel like I'm just standing around and if you see some of the local people, again very close-knit. Unless I actually went with a friend or was stood with

someone, I was familiar with, I kind of had no place being there, and they wouldn't necessarily make a great deal of effort to say hello or include you..."

Participants explained that they had felt socially isolated where they live, rarely engaging in social interaction or feeling overlooked by their community (e.g., Freddie, Catherine, Sarah, Liam). Liam described this experience:

"I feel bad for them, the old people because they're the ones that suffer with it the most. Say if they've been married for fifty years or something and their partner dies and they've literally got nobody that's got to be the hardest thing I think, and they're walking down the street and people aren't saying hello to them and stuff, that's got to be hard. But I know what their pain is like if that makes sense?"

However, some participants did speak favourably of the relationship they had established with their local community (e.g., Jack, George, Alex, Sarah). Most participants said that they believed that their area was safe and that people in their local area would help them if required and that they would reciprocate. Jack said that there is a sense of people looking out for each other where he lives, adding, *"I think I have people like watch out for me as well like they'll tell me like that they'll like be there for me if I ever need something and stuff."*

The importance of connection and feeling like an accepted member of the community was recognised by participants, for example, Fiona explained that when she does not socialise with *"other people in her close surroundings"* the negative impact *"will be a lot more negative,"* adding, *"sometimes I do feel like I belong, but if I haven't had that social contact then I really struggle to feel like I belong."*

Participants spoke of their interactions with others in their local community – explaining that once they had overcome initial challenges, they had developed good relationships. For example, Fiona commented, *"I'd avoid it [social interaction] in safety and protection of myself."* Katie remarked, *"I had a few kind of psychotic breaks which I think didn't really warm people to me because I was acting so erratically."* She said connecting with people in her community had been like a *"stalemate,"* but after connecting with others in her local area, she said, *"I'm starting to feel a lot more accepted."* She elaborated:

"... once I made that effort people were nice. You know, my next-door neighbours are absolutely lovely... I like chatting with them and stuff...once I got used to it, I didn't feel so anxious and afraid... people are nicer when you

make the effort, they're nice, you know, they're just nice people and it's just a really gorgeous village to live in..."

Some participants explained that they had started to find their place and establish a sense of belonging, but this was commonly described as a long and difficult process (e.g., George, Sarah, Alex). George said that it took *"fifty years"* for him to feel like he belongs where he lives but he now a *"very popular person"* *"knows lots of people"* and speaks highly of his local community. He did, however, suggest that he might not have been able to integrate as well elsewhere in Wales. He explained where he lives is *"completely different to other areas of Wales where you will find a blank wall... We've got enough friends thank you, bye, bye."*

Alex felt a sense of community cohesion in his local area and explained how his town had helped him to *"heal"*:

"...compared to the old set up, [place] ... it's a lovely place North Wales, it's a far cry from where I used to be, yeah...But I like [place] ...it's not a rich little town, you know, it hasn't got huge houses, well there's nice houses around the area, but you know, it's got a sense of community, I feel, and a sense of belonging and it's you know, yeah, I like [place] a lot, it's helped me, it's helped me to heal...That's what I'd say, it's helped me to heal, you know, and have faith in people again and things, yeah..."

After her experiences living in places where she did not feel welcome, Sarah described her current community as being more congruent with her worldview which made her feel acceptance and belonging where she lives. She explained, *"I'm an eclectic ideas person and I think I fit in when I meet people like that."* Sarah described her new community as *"friendly," "upbeat,"* more *"open minded,"* and *"progressive"* and added, *"connections have been built from doing things I enjoy."* Summarising her experience she said, *"Yeah, I do feel accepted. Not just accepted but that, you know, some of my ideas are welcomed."*

Like the non-Welsh speaking group, all Welsh speaking participants described difficulties relating to others and feeling *"different"* to others in some sense but Morgan, Owain, and Cai in particular, spoke of experiences of alienation that closely mirrored accounts given by the non-Welsh speaking participants. All three participants felt that they had little in common with people in their local area, for example, when asked whether he feels he belongs, Owain responded, *"not really because I don't relate to other people here."*

Morgan repeatedly referred to himself as an “outsider” and not “*part of the community*,” stating that he does not trust others beyond his close social circle. Similarly, when asked whether he would engage in events in the community, Owain answered, “*No, I don’t think I would... I think it’s because I feel like I don’t belong there.*” All three participants said they tend to avoid communication with people in their local area and would only interact with them at a superficial level or “*through necessity.*”

Owain and Cai acknowledged that people in their communities would help them if required but Owain said he would not feel confident asking for help. Similarly, when asked whether he thinks there is a sense of community cohesion in his local area, Cai responded yes but added, “*I don’t feel particularly part of that.*” He also said, “*they’ll help you out in situations but then they won’t necessarily mix with you if they have a picture of you within the community, of who you are.*”

All three participants explained how they do not feel like valued and accepted members of their communities. Cai commented, “*I don’t contribute anything, so they’ve got a perfect right not to have value in me...it’s my own fault really, to be honest.*” Cai explained that in the past he had felt like he belonged because of a shared ambition with his friends to leave the area and build a good career:

“...when I was much younger there was a lot of ambition that I had in common with friends and peers - ambition to get a high paid job and possibly leave the area... and all the stereotypical sort of things of what a man should do... that’s the one thing that we shared in common...our desire to move on, move out and achieve...So all those friends from those days have long gone...and I haven’t replaced them to be honest”

The rest of the participants in the Welsh speaking group perceived social capital as accessible and generally spoke positively about their communities. Lowri, Dewi, Alaw, Gwen, and Tomos said that they feel supported where they live, feel like they belong and fit in, and perceive others as friendly and trustworthy. Lowri said that her community “*come together when they go through a tough time*” and had helped her when she had experienced challenges related to her mental health. In general participants reported that they felt confident interacting with others, felt they could ask their neighbours for help if required, and described their communities as welcoming and sociable. However, Dewi and Alaw had not always felt so positively about where they live. Dewi shared some reservations about communicating with people in his local

community because he was new to the area and when Alaw was asked whether she had always felt a sense of belonging to her local area, she said, *“No, I never used to think like that before, it was like I don’t fit here, nobody wants me here. It was a lot to do with my family, they never used to show love.”* She said that she now felt she belonged, but it had taken her until later adulthood to feel this way and noted that she still does not feel particularly valued by others in her local community. Unlike the non-Welsh speaking group, many Welsh speaking participants conveyed a strong sense of place attachment to where they live, particularly to their hometown (e.g., Lowri, Dewi, Alaw, Owain, Gwen). Gwen said she still has *“fond memories”* about her birthplace, Lowri said, *“obviously I don’t feel the same sense of belonging here as I did there because I grew up there”* but she still described a strong affinity to her current community, stating, *“people are very proud of this place.”* Similarly, Alaw said, *“I feel very close to my village”* and Dewi commented, *“I feel like I belong because of where I’m from if you know what I mean.”* The closeness of communities, which was described as *“tight knit”* and *“cliquey”* by the non-Welsh participants, was more often described in a positive light by the Welsh speaking group (e.g., Lowri, Dewi, Gwen, Tomos). Lowri explained that her community have a strong sense of obligation to help and support each other. She said:

“there’s a lot of poverty as well, which is like sad...I love like going up there... because there’s like a big council estate up there and like all the kids are always out playing with each other...And people go in and out of their houses and they just like-, they just all look out for each other...And it feels like, wow that’s like belonging you’re looking at...Yeah, when I think of belonging, I think of up there to be honest.”

Lowri also felt that social capital is stronger in communities that had experienced hardship and poverty, explaining *“I find there’s more belonging within people who are poor and have had a hard background because they just join together...”* She said:

“Well, I used to go to school in [place] erm and I felt quite a connection towards there as well to be honest...there was like a lot of poverty there because it’s just like an old mining place that’s kind of been left without like, yeah, anything. So, I don’t know, I just felt a huge connection towards [place] and the people there, they were just like such strong people, I felt...it was good to be around people that had different lives... I don’t know, I just always felt really angry that these people left to just to be poor and have no jobs and have

no prospects in the future...but they still had such a sense of belonging and such a proudness about where they lived...”

Subtheme 2: Psychosis and rurality

Both groups of participants discussed their experiences of living in a small town or rural community, drawing upon characteristics of their local area that they perceived as protective or detrimental to their mental health. Participants frequently commented on sense of “*everyone knowing everyone*” in their local area, which was viewed as a common feature of small communities. This is captured by Cai’s comment, “*you can’t live anonymously in this community, definitely not, everybody knows you.*”

This was perceived as harmful, claustrophobic, and intrusive by both groups, particularly participants who felt like outsiders in their communities. Fiona acknowledged some positives about living in a “*small town*” where everyone knows each other, citing “*memories from when [she] was growing up*” and commenting, “*everyone knew me, I didn’t have to explain myself to anyone they knew of me they knew of my family, and I suppose we had a good reputation in that way.*” However, she predominately focussed on the more toxic aspects of life in a small community:

“...It’s kind of you can have nice and helping or you can have the opposite where it can feel almost like a bullying sensation...which is what I get quite a lot because I feel people’s disapproval and gossip, our towns great for it! and it’s another thing that I don’t like, and I avoid at all costs...so there’s that kind of aspect too... but it is a nice community and people do things for everybody and you can’t deny that”

Echoing this, several participants commented on the prevalent and unsettling nature of “*gossiping*” in their local area. When describing his community, Freddie said people were frequently “*sticking their nose in trying to figure out who’s doing what...*” Oscar said that his voices make him feel like people in his local area become “*jealous*” when he is in a good place. Sarah said, “*...it’s not very nice because there’s that risk of people you know...hearing something that’s not going on well in someone’s life, just sort of gossiping about it...*” Alaw said she feels accepted by some people in her community but added, “*you can get the odd one, do you know what I mean, they’ve lived here all their lives and the judge people like...it’s a lot to do with the paranoia that as well.*”

Morgan and Fiona described how they felt judged and stigmatised because of

their experiences of psychosis, Fiona explained, *“everyone knows everyone’s business here... and obviously once you’ve had an episode or something, you kind of feel that people know that, and some people do judge you for whatever reasons.”* A similar experience was described by Morgan:

“...living in a small rural community...obviously the attitudes towards to mental health are quite different to what they used to be but it’s still quite difficult you know. It’s one thing if you’re suffering from depression or that kind of stuff but you know like whenever I’ve ended up in [hospital] like everybody around here knows about it, you know...And you sort of...you just feel that it kind of sets you apart from people a little bit...they may not be stigmatising you, but you sort of do feel stigmatised”

Other participants shared similar experiences of returning home and finding it difficult to adjust or having an unpleasant feeling that people in the community were aware of their hospitalisation (e.g., Dewi, Lowri, Hilary, Alaw). For example, Alaw said:

“like I said when I used to go to [hospital] they showed me love, do you know what I mean? ...It was like I was going in there coming back to shit in a way... I was coming home like-, and it was still there in my head, thinking oh are they talking about me, whatever, things like that. And there was no such thing if you know what I mean?”

When Dewi was asked why he *“keeps himself to himself,”* he responded, *“I think they know I’ve been hospitalised and stuff maybe, and I don’t usually see them, I do say hello but that’s as far as the conversation goes.”* In contrast, Hilary viewed this experience as favourable, she said that her community were aware of her *“difficulties”* and that she has *“been in hospital a lot of times”* and they accept her.

Others explained that they had moved to a new place after being unwell and noted that their newfound privacy had been beneficial to their recovery. For example, Lowri said, *“where I used to live like you go back to the village everyone would know everything about everyone basically...So, it’s like a fresh start, no one knows nothing about me, so I quite like that as well.”* Similarly, Katie said, *“it’s quite nice to move somewhere where I wasn’t going to be recognised or watched.”*

Participants contrasted their experiences in a small community with urban living (e.g., Hilary, Dewi, Liam, Freddie). The anonymity that comes with living in a city was described as particularly appealing. For example, Sarah said, *“there’s that anonymity of [city] where people just go their own way”* which she viewed as a

positive attribute of urban life. Freddie commented, *“I think I’d prefer to see people that I don’t know.”* He also said:

“I think I prefer being in a city because people are doing their own stuff...they’re not like, sticking their nose in your business, they’re not like trying to befriend you just so they can go down the road and speak to their mate...”

Participants also considered rural communities to be less accepting of diversity while cities were more cultured and inclusive. This was viewed as a positive attribute by Liam, Sarah and Freddie, Sarah spoke of the benefits of *“diversity”* in cities. Freddie shared an experience of hearing racial slurs in his local area and said *“yeah, its proper shitty round here.”* He commented, *“when you live in a city you’ve got that many people from different backgrounds and different cultures and you hardly hear of anyone being racist.”*

Participants referred to other aspects of urban living that they perceived as positive such as a more active social life and better work prospects and opportunities - attributes that participants thought were absent or lacking in their local area (e.g., Sarah, Dewi, Freddie, Owain, Liam, Cai). Liam explained how he missed the friendly and sociable side of living in a city and felt that living in a small community had made him more introverted and reserved:

“When I grew up in [city]...I’d be more extraverted, I think. I think living here you just become introverted, quite closed off I think... It’s kind of like, you adapt to your surroundings, don’t you? ... It’s kind of like, not accepting your fate but just accepting that it’s a different way of life down here, I think...”

Participants also weighed up the detrimental aspects of urban living; generally, participants described their rural community as safe, quiet, and peaceful, while cities were thought of as more dangerous, crowded, and stressful (e.g., Hilary, Cai, Liam, Freddie, Sarah). For example, Dewi said, *“everyone is quite quiet and it’s peaceful here.”*

Liam said, *“I don’t think I could move back to [city] because of the crime and stuff and how busy it is.”* He also commented, *“Like I know if I go out and leave the doors open and walk up to the shop, I know someone wouldn’t be in as soon as my backs turned. So, I trust that there is less crime.”* Freddie seemed unsure about whether he would prefer to live in a rural or urban area, he said *“I like the surrounding area here, but I like the culture of the city. It would be very hard to sort of combine the two”*

and went on to say, *“I don’t like cities. There are just too many people, because dealing with my mental health...I can’t really be in crowds with quite a few people because it just pecks my head.”*

In contrast to the other participants, Morgan and Catherine explained how living somewhere so rural and isolated had made them feel unsafe. Morgan said, *“when I’m unwell, sometimes I really don’t, because of the isolation, I don’t feel safe there.”* Catherine commented, *“I used to have really bad nightmares about my house being broken into when I was in [place], it was awful...didn’t feel safe there at all...my home address, didn’t feel safe there as a kid...Yeah, it was very rural there.”* She also said:

“... like it being so rural, I was on my own a lot and being frightened on my own, nervous. When it’s dark, it’s really dark there, there’s no streetlights or anything, and I’d get freaked out by that...like right up until I left home! that never changed. And then there was also like trauma stuff that probably didn’t make me feel safe either...”

In terms of the protective attributes of their local area, almost all participants spoke of their affinity to their natural environment and the therapeutic benefits of being close to the mountains and the sea (e.g., Sarah, Morgan, Fiona). Sarah repeatedly referred to rural living as a “sanctuary” and Morgan spoke of his *“deep sense of belonging to the landscape and the sense of place that [he] gets from the landscape.”* In the non-Welsh group, participants recognised their sense of connection with the place but not the people (e.g., Liam, Katie, Freddie), for example, Katie said, *“I’ve always felt like I belong to the area itself just not necessarily like I was part of the community...you know like, what’s that Welsh term, “hiraeth” you know, that one....the area itself, I fell in love with this place immediately when I saw it...the people, I’m getting there”* and Freddie said, *“I like the area... I belong to the area as such, I like walking up the mountains... I like everything but the people.”*

The therapeutic advantages of the natural environment were captured by Morgan:

“I’ve heard voices since I was [young] and the only time when I get some genuine peace and quiet, well in the last twenty years they have become much more of a problem and much more difficult and the last twenty years, the only times that I get genuine peace in my head is when I’m running or climbing or

riding a mountain bike... so the landscape is kind of really important to me in that respect really”

3.3.6 Theme 3: Outsider status

This theme captures participants’ attempts to disentangle the reasons behind their experiences of exclusion. Often, when interviewees talked about feeling like an outsider, this was because they felt different to others in some sense and as a result, believe that they are negatively judged. This theme captures how participants make sense of such experiences and often follows a similar line of thought to, “I am an outsider in my community because...” The first subtheme relates to the Welsh language and national identity, the second pertains to participants’ mental illness, the third, appearance, and the fourth relates to participants feeling excluded because of other minority identities, namely, non-White British status and sexual minority status.

Subtheme 1: Welsh language and national identity

The non-Welsh speaking group most frequently attributed their position as an outsider in their community to some combination of their nationality and their inability to speak Welsh. The English incomers to the area were categorised as the outgroup while the settled Welsh community were perceived as the ingroup who have access to social capital.

This social categorisation was reflected in the non-Welsh speaking participants’ choice of language, *e.g.*, “*younger Welsh people, even up to their thirties, **they** don’t like the English...Not one bit, not round here anyway*” (Freddie) and “*I’m not an Englishman who is looking down his nose at a Welshman, **they** know that...but I’ve had it vice versa*” (George). The exception was Jack who was one of three participants in the non-Welsh speaking group who was born in Wales and identified as Welsh, “*like our grandparents they’ve always like advised **us** to talk Welsh in **our own country.***”

This social division appeared highly salient – this was further demonstrated by Oscar’s comment, “*I think I live in a place that is hardcore Welsh... like if there were two twin brothers now and one spoke Welsh, one spoke English, the one who spoke Welsh would get a better welcome than the one that spoke English...*” He added, “*I think people who speak fluent Welsh are more accepted in my area.*” Similarly, Jack commented, “*I think like when you live in a Welsh town, like they will obviously like judge you and just think like, of you a bit different if you speak English.*” He also said,

“if you do start speaking English as you grow out of schools, people can look down on you a bit.”

When participants talked about their experiences of social alienation and exclusion, their reasoning behind this frequently centred around their dissimilarity to their community based on language or national identity (e.g., Freddie, Catherine, Liam, Sarah). This is evidenced by this exchange with Freddie:

“Interviewer: Do you feel like you fit in here?”

Freddie: Kind of yeah... I stand out, I don't fit in but because I stand out I just... I don't know, I'm not really bothered about fitting in or standing out...

Interviewer: Why would you say that you stand out?

Freddie: Because I'm English...

This view was widespread amongst participants and was commonly raised by participants before they were prompted to discuss language and national identity. For example, Catherine frequently attributed her experiences of exclusion to her English national identity and her inability to speak Welsh. When asked about her experiences living in Ynys Môn and Gwynedd, she remarked, *“[place] was really difficult, I found it very very Welsh there... for somebody who has lived here since I was two, I was still treated as the English outsider and just not accepted at all by them...”* She said, *“if I could just be Welsh and speak Welsh, maybe I would belong more.”* Catherine also referred to examples of Wales and England's political, cultural, and sporting rivalry. She said, *“is it not a bit strange to be holding on to things that happened you know, hundreds of years ago, can we not like let that go...I wasn't involved in that!”* She added, *“it does make you feel a bit pushed out...pushed out of somewhere that's meant to be your home.”*

Katie shared a similar sentiment, she said, *“it's very difficult to feel like I belong in a place that primarily speaks Welsh as the first language, you know like, because I don't.”* She also commented:

“At first because we live in a village, I've found that people who've lived here for a very long time, whose families that have grown up in these areas, they're very wary of outsiders...so at first it was quite difficult because I sound English, I only speak English... if I see someone on the street, they would speak to me in Welsh first and then I have to say back, 'I don't speak Welsh.'”

Similarly, Freddie said, *“like when we moved to Wales my mum said that someone had told her, oh be careful the Welsh are quite, you know, they’re quite shitty with you. And she wouldn’t really see it because she’s older...But younger people, younger Welsh people, even up to their thirties. They don’t like the English.”*

When discussing her experiences living in a “very high Welsh speaking community,” Sarah explained,

“I sort of disconnected to actually how difficult it is to live there, and many people have spoken about that who are Welsh themselves. It’s a very sort of close-knit community where they’ve built on heritage, of sort of, people they’ve grown up with and lived with and that carries on through the generations.”

She remarked, *“they do have an issue with the English, and they see them as kind of coming in and taking over, no respect for the language.”* She also said, *“the anger towards its suppression in the past and that protection of it means that people can actually end up trying to almost exclude people who don’t speak it.”* Similarly, George commented *“A lot of Welsh people, well not a lot but a few, are racist toward the English...because of history...and I can fully understand the oppression that has taken place.”* George also described English suppression of the Welsh language as ‘linguistic racism.’

Participants talked about language barriers they had faced due to their inability to speak Welsh (e.g., Liam, Sarah, Catherine, George). For example, George acknowledged that his inability to speak Welsh fluently affected him both in terms of his everyday social interaction and his access to opportunities in the past, however the following quote could also be an example of Welsh speaking people in his community trying to include him as a fellow Welsh speaker:

“There are particular individuals round here who will not speak English to me, and their Welsh is absolutely superb. They know that I don’t understand half of what they are saying but they’ll continue to speak in Welsh. But I can manage to guess what they’re talking about... and I also accept that this is the heart of Welsh-speaking Wales, and they have a perfect right to speak Welsh to whoever they want to, even though I’ve lost out all my life because I didn’t speak that language...”

Liam was less understanding of Welsh being used in social interactions he was involved in – sharing his experiences navigating the group dynamics of bilingual conversations, he said:

“So, it would be my conversation and we’d be talking amongst us three and someone else would come in and start answering or chipping into the conversation in Welsh and it would change to that. So, it’s like they stole my conversation type thing. Or they’d come in and they’d switch it to Welsh even though they know I didn’t understand it and that can be like well we don’t want you in our conversation or we don’t respect you enough to be in our conversation...”

He considered this “*rude and arrogant*” and commented, “*sometimes I just used to walk out, it’s like watching a Chinese film without subtitles, there’s no point in even trying to understand it...*”

Some participants shared their experiences of feeling excluded at school for not speaking Welsh (e.g., Oscar, Jack, Catherine). Oscar said, “*I moved to [place] when I was about ten or something like that... I went to a local primary school and the teacher wouldn’t speak English to me... I couldn’t understand any Welsh... Do you know...I always say that’s like a form of racism... you know because I only spoke English and she would speak Welsh to me.*” Jack shared a similar experience:

“...I spoke Welsh from when I was in primary school...So, I’ve been speaking it for most of my life...But I did move, I was in [school] in [place]...and I was speaking a lot of like English to the teachers...And they were just always like really nasty and stuff and like other problems like, like I stopped going to school...”

Freddie and Liam felt that people had used Welsh to antagonise them or talk about them behind their backs – Freddie said that when this had happened, he would, “*speak back to them in Welsh.*” He continued, “*they would soon shut their mouth and shy away*”. Liam explained:

“I’ve never had a problem with people speaking Welsh I think, but when they talk about me in Welsh, that can bother me a lot, especially when you know they’re talking about you in a language you don’t understand. He added, if you want to say something about me, say it to my face or say it in a language I can understand, so I have a chance to respond... Don’t be being sly and stuff like that, yeah that really annoyed me that.”⁴²

⁴² The idea that Welsh speakers purposefully switch language from English to Welsh to exclude English monolinguals is a well-known trope about the Welsh language, see <https://nation.cymru/opinion/welsh-speakers-switch-english-walk-into-pub/>

George had an opposing view on this issue:

“...the problem is not between the English and the Welsh. It’s the English speakers and the Welsh speakers because you find that when one English person greets half a dozen Welsh people, the language will always switch to English...It’s not the other way round. And, I’ve heard English people say in English in [place] Oh, they all change languages when we come here...Not true. Not true at all.”

Alex also said that he had not experienced any sort of animosity about the language barrier:

“...If they’re speaking in Welsh, then you’re speaking English, they’ll converse in English, really. I haven’t had much trouble to be honest. I’ve found them very welcoming to me and everything and understanding of the fact that I don’t speak much Welsh yeah. I have to say obviously “Dysgu Cymraeg”, “I’m learning Welsh”, “Ychydig bach”, “A little bit”, you know.”

Some participants discussed issues of language and status, for example Freddie and Catherine felt that their communities associated the English language with being “posh” and stuck-up. Catherine explained, *“I think people hear my neutral English accent...I don’t think I have any particular accent and assume that that’s a posh accent and I’ve had sort of prejudice with that.”* She also said that she had witnessed people in her local area be “really vile” to somebody they perceived to have a posh accent.

In contrast to the rest of their group, three non-Welsh speaking participants did not share the same conviction that their national identity or inability to speak Welsh had negatively influenced their sense of belonging to their area (Alex, Hilary, Fiona).

When Alex was asked whether he perceived that his lack of ability in Welsh has any role in his sense of belonging to his area he responded: *“I’m aware that I’m an English guy here in North Wales... in a very-, quite a Welsh area...it has caused problems for me a little bit in me work because I’ve had clients who didn’t want to deal with me because I didn’t speak Welsh...”* He also explained:

“I haven’t encountered many people that have openly said to me, Oh, you’re English, go home or anything, Go back to England ...I haven’t encountered many people that have said, you only speak English I’m not talking to you. Because a lot of Welsh people, their first language is Welsh, yes, but they all speak English as well. Everything is bilingual so that’s great really... there

must be some rumblings going on, That [Alex], he's English or something, there's obviously that going on somewhere, but it doesn't concern me, it doesn't bother me really."

However, Alex felt he had to "prove" himself to his community in order to belong:

"...for people to respect you and for you to belong in the community and belong to each other and your family and friends you've got to prove yourself I feel...when a neighbour stops you in the street and they ask you what you're doing with your life ... you feel as though you've got a sense of proving yourself. I've got to prove myself so I can belong to the wider community and things..."

Hilary said that she felt a particular sense of belonging when she was "asked to participate in things... more so when the children were at younger and at school," adding, "we weren't left out because we were English, you know". In this additional comment, Hilary appeared to position herself as part of the outgroup, implying that there was perhaps some prior expectation that she might be "left out" in her community because she is English. A similar point could be made about her use of the phrase "language problem" when she was asked about the positive aspects of her community:

"...Well, who wouldn't want to live here, you know, everybody we met, or we have met during the time we've been here, have all been very friendly and I don't think we've come across anybody that I can think of, you know, that has been nasty or anything like that because of the language problem...Nobody you know, they're all apologising to us!"

Finally, when asked about her views on Welsh speaking and belonging in her community, Fiona who lives in an area with a relatively low proportion of Welsh speakers, explained, "where I live is not Welsh at all, we've got a lot of people from [UK cities] so, though you've got [town] that are extremely Welsh, [town] is like your kind of London to be honest! You'll hardly find anyone that speaks Welsh unless they're about eighty or ninety... so I haven't had a problem with it." She added that if she lived in a community where there was a higher proportion of Welsh speakers she would, "probably make more of an effort to speak Welsh to kind of fit and be part of things."

Fiona did comment that not speaking Welsh might present an issue living elsewhere in Y Fro Gymraeg:

“Obviously, if you don’t speak the language or you can’t speak it very well and the rest of the community is speaking that language, you’re going to feel a bit outcast... I suppose my belief on that kind of strengthened because I have people that live in [place] that are pure English and they really struggle and the school only speaks to them in Welsh, yet they can’t understand and its quite heart-breaking for them...so yeah you definitely feel a bit outcast...”

Consistent with the accounts of the non-Welsh speaking group, Welsh speaking participants viewed the categorisation of the Welsh speaking ingroup and the non-Welsh speaking outgroup as a salient social division in their communities (e.g., Dewi, Lowri, Morgan, Gwen). For example, when asked about her views on speaking Welsh and belonging in their local area, Lowri said, *“it’s so obvious in our village there was two or three families that spoke English and then it was so obvious who wasn’t from the area because they didn’t speak the same language, they would be a bit like outsiders.”* She noted, speaking Welsh was important where she lives but *“not all areas”*, and continued, *“in these areas, you wouldn’t be as accepted really. No one would think that you’re local, they’d think you were like a tourist if you were speaking English. If you didn’t have a Welsh accent as well”* She also explained:

“...there’s a lot of like feeling towards people coming and taking up those local houses, especially where I live because there was a shortage ... there’s a lot of hatred towards like English people coming but especially buying them as summer houses... And you could tell who they were because they didn’t speak Welsh. So, it just differentiates people very much... because if you’re from a Welsh [place] like everyone that’s from a Welsh [place], can speak Welsh from a Welsh place. So yeah, I feel like it is important. It might make people from England sort of feel a bit isolated that might not be very helpful for them...”

The second homes market was also highlighted as a prominent concern by other Welsh speaking participants, Alaw explained, *“there’s a lot of people who are in the village, they’re English people because they’re holiday homes most of them.”* Gwen shared particularly strong views on this problem, she said, *“there’s English people all over the island”* and felt they were *“taking over”*:

“Gwen: They’re taking over

Interviewer: They’re taking over?

Gwen: Definitely, they’re selling the houses for a profit in England and they’re buying them here ‘cause they’re cheaper and their squeezing us out”

Alaw and Cai thought that not being able to speak Welsh in their communities would make it more difficult to feel a sense of belonging. Alaw said, *“you’d feel out of it I think... a bit different.”* She went on to explain her point by describing how she would feel if she lived in an area where nobody spoke Welsh, *“Yeah if there’s English people here, all English people here, I’d feel out of place talking Welsh you see ... yeah I would be made to feel to talk English if you know what I mean.”* Cai felt like not being able to speak Welsh in his area might be *“frightening”* for some people, particularly for individuals who experience mental health difficulties:

“Interviewer: ...what do you think the experience would be like if you couldn’t speak Welsh living in your area?”

Cai: Oh, yeah, that would be-, that would be very frightening...The combination of mental health and not being able to speak the same language, yeah, that would be.

Interviewer: What do you think that would mean in terms of belonging to that area?

Cai: There would be no belonging at all there, there’d be great difficulty maybe living there, definitely.”

In line with this, most participants in the Welsh speaking group felt that the ability to speak Welsh is useful for social participation in their communities. Cai said speaking Welsh helps in terms of *“getting yourself round the area, communicating, trying to make friends”* and others noted that a lack of Welsh language ability might make it more difficult to feel included. For example, Lowri commented:

“...Like all the community things like the Eisteddfod,⁴³ or the Young Farmers,⁴⁴ the choir - they were all in Welsh like most of everything that was a community setting was all in Welsh. If you spoke English, you couldn’t really get involved with the community in the same way because it was through the medium of Welsh... yeah it kind of separates them from the rest of the people, I think...”

Similarly, Morgan said that living in a Welsh speaking community without any Welsh language ability would not be met with *“any animosity”* anymore but he did comment that it might present some *“difficulties”*:

⁴³ A Welsh language cultural festival.

⁴⁴ A Welsh social club.

“Morgan: I think some people who move to this area are quite surprised at how prevalent the Welsh language actually is. And I think perhaps sometimes people have difficulty with that.

Interviewer: What difficulties are you referring to?

Morgan: You know, getting sort of accepted by the community, getting involved in the community, community activities and this sort of stuff... feeling part of the community and not feeling like an outsider”

While of the Welsh speaking participants noted that not being able to speak Welsh might present some challenges in terms of belonging to a predominantly Welsh speaking area and getting involved with the community, Gwen’s views were markedly different. She demonstrated strong anti-English sentiment. She said that English people were disrespectful and not welcome in her community – she felt that the experience of living in her area as a non-Welsh speaker would be unpleasant and when asked why she said, *“we are Welsh, and we don’t bloody like it ... nobody bloody likes them that’s why.”* She also said that this view is *“a lot of locals opinion as well but they haven’t got the guts to say it.”*

“Gwen: I don’t bloody want them here

Interviewer: You don’t want what- English speakers here?

Gwen: English full stop.

Interviewer: Oh okay, and why’s that?

Gwen: They’re coming here taking over the place

Interviewer: You don’t like that?

Gwen: No, I don’t, it’s my country ...they’re coming here... they go down the country roads and come towards you yeah, they expect you to move not them, oh they can fuck off, I’m not doing that...”

However, while Gwen did feel the Welsh language was important, she did say that she felt the reason for the decline of the language was not the fault of English incomers:

“Interviewer: Do you think the Welsh language is an important part of belonging to a Welsh speaking community?

Gwen: Yes to the older generation rather than the young, you see yeah, we can’t blame English for the language dying... because a lot of Welsh people don’t speak Welsh with their children and that’s one thing we can’t blame the English...”

Owain's perspective was notably different from the rest of the Welsh speaking participants. Unlike the rest of the group, Owain said he felt like an outsider in his community because he is a Welsh speaker. Despite living in an area with a high proportion of Welsh speakers, he described where he lives as *"not a very Welsh place"* and said that he would avoid community events because he would be expected to speak English, he said, *"I feel like I don't belong there... I feel like I can't speak English - it's like a big confidence thing."* Owain explained, *"... they speak Welsh, and they understand Welsh, but they don't speak it because they think they're too good for it and all that..."* He felt exasperated that he was unable to use Welsh as frequently as he would like, commenting, *"All my life I could speak Welsh, it's not very helpful."* He also believed that people had excluded him because of his Welsh accent, when asked about his interactions with people in his local area, he responded:

"Owain: I'll try and talk to them yeah... But most of them will just hear my Welsh accent and ignore me, but yeah, I do sometimes."

Interviewer: You feel like people ignore you because you've got a Welsh accent?

Owain: Yeah, I think so, but it's probably me being paranoid."

Owain and others spoke of their experiences as a Welsh speaker outside their local area, in contexts where Welsh is not as widely spoken (e.g., Owain, Dewi, Lowri). Dewi described his difficulties living in university accommodation where English was the *de facto* language at a time in his life when he was not confident communicating in English:

"...in my second and third year in University, I lived with Welsh speaking people from North Wales...and my first year, I lived with some Welsh people but mostly from England. So, naturally, the language of the flat was English, and I struggled a lot like I tried to fit in ...I found it really hard to start with...because communicated all through school, all through my music, my mum was explain to me all was in Welsh really... I didn't really have a taste of English music."

Dewi also shared his experience of language barriers whilst in hospital, explaining that it was more difficult for him to express himself in his second language, English:

"Maybe also in hospitals, it would be nice to be able to use the Welsh language more maybe. Nothing against the English-speaking nurses but it's difficult at

times, you know. It's more difficult to express yourself maybe, when you have to do it in your second language."

Owain described how being in a social context where he is unable to communicate in Welsh makes him feel like he does not belong. As an example, he described his attempts to speak Welsh to people in South Wales when watching Wales play rugby but finding it difficult because of the difference between North and South Walian Welsh:

"Interviewer: what kinds of things make you feel like you don't belong somewhere?"

Owain: When I go and watch Wales, when I go to South Wales and we try and speak Welsh to them but really, it's not really the same language, it doesn't feel like. We don't have the same kind of Welsh as them."

This differs somewhat to Lowri's view, she described an experience when she faced a language barrier as the only Welsh speaking child at her school and explained that this made her feel *"different but in a proud way."*

"when I was younger, I went to school where no one else spoke Welsh and I didn't understand what they were saying. I remember that very clearly and I feel like that shaped like, my idea of like, being different but in a proud way ..."

As well as the Welsh speaking ingroup and the non-Welsh speaking outgroup, Welsh speaking participants made more granular categorisations which were sometimes used to position themselves as outsiders in their communities (e.g., Owain, Dewi, Lowri). Dewi commented on town rivalries and cited this as a reason why he has not *"connected"* with people in his local area, *"I've met some [place] people and got along with them but never connected as mates and stayed mates with them. I think one of the reasons is because [place] and [place] have this historical not dislike of each other... it's less now, but there used to be a lot of fighting between [place] and [place] people and stuff..."*

Owain described a rivalry within his community. When asked about his experiences living in his local area, he responded, *"It hasn't been the best, there's been like this massive divide from one side of [town] to the other side of [town] and there's always been that hatred here...It comes down from generations, there's hatred."* He explained that living in his current community is *"weird"* because he is from an area *"they hate"* and noted that makes him feel like he does not belong in his community.

Others alluded to divisions based on more affluent and poorer areas in their communities (e.g., Lowri, Owain). Lowri said there was an *“even split between the poorer side and the richer side”*, she felt that the richer people looked down on the poorer people and that there were *“two separate communities instead of it being one.”*

“Interviewer: what are your thoughts and opinions about the people who live in your local area?”

Lowri: There’s like an even split between the poorer side and the richer side...And there’s a bit of like judgement from both sides towards each other because you can see like there’s just like a line almost and there’s like nice houses and then there’s a council estate...but I just love the accent as well ...When they speak Welsh, they’re just characters to be honest they just make you laugh ... but it is very deprived sometimes... There’s a lot of problems with heroin and things like that...I don’t know, I feel like there shouldn’t be this gap in our town where like there’s richer people and the poorer people and they kind of look down at the poorer people...”

Subtheme 2: Experiencing psychosis

In this sub-theme participants from both groups talked about their experiences of severe mental illness and explained how this had made them feel alienated where they live. Participants commented on how their psychosis made them feel different and disconnected from themselves and others which caused them to feel like they do not belong (e.g., Katie, Jack, Fiona, Lowri). For example, Jack commented, *“I don’t feel like I don’t belong anywhere, I just feel like I don’t belong in my own body, like.”* Fiona said, *“knowing that you feel different can also make you feel that you really don’t belong”*, she also noted, *“If I’ve had a psychotic episode, it will really disconnect me...”* Similarly, Katie said, *“that kind of disconnect from people and your area is kind of what removes me from feeling like I belong somewhere.”* In this extract, Katie elaborates on what belonging means to her, noting how it can be difficult for *“people who feel so disconnected to reality”* to feel like they belong:

“Interviewer: What does belonging mean to you, personally?”

Katie: A sense of community I suppose. And sort of togetherness and you know, feeling connected to other people and your environment. Which is very difficult for people like me because we feel so disconnected from reality. So, I feel like belonging is a sense of being grounded and sort of being in social situations, being connected to people around you and your personal environment.”

Participants talked about how their unusual experiences made them feel like they do not belong, noting how their psychosis makes it difficult for them to relate to people and for others to understand them (e.g., Cai, Alaw, Morgan, Oscar). For example, Lowri explained, *“I feel sometimes with mental health...when people don’t understand and the being judged basically makes you feel like you don’t belong anywhere and that you aren’t appreciated and that it’s not okay to not be okay, you know. Like that, for me, makes me feel like I don’t belong.”* Similarly, when Oscar was asked about any negative experiences living in his community he said, *“yeah, I suppose so, like you know, having schizophrenia, that’s negative.”*

Morgan commented, *“I would definitely say that my mental health difficulties have had an impact on my sense of belonging..., without any doubt.”* He noted that he feels, *“very different from other people”* and that this makes him feel like he does not belong. He also added:

“...for a long time, because of my mental health problems, I felt even more of an outsider you know...when you’ve got voices screaming at you that you’re a horrible person, that you’re a bad person, that you’re this, that you’re that. it’s very difficult sometimes to kind of relate to other people.”

Participants discussed how their experiences of paranoia or mistrust of others made it difficult to feel like they belong where they live (e.g., Freddie, Catherine, Alaw, Jack, Tomos). Jack said he feels like he does not fit in where he lives if he wakes up *feeling anxious* and like *“something’s going on.”* Catherine explained, *“when I lived in [place] for a short time that’s when I was really poorly then, and I had quite a difficult time with the neighbours. Because I thought there was all sorts of things that were going on that weren’t, because I was unwell.”* Tomos felt like people treated him differently and this makes him feel like he does not belong. When asked in what ways people him differently, he responded, *“don’t know really like some think I’m a bit weird or yeah, I just get paranoid sometimes.”*

When discussing his difficulties relating to people in his community, Freddie explained, *“because I’ve been diagnosed, well not because of been diagnosed with schizophrenia, but because I have mental health issues, I’m kind of in my head a lot of the time... I suppose I overthink a lot of things but it’s very difficult to not be in my head and think, “oh he’s saying this or he’s doing that, and this might be a cause of this or this might be a cause of that””* Alaw also explained how her experiences of

paranoia negatively impact her sense of belonging to where she lives, when asked about what makes her feel like she does not belong, responded:

“...it’s like when paranoia starts, and it happens here. It’s like episodes going on outside and nobody there...I think it’s like friends and things like that that are doing it but there’s nobody there...and I feel like they want me out the village and at one time I used to go out the flat and walk in the dark wherever.” She also said: *“when the paranoia starts it’s like I’m against everybody...I think my close friends are against me and I’ve got to think twice is this happening or not, do you know what I mean?”*

Many of the participants’ feelings of alienation were linked to how they thought others perceived them because of their psychosis. Participants frequently talked about feeling “judged” or felt like others pitied them or viewed them as strange (e.g., Lowri, Fiona, Katie, Alex).

This stigma had a strong negative impact on participants’ sense of belonging. For example, Fiona explained that *“how people see [her]”* and feeling others *“disapproval”* is a central theme in her psychosis. She commented, *“obviously from living here for more time, I kind of worry how people perceive me now, especially if they know if I’ve got psychosis.”* When asked whether there had been any occasions when she felt she did not belong in her local community, Fiona responded, *“yeah, when I first was diagnosed with psychosis that was a big one... just the label psychosis kind of triggered “not normal” ...and I didn’t quite know how to come to it, to accept it...”*

Similarly, Morgan said, *“I still think that some people are actually judgemental because of my mental health problems, and I think that a lot more people would be judgemental if they knew, I think...But maybe I’m just being paranoid, I don’t know.”*

When asked about what makes her feel she does not belong, Katie responded, *“being kind of judged, before people really know me you know, especially with my illness, you know, I can come across very strange and people kind of think I’m strange, because I am.”* Lowri said that people’s “pity” made her feel different from others, noting, *“a lot of people feel pity and it makes me feel different then when they just constantly ask you if you’re okay...”*

George felt like his mental illness was a significant factor in him having initial challenges he faced connecting to his community, noting that it was *“the mental illness, not the Englishness”* that presented difficulties.

Some participants used self-stigmatising language when talking about their

experiences of psychosis (e.g., Catherine, Oscar, Fiona). For example, Catherine felt like people judged her because she is *crazy* and when Oscar was asked to explain why he felt like an “outsider” in his community, he responded, “*I feel like the local nutter, I think.*”

Finally, Alex talked about how public perception of severe mental illness had influenced his sense of belonging. He said, “*the higher awareness of mental health problems has helped peoples’ understanding of how we fit in to culture and society and everything.*” However, he went on to explain the adverse impact of negative media coverage of people with severe mental disorders, for example, depictions of people with psychosis as dangerous. He said that these “*blowback events*” make him feel like he does not belong. He explained, “*to belong you’ve got to have an understanding from other people of your condition that you are a good guy, you’re not a threat to other people.*”

Subtheme 3: Appearance

Only participants from the non-Welsh speaking group talked about how their appearance signalled them as an “outsider” where they live. They talked about having distinctive hairstyles, their dress sense, their weight and “*looking English*” (Katie, Freddie, Liam, Fiona, Catherine). Catherine and Fiona felt that others judged them because of their weight. For example, Fiona explained, “*I struggle from day to day to get from A to B because I don’t feel that connection to the world and I feel judged all the time... and that can be anything from my weight which is a huge one, to my clothes, yeah, it’s normally appearance-wise ...it all boils down to not being good enough and kind of projecting that and feeling that’s how others accept me.*” Catherine shared a similar view:

“I always think the interactions are not going to be nice or useful or they’re going to judge me, they’re not going to like me. They’re going to not like me because I’m English, or not like me because I’m fat, or not like me because I’m crazy, or not like me because of this or that.”

Katie, Freddie, and Liam talked about how they look different from others because of their hairstyle or how they dressed - for this reason they believed that people in their local area viewed them as outsiders. Freddie thought people perceive him as “*dodgy*” because of the way he looks, similarly Katie commented on how she thought her neighbours perceived her because of her appearance, she said, “*at first it was very*

much, not just that we were outsiders but, “oh my god they’re here to be loud and make noise” and when they realised that actually we weren’t like that at all, they seemed to kind of be like, “okay, they’re not here to be annoying.” Finally, when asked about his interactions with people in his local area, Liam commented *“I think looking English can be a disadvantage...because if you dress in a certain way the older people will look at you in a certain way.”*

Subtheme 4: Other minority identities

Two participants from the non-Welsh group talked about other minority identities and the challenges associated with belonging to a marginalised group. For Alex, growing up during a time that was much less tolerant of the LGBTQIA+ community had continued to have a negative impact on him. When asked about his sense of belonging to his area, he responded *“Well, being a [psychosis diagnosis] and a gay man...there’s a lot of potentiality there for stigma and discrimination...”* He explained that he does feel he belongs where he lives but his sexuality and his mental health diagnosis presented the most significant challenges in terms of feeling accepted. For example, when asked about his sense of belonging to his local area, he said, he is more worried about the *“[psychosis], gay thing rather than the Welsh issue.”*

Alex shared his concerns about others knowing about his sexuality, explaining, *“If you thought you could be openly gay then think again in my opinion....And even now, you’ve got to be on your guard, you’ve got to be very careful what you tell people because of the toxic nature of what’s going on at the moment.”* These concerns also had a negative influence on his social interactions, discussing his plans to attend a community-based group, he said:

“I’m going to do something positive with the sociability really with [group], so I’ll give that a go.... Which will take a great deal of courage really on my behalf...again, I’m terrified of them finding out I’m gay! I don’t want to go really, but I better go really.”

Sarah spoke about her non-White British background and how this had influenced her sense of belonging where she lives. When asked about whether her lack of Welsh language ability influenced her interactions with others in her local area, she described an unpleasant encounter she had at work and explained how she was unsure whether she was being excluded because of her non-White British background or because she was not a Welsh speaker:

“...that was the place where I felt the most, you know you even somebody saying “how could you work here” you know, “not that I have a problem with foreigners” and you don’t know how to take that because it’s like well do you mean because I’m non-Welsh or are you talking about the fact that I’m actually ethnically different as well?”

3.3.7 Theme 4: Protective strategies

This theme captures the strategies that participants employed to protect themselves from harm, including how they confront the experience of feeling like an outsider where they live. This theme comprises three sub-themes, the first sub-theme, “navigating identity” relates to the ways that participants categorise social groups to shield themselves from the adverse psychological consequences of not belonging. The second sub-theme relates to “safety behaviours” which are actions participants carry out to manage situations they perceive as threatening. The third sub-theme pertains to “social connectedness” and refers to positive social connection and relationships that bring meaning and purpose.

Subtheme 1: Navigating identity

Participants experiences of navigating their identities differed between non-Welsh speaking and Welsh speaking groups. Non-Welsh speaking participants frequently talked about their experiences of grappling with their English and Welsh identities, often feeling like they do not particularly belong in either group (*e.g.*, George, Catherine, Freddie). Freddie said, *“I do kind of consider myself half Welsh but more Welsh in like I can speak Welsh, there’s the mountains, and then I suppose I’m English because English is my first language, being from England as well naturally.”* George also shared his experience of navigating his identity:

“Interviewer: Do you consider the language that a person speaks to be an important part of their sense of belonging?”

George: Most definitely, I envy the Welsh speakers.

Interviewer: For what reasons?

George: Well, take a rugby match. I was born in England, England are playing Wales, I’ve lived in [20+ years], I want Wales to win but I feel that I’m being disloyal to my ancestors by supporting an opposing team.”

Catherine believed that having a Welsh identity and being able to speak Welsh would have a positive influence on her sense of belonging to her community. She continued,

“well, is it the irrational maybe? that bit of me thinks that. I know logically that you could probably belong very well if you do the right things and stuff like that, I just, I haven’t found those ways.” Catherine described the challenges this has presented in terms of navigating her sense of identity:

“It’s kind of messed up my kind of... this is going to sound really dramatic in a way... but my identity in some ways, because I don’t know whether I’m Welsh or English, and I don’t know. So, I think in my head in Welsh, not the words as in, so if I’m say spelling, I will spell phonetically so my English spelling is pretty pants sometimes, but then I can’t and yeah, it’s all just jumbled up ... I feel, this in an awful thing to say, but I feel like I need to go home as in back to England when I’ve never even lived there! I can’t remember being in [place] ...I don’t know where home is. Which is really like shit really. And I think I spent a lot of time in my twenties in [place] trying to get rid of that feeling to be part of Wales, and I still don’t feel like it...”

Sarah talked about how themes of language and identity had manifested in her hallucinatory experiences. She explained, *“I was getting this idea about languages and peoples’ languages as a theme.”* She described how her hallucinations centred around language barriers – she explained, there’s *“all this kind of disconnect and dysfunction coming in and confusion and conflicting ideas because of the differences in the languages.”* Sarah also spoke about hearing voices in Welsh and other languages she does not understand, she continued, *“I remember hearing certain Welsh words and then they were sticking and then wondering what they meant...I don’t know if it came out because there was so much that I’d been exploring beforehand...identity was a big theme in the psychosis.”* Reflecting on her experiences, she said, *“I don’t like cultural homogeneity, I like differences, I like variation, and I think maybe I was wrestling with that, as someone who can speak and understand a different language that’s learning a new language.”* She also commented:

“I’m not sure why that came up in the psychosis, if it was just a breaking down of identity or different themes as to where, like if I’m trying to fit, where do I fit? if there’s all this dysfunction, you know? I’m here in this place and yet I couldn’t put myself in one, I was a bit of an enigma in a place.”

To reconcile this salient difference between their identity and that of others in their local area, participants appeared to utilise two main strategies. The first involved interviewees redrawing or dissolving boundaries of identity to position themselves as

part of a larger ingroup. The second strategy involved participants accepting and rationalising their position as outsiders, justifying their position by highlighting their incompatibility with the other group.

Participants who adopted the first strategy recognised a strong Welsh identity and the ability to speak Welsh as key antecedents of belonging to their local area. In the absence of these attributes, they looked for alternative ways to define their identity (e.g., George, Alex, Sarah). One way in which they did this was to highlight other characteristics that they believed they had in common with people in their local area. For example, George perceives his identity as “*neither English nor Welsh*” but described other commonalities, for example “*kindness and respect.*” He commented, “*It’s the English brain and the Welsh heart and the two shall meet but if you realise it’s with your heart you speak, you’re accepted.*” He underlined the importance of having a sense of identity, noting that “*it’s not necessarily confined to nationality or place of birth.*” He also said:

“I don’t think there’s anything more than a sense of identity, I really don’t. Because you can strip away everything but if you have a sense of identity, that’s it. And that’s why I said that, as a compromise, I say I’m a child of the universe. Which makes me like you even though your Welsh. And if they get it, which most of them do, they realise that I’m neither English nor Welsh...But I think in life, it’s your attitude to other people that defines you as a human being.”

Like George, other participants conceptualised their identity on a broader scale – transcending identities based on language or national identity. For example, Alex said, “*I’m a human being having an Earthly experience on a troubled Earthly planet.*” Similarly, Sarah said:

“...in terms of cultural identity, I try not to sort of fit into... I feel like I’m cosmopolitan, I kind of belong to the world, I like to be able to adapt, to fit into any culture and I think there’s similarities in all of them. When you go back to the indigenous nature of all cultures, there’s similarity there.”

Alex often discussed issues of identity and belonging at an overarching UK-wide level, positioning himself as part of a wider ingroup who share common threats. After commenting on national identity, Alex said that he believed “*nationalistic*” and “*parochial*” identities were “*destabilising*” communities. He also talked about the “*significant crime and disorder problem*” in the UK continuing, “*the level of criminality that I am seeing on these news...I mean, this is going to affect everybody’s*

sense of belonging now, at the community level, the national level, the state level..." The universal threat of Covid-19 and was also reflected on by Alex, who said, *"I think before the pandemic it was more congenial atmosphere, I think people were getting on a lot better...The pandemics just causing many problems."* He added:

"I feel a sense of detachment from people, the general public if you will...Do I feel safe around them? Well to some extent, yes, to some extent no. I don't feel threatened by them but when you go out there ...Covid-19, the crime and disorder problems... people are suspicious of each other, I feel. They're suspicious...Everyone looking over their shoulders and people are unwell... we're in supermarkets wearing masks and sanitisers and gels...safe distance, two meters apart... That's obviously going to create suspiciousness and distance from each other..."

Like the Welsh speaking group, some non-Welsh speaking participants talked about the importance of the Welsh language has in terms of identity and community cohesion (e.g., Hilary, Alex, George). Alex described the Welsh language as *"protective"* and a *"safety net"* for the Welsh people and Hilary said speaking Welsh makes people feel *"secure."* Alex and George moved away from the linguistic situation in Wales. They spoke about cultural and linguistic diversity in England and how they believe a shared language is important in preserving social fabric of communities. For example, George said:

"A language only exists if its alive and it identifies people in this area with each other. Its cohesion, any language is cohesion. I mean, I haven't been to England for a long time but Birmingham and London, you won't see a White face. In many areas of it you won't see a word of English being spoken...Yeah, well if we're becoming multilingual that's great, but it depends on whether the incomer to the area attempts to try to learn the basics of the, niceties of Welsh or English, or Scottish...But it is the gel that keeps the community together but more, more than what I'd say around here, the gel that keeps us together is kindness and respect, not language."

Similarly, Alex commented:

"...it's a great language [Welsh] and I think the Welsh language has protected Wales generally from, you know like in England where we've got, you could say, an overload of different cultures and things, haven't we really...you could say England is too congested with too many different nationalities and things

really. And Wales seems to be a bit together with itself because I think the Welsh language has kept this country together.”

Other participants demonstrated similarities to the Welsh speaking group based on their respect for the Welsh language and culture. Fiona commented on the “*sense of pride*” that people derive from speaking Welsh and others condemned the English oppression of the Welsh language (e.g., George, Katie, Alex). George noted, “*I can fully understand the oppression that has taken place.*” Alex commented, “*I accept it’s not good if a lot of people are coming in from all over the country to buy up these holiday homes on Anglesey ‘cause it’s destabilising the communities, well it’s pricing people out of the housing market for a start.*” Katie viewed the Welsh language as a “*symbol of the strength of Welsh people after everything that Wales went through, and the Welsh people went through.*” She also said:

“...there’s a reason why you know, in so many cultural genocides, they did try to wipe out languages, especially with Wales for example because it’s a really great way of dividing people and stopping them from feeling connected to their homes and their lands and their culture, you see it time and time again... So yeah, I definitely do feel like people do feel like people speaking their native language is very important to them feeling like they belong.”

Some participants viewed connecting with Welsh language and culture as a way of bolstering sense of belonging and relating to the Welsh ingroup (e.g., Katie, Sarah, Alex, George, Jack). For example, Katie said, “*you can be friendly with people everywhere but feeling connected to a place, you know my sense of belonging is also quite rooted in Wales, you know, the culture and the heritage and stuff, because I felt disconnected from that for a long time. What made me feel like I belong, was kind of reconnecting with Welsh heritage.*” She continued, “*you know sort of reading into the history and everything ...but it’s mainly going to places, like visiting the sights, the castles or just you know, there’s a lake I like to go to, kind of reconnecting.*”

Alex said that since moving to Wales, he has become “*Welsh-lish*” and developed a stronger affinity with Wales and Welsh politics because “*Wales and the Welsh have saved [his] life.*” He explained:

“I’ve taken onboard the Welsh, I’ve thought to myself, I’ve moved to North Wales, I’ll become a-, I think one person said to me, a “Welsh-lish” guy, I don’t support England now, I support Wales football, I’ve got Welsh plates on me car, Welsh flags in my garden. Because my sense of that [is], Wales and

the Welsh have saved my life, yeah. They saved my life. And they have you know, and that's where I'm coming from with that, yeah, thank you, you know."

Several participants talked about speaking or learning Welsh as a way of fitting in and garnering respect from Welsh speakers (e.g., Freddie, Sarah, Katie, Jack). Freddie said, *"Being able to speak Welsh round here does give you a fair amount of credit."* Sarah explained, *"with getting into Welsh classes, I've managed to feel connected."* Comparing her experiences to how she felt living in her past community, she said, *"it's a lot different you know, the difference between here and maybe the [place] areas, it's shown through quite a lot."* Katie said that when she started to make an effort to speak Welsh in her local area, *"people seemed to be a bit warmer to [her] about it."* Jack highlighted his affinity with the Welsh language, he said, *"Like everyone knows I'm Welsh. Like if someone Welsh, walked up to me and spoke to me in Welsh, I would speak Welsh back to them."* He also said that he would like to speak Welsh more often, but he finds that people usually switch to English when talking to him:

"it's [Welsh] a very valuable thing and it's one of the hardest languages to learn like so when you hear people speaking it, Welsh, it's really beautiful language. But it's so hard when you've like, kind of lost it, so when in your brain it's hard to find it all again, like all the right words to say. Like, I think I want to start speaking Welsh a bit more. I do sometimes, like I'll just start speaking Welsh to my friends but like they'd always go back to English yeah, so I'd just stay with English."

Some participants made attempts to distance themselves from an English identity (e.g., George, Sarah, Katie). For example, George said that he would *"feel like an outsider in England"* now. He also alluded to issues of language and status, referring to the *"English brain"* and the *"Welsh heart"*, and when explaining why he feels he belongs to his area, he said:

"The fact that nobody asks you what you do for a living or how much your house is worth. When two Englishmen meet in England, it's where do you live, and what do you do for a living, where do you live. And what they really want to know is how much your house is worth and have you got more money than me? ...Amongst certain people. But in Wales, the first question is where are you from? who is your family? and who do you know that I know? In other words, it's building bridges."

Similarly, Sarah described the perception of the English language as a higher status

language as a “*conflict in [her] culture*”:

“I sort of don’t like this pedestal that English is put on where it’s kind of like intelligence is associated with being able to speak English well, so I think that’s a conflict in my culture, my identity... and then me being able to speak English well is a sign of perhaps education or me fitting the social construct of a White person... I speak English ‘cause I was born and raised in English, if anything maybe my cultural identity would be more associated with [place], my ethnic origin.”

She also commented, “*I’ve always thought if I was born in China, you’d be saying the same thing about my ability to say Chinese. I only take it as a language that I’ve been born and raised with, I actually have the desire to learn other languages.*” Sarah compared the oppression of the Welsh people to the persecution faced by people of her cultural origin and explained that her non-White British background may have made her “*less of a threat*” in Wales.

“I come from a [place] that has a history of oppression. And then to hear that, there’s an element where you kind of think, well you’ve got a chip on your shoulder, you know, you’re not the only nation, and some people have had it worse than you. And I do think actually that what had happened is almost having that ethnicity made me less of a threat sometimes in Welsh...because they do have an issue with the English and they see them as kind of coming in and taking over, no respect for the language. But I think with me there was maybe a different stance because of my ethnic background as well, so that might have had an effect...”

Participants in the non-Welsh speaking group who utilised the second strategy took a different approach to navigating their identity. They showed no desire to carve out their place in their community but instead accepted and rationalised their position as an outsider (e.g., Freddie, Liam, Sarah, Catherine). To justify their decision, they explained their incompatibility with their community, often by highlighting perceived attributes of the other group that they thought were undesirable.

Sarah talked about how differences in values and beliefs made her feel incompatible with her previous community, she explained, “*where I was before they can be quite in the box thinking and people being quite rigid in their ways of seeing things so they can often undermine any pursuits you have to do something new.*” Comparing this with where she currently lives, she commented, “*people are friendly,*

open-minded, think open to new trains of thoughts and experiences. There's a degree of progressiveness...I don't feel that sort of barrier to accepting extensions of friendship or opportunities to meet new people."

This notion of communities being small-minded and judgemental was talked about by other participants, particularly Freddie and Liam. Both described themselves as inclusive and tolerant but perceived their communities to be the opposite.

Talking about what he referred to as the "English" and the "Welsh" aspects of his identity, Freddie described people in his community as "two-faced", he said, *"they'll be really nice to your face and then, they'll go and do something."* He said, *"that side of me is definitely English... I can be snidey if I want but I won't be."* Freddie explained how he found it difficult to relate to others, particularly young people in his local area, he remarked on them *"drinking themselves stupid every weekend"* adding, *"I'm not into drinking at all."* He also commented:

"I don't really have much in common with them to be honest. When I was younger, I used to hang out with my mate... and loads of lads our age, they're just like fucking hating us because were driving round in cars...I didn't really care, cause like oh yeah whatever, shout at me like that, you know? you go and drink your pints in the pub, and then go back home and argue with your missus because you're drunk, and you can't fucking figure out how to live life properly. But yeah, there's much more to life than a lot of people round here have any concept of."

Freddie explained how he had no desire to be a part of his community because of the way he had been treated, he said, *"people are willing to push you for their own benefit. Whatever they are willing to do and there's a lot of people like that round here and that makes me feel like I don't want to be a part of the community as such."* He continued, *"If I was, say a leader of a community or an influential person I wouldn't have no one being shitty to someone, especially not someone that was struggling with say mental health issues."* He also said, *"people round here, because everyone takes the piss out of everyone, it brings the clever people down and it just becomes like a bottomless pit of negative emotions, if that makes sense? But yeah, it's weird living round here."*

Liam shared a similar view:

“Interviewer: when we were talking about belonging and what you thought belonging meant, you mentioned feeling accepted and valued, do you feel that here?”

Liam: No, wouldn't say so, no...I think with all the stuff that's happened where I've lived and how everyone's connected and stuff, I just don't... yeah, in the way people have treated me since I've been here and stuff, the way they treat you and that. But yeah, I don't know, I've kind of like put up a shield against it as well, now...”

He believed that people were being “judgemental” and “closed-minded” towards English people, he said, “...my mate he's Welsh and he's got Welsh flags and stuff and he has them on his car... he's proud of his nationality which he should be. But he's not rubbing it into other people's faces, he's not holding it against you. You know, he's not judging you cause you're not part of his nationality. Whereas his brother can be like that. Like an arrogance or an ignorance in your face, where he's not as closed-minded.” He also appeared to refer to English people as “foreigners.”

“I've noticed like people that have say, if they've got an English friend or English family member or their wife's English, they're not going to tar everyone with the same brush, they're less judgemental to people. Because some of them are like all English people are the same, they're all this, they're all that, it's like a closed-minded racist view...But yeah, feeling a sense of belonging, I'd say I was when I met my girlfriend, she was less judgemental towards the English and we just accepted each other for who we were and also meeting Welsh people that see other, the other Welsh people as like idiots for like the way they treat foreigners or whatever. I think it comes to a level of understanding, I think.”

For Liam, his negative stereotypes about Welsh people, including the expectation that he would be judged negatively because of his English nationality, shaped how he approached social interaction. Talking about starting a job at a Welsh-speaking workplace he said:

“I was the only English guy there and I pulled up I saw this old man and I thought oh god he looks bitter him like, bet he's worked here his whole life and he doesn't like the English, that's the impression I got off him, but I couldn't have been further from the truth... he was completely the opposite and the same views and values we have about racism towards Black people or whatever, he

had the same thing, like treat people with respect and that were humans and all this... he was the opposite of what I thought, he's cultured and he knows lots of people...he's not judgemental."

For Sarah and Catherine, their perceived mistreatment appeared to be channelled into resentment towards the Welsh language. For example, when discussing her reasons for stopping learning Welsh Catherine said, *"I don't know if there was a bit of stubbornness and resentment, like you know, you can't make me speak a language, especially if you're going to treat me like crap. And you know, back then it, it maybe it's different now but they would take the mick out of you if you didn't get it right."* A similar sentiment was expressed by Sarah:

"...it's a very high Welsh-speaking community and although I came there and I was like wanting to speak-, learn Welsh and I had an interest, I didn't feel encouraged to do so for the sake of trying to fit in...So, it's kind of like, this is our community and you know, if you want to come in more and learn Welsh... And they had got a reputation of not being very welcoming to outsiders so whilst I had a few people there that I did connect with and talk to and who were forward thinking and liked new ideas, there was also this general element of not feeling confident enough to go and try and use my Welsh or do that. I didn't want the pressure of you need to learn this language to be included, so I think that there was an element of that as well."

Most participants in the Welsh group utilised the first strategy when navigating their identity. This involved mapping out what it means to be Welsh and defining the boundaries of identity – establishing who are part of the group and who are considered outsiders.

All participants viewed their status as a Welsh speaker as a fundamental part of their identity which was highlighted by Owain, who said, *"it's like an identity, it shows who you are."*

For the participants who generally felt like outsiders in their community, speaking Welsh was thought of as a way that they could fit in and belong, at least superficially (Morgan and Cai). For example, Cai said his position as a Welsh speaker meant that he could *"sort of fit in, in a way, with that on occasions."* Similarly, when he was asked whether he considers his ability to speak Welsh to be a significant part of his identity, Cai responded said that his Welsh identity occasionally afforded him *"brief shot of belonging"*, he said:

“... you know there are days where I don’t feel belonging but then... speaking to family in Welsh, that brings belonging and there’s the football, there’s the rugby...that brings sort of a brief shot of belonging I suppose... You know, you don’t have it every day, but it does on occasional times.”

Morgan said the Welsh culture and had *“never been a hugely important thing in terms of how [he’s] lead his life”* but he did feel like his ability to speak Welsh made him feel like he was a *“member of a club.”* He explained:

“... there’s also the sense of belonging as far as the culture and the language goes as well... it’s never been a hugely important thing in terms of how I’ve led my life I do feel because I’m a Welsh speaker and I was born and brought up here, you know, you feel like you’re kind of a member of a club really. You’re a member of the Welsh speaking club and it sort of sets you apart from the rest of Britain...whenever I’ve been away from wherever I’ve been in other parts of the world and people ask me where I’m from, I don’t say Britain, I say I’m from Wales...”

When asked about their sense of belonging, Welsh speaking was frequently brought up unprompted and participants felt it important that they lived somewhere where Welsh was widely spoken (e.g., Lowri, Dewi, Owain). For example, describing where she lives, Lowri said, *“it’s still a very Welsh place as well, which I like... Everyone’s Welsh here.”* Similarly, Dewi said,

“...yeah, it’s important to be that I’m in a Welsh area really. I can’t imagine living in England... Yeah, I can’t imagine it so yeah, I guess it is important to me... I would love to live abroad or something, like something like that would appeal to me, but I would always come back, I think. Language is important and if I’m going to have kids, I want them to be able to speak Welsh as well.”

Speaking Welsh was viewed as an important requisite of belonging to a Welsh community. When asked about her experiences as a Welsh speaker living in a Welsh speaking community, Alaw felt this was identity affirming, she said, *“Yeah, that is good, it makes you feel in a way, more Welsh if you know what I mean...”*

Lowri explained the importance of community events being through the medium of Welsh - she suggested that non-Welsh speakers learn the language to be included but acknowledged that this would be challenging, she said, *“if we changed all of our community events to English, the language would die out if we didn’t speak it every day. So, I just feel like, even though it might be hard for outsiders, you can*

always learn Welsh I guess, which is so hard though! 'cause it's like, apparent it's like the hardest language, like a hard, hard language." There was a sense of Lowri wanting to keep the Welsh speaking "club" exclusive, for example, she said, *"we have to keep it [the Welsh language] sacred."* She was also unsure about whether new Welsh speakers:

"I don't know if I feel like people should learn Welsh because there's no point like knowing a language, but you never speak it because you're not comfortable...I think it's just important to keep the places, the little villages and the towns that are Welsh, like still to speak Welsh so that it's still alive. Because I don't know, a lot of people that are learning it still don't have the confidence to speak it really..."

Being born in Wales and having family ties in the area were also considered key components of a Welsh identity – this view was shared by most participants (e.g., Alaw, Morgan, Dewi, Lowri). For example, when asked whether he feels like he belongs to his area, Dewi responded, *"I do because I was born in [place] just a few minutes away."* He also said, *"a lot of my family was raised in [place] and some still live here, I mean some have died now but that's kind of makes me feel like I belong here as well - the fact that lots of my family on my mother's side have lived here."* Similarly, Morgan said:

"...But then, on the other hand it's [belonging] you know my family on my mother's side of the family have lived here for a very long time, generations of my family have been to the same- to the same school, so there's the sense of sort of family history and the belonging through this is where my family is from..."

Participants conveyed a strong sense of belonging and pride about their Welsh roots (e.g., Gwen, Dewi, Lowri, Alaw). Dewi said, *"where you are born and how you are raised is important to how you define belonging."* He continued, *"I was raised in a Welsh family, and values, you know like strong values."* When asked whether she feels she has things in common with others in her local area, Gwen responded, *"Yeah, I'm Welsh...this is a very Welsh place you know... I am a country Welsh, that's what we are most of us are country Welsh"* She explained that generations of her family had been brought up in Wales *"all my family was bred on [place]."*

Lowri spoke about the strength of the Welsh people in the face of oppression of the Welsh language and culture, noting the Welsh Not⁴⁵ as an example. She said:

“... my dad yeah, he feels so strongly about like the Welsh language like a lot more than me to be honest, but I still do like, I feel like if I didn’t speak Welsh I probably wouldn’t feel half as proud of being Welsh. Having our own language that survived so many centuries with so many things happening like the Welsh Not and all of that...”

Morgan spoke about the oppression of the Welsh language and also commented on other minority languages, he said, *“Welsh isn’t unique in that respect you know, there are lots of minority, indigenous languages that are under threat by Western...basically by the English and American culture you know so you need definitely to preserve that.”*

Morgan also shared a conversation he had with another minority language speaker:

He said, “You’re Welsh right?” and I said “Yeah”, “Do you speak Welsh?” and I said “Yeah, first language”, ...and he said “You people are like us, you’re an ethnic minority in your own country”... you know, so I thought oh yeah, you’re right

He also felt it important to separate himself from an English identity, he explained:

“... quite a lot of the places I’ve gone, you kind of want to make a kind of point of not being English because you know, the English may not have the best reputation, for instance. So, well you go, I’m actually not English, I’m actually Welsh, and my first language isn’t English, my language is Welsh, and that definitely changes people’s attitudes towards you, I’ve found...”

While Morgan showed an affinity to his identity as a Welsh speaker, Morgan also distanced himself from *“Welsh nationalist politics”* which he described as *“inward looking and small-minded.”* He felt that that this created a *disconnect* between him and the Welsh community. He explained,

“I’ve always had a major problem with Welsh nationalist politics...I really don’t like that and that has always created a bit of a disconnect between me and the Welsh community if you like, I’ve always found that quite hard to deal with you know. Especially with my wife being English, you know the attitude of some people toward the English and outsiders, that sort of negative attitude

⁴⁵ The Welsh language was actively discouraged throughout the 19th century. Schools were reported to have used “the Welsh Not” – a “token” made from wood that a child would wear round their neck as punishment if they were caught speaking Welsh in school.

towards them, I find that very, very difficult and I've always wanted to distance myself from it...and because of that, that actually does set you apart you know...that's the one thing that really stands out in that respect for not belonging."

Subtheme 2: Safety behaviours

Participants from both groups talked about safety behaviours that they carry out to protect themselves from harm in situations they perceive as threatening – these behaviours could be grouped under flight, freeze, fight, and fawn stress responses. All participants demonstrated flight stress responses in some capacity – these were generally actions carried out to avoid situations that evoked negative emotions. The most common manifestation of this was the avoidance of social situations and interactions with others. For example, George said that he avoids social events in his community is his *"deep-rooted phobia."* When asked why she avoids community gatherings, Alaw said *"I don't like to be in crowds, things like that."* Oscar explained that social situations are *"something [he] has trouble with"* and added, *"pushing myself to do it is not a good thing."* He explained:

"I can't deal with being in a place where there's a lot of people, I need to go home and ride the storm and wait for it to pass...you know, there are times that things are so bad, I can't cope in social situations."

Fiona recognised the function of her social avoidance in terms of a *"short-term fix"* of safety and protection, but noted how this can easily spiral into a negative habit:

"the more that I avoid, because obviously my brains thinking, "oh this is working I'm avoiding things" and I'm getting my short-term fix and I'm feeling safe and protected but that then sinks and seeps into other things and different areas of life 'til it becomes a huge habit."

In terms of their reasons for avoidance, all participants talked about social situations being uncomfortable for them – some interviewees talked about their social anxiety and difficulties navigating conversations, while other participants spoke about feeling mistrustful of others.

Catherine explained that her past negative experiences are the reason she does not trust or engage with others her community, she said, *"I've wanted to but then, I think I had such a bad time in [place] that I just, I just stay away from people now... I just don't trust them..."* Talking about her experience elsewhere, Catherine said, *"even though it's quite Welsh ... I didn't have any trouble with anybody, didn't really get to*

know anyone...” Liam and Freddie also said they do not trust others so they avoid interaction with people in their local area. For example, Liam said, *“I don’t really give them a chance like the younger people and stuff up there, I don’t give them a chance to betray me, they don’t get close enough to do that again, if you know what I mean?”*

Morgan shared a similar sentiment, he said, *“some of the people who we have as close friends, I trust them totally...But because of the stuff that goes on in my head, I would say I don’t trust anybody no.”* Morgan explained how his experience of hearing voices make it difficult for him to engage in social situations:

“Interviewer: Do you engage in any sort of events or activities that go on in the local area?”

Morgan: I wouldn’t say so, no...I find that sort of stuff very difficult...yeah, I do find that very, very difficult...

Interviewer: For what reasons, do you think?

Morgan: It’s because I experience voices at different levels sort of most of the time...when I go into social situations where I don’t know people or there’s a lot of people, then that stuff gets much worse...And I feel it makes me extremely anxious ...”

Some participants said that they avoided social interaction through fear of judgement or because of their suspiciousness of the intentions of others (e.g., Morgan, Liam, Fiona, Catherine, Sarah). Fiona explained, *“I worry about how they [people in her community] judge so I tend to keep myself to myself.”* Sarah talked about how she had questioned people’s authenticity when people approached in social situations:

“I think there was a vibe of cliquiness and people did sort of get involved but I also noticed very much a male sort of lad culture where being a single female living alone that had come here, you know looking different, seemed more of a source of conquest and intrigue rather than genuine friendship. I didn’t know who was genuinely trying to get to know me... I probably didn’t feel comfortable enough to sort of socialise with the people there...”

A common experience amongst participants was that they did not feel confident interacting with others and struggling navigating social interaction, several said they *“keep themselves to themselves”* and avoided initiating conversation. Katie said she had avoided interaction with people in her local area because she *“felt bad asking them to speak English.”* She continued, *“I thought that they were kind of already going to,*

you know, be shitty about it so I just kind of didn't bother... and it does still happen sometimes. That block does still sort of come into play."

Morgan explained, *"I don't kind of go out or go to the pub or anything like that so on one level, I don't feel particularly confident about sort of socialising or communicating with other people really. I'm quite sort of selective about who I do that with."* When asked why she avoids social engagement, Catherine responded, *"just I've never really learnt how to be sociable I suppose."*

Jack, Hilary, and Cai talked about feeling anxious and uncomfortable around others. For example, Cai said, *"I probably would feel safe outside but not comfortable."* Jack shared his experience of social anxiety and how this causes him difficulties when navigating conversations:

"I've always had like a weird like social anxiety, like it's hard for me to keep up in a conversation with someone, like I always find myself like, instead of like going into the conversation with them, I just sort of like pull out and start talking about myself and it just like makes the other people feel like, "why does he just keep talking about himself?" So, I get like a thing in my head then I just can't talk to people."

Similarly, Alex shared his difficulties negotiating social interaction – he said people act unusually towards him and explained that he has to *"push himself"* to leave his house:

"I can be timid around the general public you know because I'm subject to strange behaviours from them really, yeah...it's the suspiciousness I'm sensing...I think people have become suspicious of each other, lack of trust and everything now...So, I feel a bit uncomfortable really. I have to push myself to go out the house and do my shopping which I do at seven o'clock in the morning, so I don't see as many people..."

Gwen said that she finds going out overstimulating and irritating, she said, *"I tell you what I can't stand, is music in the shop oh Jesus Christ."* She also said, *"Since I've been ill with this [psychosis] I just want to be left alone, do what I want when I want to do it... I don't want to face people; they get on my nerves."*

Avoiding social situations was not the only form of avoidance behaviour exhibited by participants. It was commonplace for participants to feel unsettled where they live, with several sharing their experiences of moving around a lot and others

explaining their desire to move elsewhere (e.g., George, Fiona, Liam, Cai, Freddie). George described the range of place he had lived during his life and continued, *“But I kept on having breakdowns or distinct changes in thought. Yeah, there was, “I can do better than this”.”* Fiona talked about her experience of wanting to leave her local area, she said, *“many a times, I’ve said “look, can we just bloody move!” like “you’ll find a fault wherever we go, you’ll just keep running!”.”* Similarly, When Cai was asked whether he has always felt like he does not belong where he lives, he responded *“Yeah, I think so, I tried moving away...”*

Using alcohol and other drugs was another form of avoidance strategy that participants shared (e.g., Jack, Dewi, Alex, Alaw). Alaw said she had used *“illegal drugs”* and alcohol, and this had made her paranoia worse. Dewi explained, *“I drank a lot and that kind of gave me confidence in first year, but I drank a lot just to be able to settle in when you’re going out with them a lot, but it’s mostly just getting too drunk, you know so when I was sober, I found it difficult.”* Jack shared a similar experience:

“Interviewer: what was it like living in [place]?”

Jack: Oh, I was partying a lot...So my head was not screwed on there. I was, I was just like doing, partying, seshing, taking drugs and stuff...Now I’ve calmed down a lot more I’ve actually like sort of got into my own head to like think, to like, about nicer stuff and not just wanting to like go out and do stupid things”

Alex explained that he does not feel *“entirely safe”* because of his past experiences. He shared the actions he takes at home to alleviate his anxiety:

“Alex: I feel safer, I don’t feel entirely safe but um, because of what I’ve been through in my flat there in [place], I have to you know... I’m checking the door about twenty times, thirty times a night, I know it’s locked, but I’m having to check it’s locked. I’ve put CCTV cameras up, I’ve put signs up, CCTV in operation... do I feel safe? safer than what I used to...”

Some participants talked about freeze responses (e.g., Cai, Alex, Dewi, Sarah, Catherine). This encompasses *“camouflage”* responses whereby the participant attempts to detach themselves from the outside world, isolating themselves from others to protect themselves from further harm. For example, Catherine commented on her fear of negative judgement to the extent that she cuts contact with people whilst at home, she said, *“when I’m at home, like if somebody knocks on the door, I don’t answer...I switch off the phone, it’s just like...It’s easier just to stay out of it...”* Dewi shared his experience of isolating himself at university because of the language barrier

between him and his housemates at university, he said, *"I just completely pushed them away, I kept myself to myself because I found it so hard to communicate in English."* Similarly, Sarah talked about how she isolated herself from work colleagues because she had difficulty connecting with them, *"I'd had jobs where I'd gone and then I'd not really connected with the people or they misunderstood my character, they'd try to provoke me, so I felt very isolated, and I'd isolate myself from them."* Cai explained his use of "masking" to feign a sense of belonging. Masking is a term used to describe when a person adapts their behaviour to fit in and "camouflage" in their social environment:

"Interviewer: Do you feel a sense of belonging to your area?"

Cai: If I can put on a mask then yes, if I can't then no. In terms of masking, I mean masking all the disability all the mental health problems then I would, yeah, I would feel like I belong. But otherwise, not particularly."

Fawn and fight stress responses were not as commonly reported by participants. Fawn responses involve "people pleasing" behaviours and are used to appease another person and avoid conflict commonly at the expense of the individual own needs. Fiona alluded to the difficulties she faces because she is a "people pleaser":

"...even though like my heads completely telling me the opposite and I should make the effort. Erm, I just know it's an ordeal for me and if they are to be negative back then it's took personally. So, I tend not to try and focus on it, but being a people pleaser that kind of comes into the equation, as well."

Fight responses tend to involve reducing a perceived threat by demonstrating a sense of power and control, this could involve hostile or reactive behaviour. Liam and Freddie demonstrated some evidence of fight responses, for example, Freddie said that he would react in a similarly confrontational way towards anyone who approached him in a hostile way. When asked whether he feels speaking English in his local area affects his sense of belonging, he replied, *"I couldn't give a fuck"* and continued, *"they're snotty about English people so I really don't care...and if they wanted to be snotty with me about being English, I'll just tell them to shut up in Welsh or whatever."*

Similarly, Liam explained how he had prepared himself to deal with physical confrontation, he said, *"I think that's down to me, think... Knowing that if anything does happen, I'm prepared to deal with it...and that's given me the best confidence because, you're not worrying about it, it takes a weight off your shoulders... Whereas before I was quite bad. You had to deal with the what ifs and what would you do."*

Liam also described a hostile encounter he had with a person who had acted aggressively towards him in the past, he said, *“I made sure that he seen me, and I was staring at him, and he just would not look now.”* Reflecting on this behaviour, he said:

“But I think, if you’re like I don’t want people to mess with me and whatever, it can actually stop people coming towards you as well, kind of repel other people from coming or getting close to you...But it’s for a reason I had to do that, I think... it can intimidate others as well, like people that aren’t involved and they think like whys he got a chip on his shoulder but there’s an actual reason why I have, you know what I mean,”

Subtheme 3: Social connectedness

Participants from both groups talked about social connections and relationships that foster a sense of belonging and purpose. Establishing positive connections with others was viewed as challenging but essential for mental health. For example, Cai explained, *“I would find it much easier if people reached out to me first, yeah...reaching out to people is something I find very difficult.”* Sarah said, *“I’ve tried to convince myself, you know about the lack of need of external type of relationships, but I think having a sense of belonging is [important] yeah.”* Fiona said that efforts should be made to get people socially involved:

“I feel from kind of my learning experience, being connected to society is a huge part of acceptance and belonging and I think that’s something that I think as a mental health thing needs to be addressed. Because yeah, instead of just looking at the drugs or whatever, try and get people socially involved again...”

Similarly, Morgan explained, *“when you’re having mental health difficulties, that sense of belonging can seem a long way off when you’re really unwell but then, you know, the support that that sense of belonging can actually give you when you’re having a difficult time, I think is quite important, you know?”*

Contact with other people with lived experience of mental health difficulties was described as a particularly powerful source of social support by most participants (e.g., Hilary, Owain, Morgan, George, Lowri, Sarah).

When asked about his sense of belonging, Owain said that the charity organisation that supports him with his mental health *“is the only place [he] really thinks [he] belongs.”* He added, *“because all the people there, they all want the same goal...Everyone’s the same there and everyone’s like happy and it’s a really good*

place for help with my problem.” Similarly, Hilary noted, “I’m not really a group person but [group] is specifically for people with mental health problems.”

Participants talked about how attending a group with other people with mental illness had helped normalise their experiences psychosis and made them feel less alone. Morgan shared his experience of this:

“At the time I was really unwell and I wasn’t doing anything, I wasn’t getting out in the mountains at all and he [support worker] kind of took me to this sort of outdoor group, he kind of dragged me along to it and it was for people who have mental health problems...then I made connections with other people who had mental health problems for the first time really, outside of hospital and that’s been really beneficial so I’d say those contacts are quite important for me ...because, for a long time, because of my mental health problems, it’s very difficult sometimes to kind of relate to other people. But I now know other people who have experienced the same stuff as I do...which, it just makes you feel a bit less of a weirdo.”

Similarly, Sarah talked about a group that she attends that is also *“a place of support and chat.”* She explained, *“people share their own experiences and their struggles...you know, so you’re not completely isolated, it is a common thing, and there are people from different walks of life, and you can connect.”*

Fiona and Lowri talked about connections they have made through an online mental health community. After sharing her experiences online Lowri said, *“everyone saw it or read it and like the reaction was so like kind, I don’t know, it’s like the communities so much kinder than you often think”*. Fiona also shared her experience of online support groups:

“...with the condition it’s extremely isolating, it’s not something people talk about and I do now because when I first had psychosis, I stayed away from all internet etcetera etcetera, but I actually am a member now of a group and obviously I get to hear other people’s stories on that so it makes you think actually I’m not alone here, and I think that’s really important.”

Alex explained that he had found it difficult to find mental health support groups and had instead tried other avenues such as churches and spiritual groups. He said, *“there’s a lack of mental health support groups, I think, I feel in [place]. I don’t think there’s one running at the moment, of my knowledge.”* Alaw also noted that she felt she could

only talk about her diagnosis to her HCP, *“I talk to [name] about my illness but I won’t talk to a lot of people about my illness.”*

Participants also talked about having friends with shared experience of mental illness. For example, George said, *“I’ve got, probably twenty people around me with schizophrenia, manic depression, OCD, depression and it’s through late night telephone calls and discussions that we’ve sussed this out.”* George and Alex said that they have more of an affinity to the *“mental health community”* than any other form of social identity. Alex said, *“first of all, I identify most with the mental health community. If I see friends out, I just say hello to them and have a chat with them in the mental health community.”* Similarly, George commented, oh, *“I love my area...don’t get me wrong and I love the people in it. They get me through...But I’ve got more of a sense of being a part of a mental health community...which is global.”*

Participants also talked about the importance of connecting with people who have similar values and interests or attending groups that facilitate positive connections with others (e.g., Morgan, Liam, Sarah, Fiona, Katie, Alex). Morgan described his love of outdoor sports as *“an ingrained part of [his] life.”* When talking about meeting other people who share his passion, he said, *“people can instantly to relate to you and I can relate to them, you know.”*

Fiona talked about a walking group she attends and said, *“I have social anxiety, quite high, so doing it with someone that I feel I belong to in that group as well kind of takes the edge off.”* Sarah talked about the sense of belonging she derives from attending outdoor activity groups and her Welsh language classes, she commented, *“I feel a sense of belonging in my Welsh classes”*, she talked the positive experience of *“going to Welsh and meeting new people in the area and being connected.”*

All participants talked about the importance of their support networks for feeling a sense of belonging, including close relationships with family, friends and partners who accept and support them. Morgan commented, *“we’re very lucky to have supportive friends.”* Freddie and Liam talked about the value of having friends who share common interests, commenting on one of his friendships, Liam said, *“we share a lot of the same values and outlooks and stuff. I think cause its more dispersed down here, it’s harder to find, I think. I think once you do find it down here you appreciate it more I think.”* Alaw and Freddie talked about spending time walking in the outdoors with friends, for example, Freddie said, *“I’ve got a few friends they like to be outdoors you know, do outdoor things...walking up the mountains...there are a few people like*

that that I'd say that I have quite a bit in common with."

Morgan and Lowri talked about the comfort and familiarity they get from spending time at home with family. Lowri said, *"I'm just so grateful that I'm home with my family and stuff...yeah, so that, for me that's like, feeling like I belong... Yeah, just like, that it's my room, and it's like our house and its cosy and when you belong, you're just surrounded by people that love you...like you don't have to be someone else, you can just be relaxed around people you belong with, it's a good feeling."*

While participants talked about dwindling support networks after they experienced psychosis, some commented on a positive aspect to this - Morgan said, *"through my mental health problems, I've actually found out who my real friends are"* and Fiona noted, *"you kind of find out who the real golden ones are that accept you as you are and make you feel that you belong, which I think is really important."*

3.4 DISCUSSION

3.4.1 Summary

Group density studies have found that living in an area where a high proportion of the population differ based on a socially salient characteristic has been identified as a risk factor for psychosis but the social processes behind this are not well understood. This study is the first to qualitatively explore the subjective experience of group density from the perspective of individuals experiencing psychosis who are either similar or dissimilar to their local area based on their dominant language. This provides a window into the possible mechanisms behind group density associations.

The common thread throughout this study was the experience of exclusion and the various ways that participants made sense of this. The experience of not belonging and feeling like an outsider appeared to be more common in the non-Welsh speaking participants. For many of whom, living in an area with a high proportion of Welsh speakers was an uncomfortable experience and this was often the reason that they attached to their feelings of exclusion. For Welsh speakers, their Welsh identity and ability to speak Welsh was considered protective and a way of fitting in and belonging to their community – pointing to possible protective mechanisms involved living in high own group density areas.

Participants also felt like outsiders because of other components of their identities, namely, their lived experience of psychosis, their appearance, or another minority position *i.e.*, non-White British status or sexual minority status. Participants employed strategies to protect themselves from the negative psychological consequences of not belonging. These included attempts to construct a positive and stable social identity, engaging in safety behaviours, and establishing positive and meaningful connections with others.

This study adds to a growing body of experiential research exploring how individuals with psychosis navigate their social milieu (Freeman *et al.*, 2015; Söderström *et al.*, (2016 Stanghellini *et al.*, 2020). This can help to shed light on possible processes behind the development and maintenance of experiences of psychosis.

3.4.2 Power threat meaning framework

The themes derived from this study can be understood within the Power Threat Meaning Framework [PTMF]. To understand mental distress, the PTMF considers the

ways in which power is operating in a person's life and focusses on how they make sense of and respond to this (Boyle, 2022). In line with evidence supporting the psychosis continuum (van Os *et al.*, 2009), The PTMF views behaviour which might be viewed as unusual or "abnormal" as existing on a continuum with "normal" functioning (Johnstone *et al.*, 2018). The PTMF highlights the importance of subjective experience and the meaning that the individual attaches to their experiences. The framework also notes that people are "inseparable from their material, social, environmental, socioeconomic, and cultural contexts" and therefore their distress should be understood within the context of their social environment (Johnstone *et al.*, 2018, p.183). See Figure 4 for how themes are organised within the PTMF.

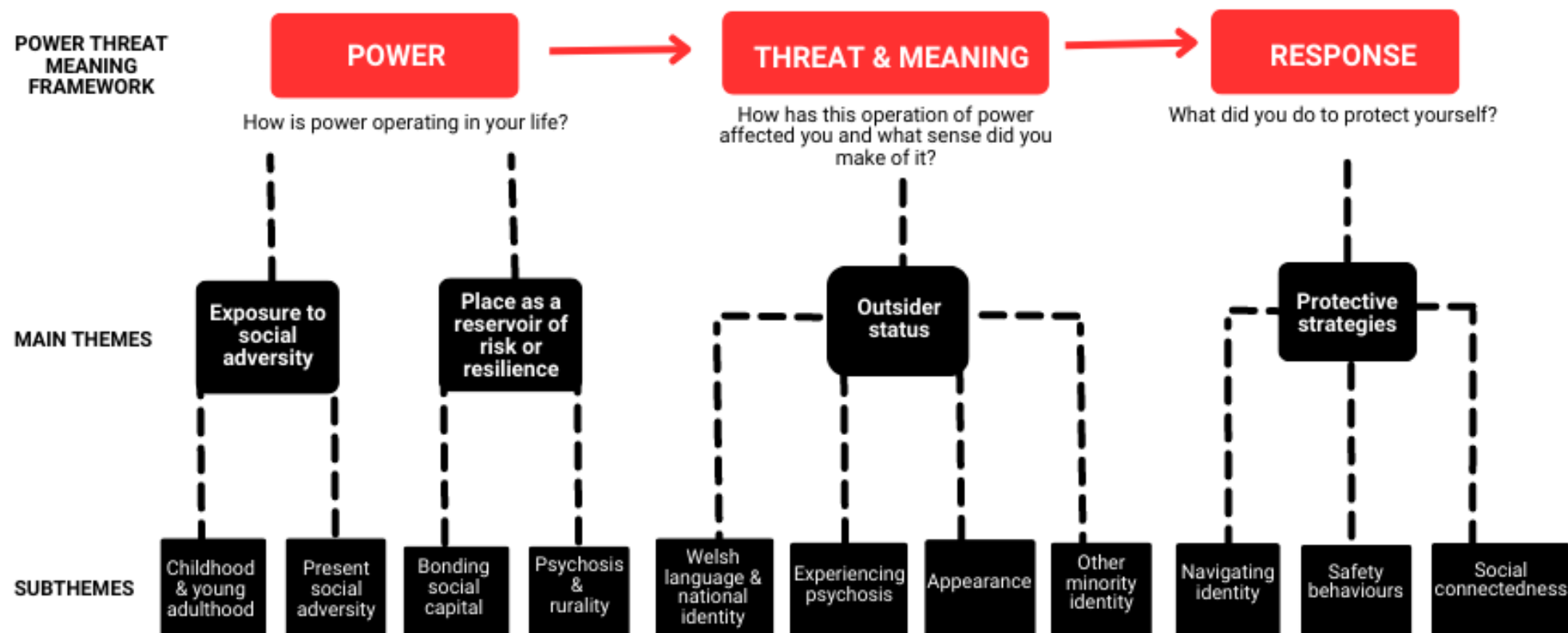


Figure 4. The four main themes and eleven subthemes organised within the Power Threat Meaning Framework.

3.4.3 Power

The “Power” aspect of the PTMF relates to the question, “What has happened to you?” This encompasses two themes, “Exposure to social adversity” (Theme 1) and “Place as a reservoir of risk or resilience” (Theme 2). Participants revealed the positive and negative operation of power in their lives in the form of experiences of social adversity and trauma, their perceived access to community social capital, and through their experiences living in a rural environment.

Past and present social adversity

All participants alluded to experience of social adversity or trauma (Theme 1). Participants talked about their experiences of bullying, victimisation, social isolation, stigma, or living in deprived conditions (Subtheme 1). The negative impact of adverse experiences on participants’ sense of belonging, self-esteem and feeling of control over their life appeared to persist into later life (Subtheme 2), with many feeling that their adverse experiences had shaped their negative perceptions of themselves and other people.

Participants talked about a general sense of feeling different, some felt like they have and always will be an outsider, as captured by Morgan’s comment, *“I always felt like an outsider...so, in terms of the community around here, I’ve never felt a particular sense of belonging.”* It was common for participants to feel mistrustful or suspicious of the intentions of others because of their past adversity and trauma, and others talked about how their repeated experience of life stress had made them feel less in control of their life, as captured by Freddie, *“I was more in control of my mind instead of being overrun by people and their opinions.”*

This chimes with the evidence base on the relationship between social adversity and psychosis – particularly the literature around experiences of psychosocial stress and the development of negative schemata (Howes & Murray, 2014; Humphrey *et al.*, 2021; Longden & Read, 2016). Many of the participants’ experiences related to early experiences of alienation and rejection which might have led to the development of negative schemas about the self and others, for example, beliefs that the self as vulnerable or worthless, and others as dangerous or having malicious intentions (Humphrey *et al.*, 2021).

Bonding social capital

The second theme “Place as a reservoir of risk or resilience,” captured the ways in which participants’ lived environment either precipitated social stress or was protective against it (Theme 2). The first sub-theme related to social capital, more specifically, bonding social capital (Subtheme 1). Generally, non-Welsh speakers were aware of social capital in their area, viewing their communities as “*close-knit*” and supportive of one another, however to many participants, social capital was perceived as inaccessible to them. This sense of exclusion contributed feelings of not belonging and “outsider status.” However, the Welsh speaking group more often viewed the closeness of their community favourably and felt they had access to supportive community networks – though this was not the case for all Welsh speaking participants (*e.g.*, Morgan, Cai, Owain).

What was described by participants was characteristic of bonding social capital (Putnam, 2000), but more frequently, Welsh speakers viewed themselves as part of the ingroup while the non-Welsh group more commonly thought of themselves as outsiders. For participants who perceived exclusion from social capital whilst observing the togetherness of their community from the perspective of an outsider looking in is perhaps especially harmful.

Social capital is thought to “buffer” social stress and is therefore protective to those who have access to it (Kirkbride *et al.*, 2008). However, as Putnam, (2000, p.21) states, “networks and the associated norms of reciprocity are generally good for those inside the network, but the external effect of social capital are no means always positive.” This relates to the “dark side” of social capital (Putnam, 2000) – while bonding social capital is protective to those who have access to it, because of its inward looking and exclusive nature, it is thought to impose greater risk to individuals who perceive exclusion from these networks of support (Kirkbride *et al.*, 2008). Interpreting their mixed findings surrounding the relationship between social capital and psychosis risk, Kirkbride *et al.*, (2008) suggested that areas with high social capital may be more ostracising for other social groups, such as minority groups, who are already at increased risk of psychosis, further exacerbating their sense of “outsider status.” In line with this, using neighbourhood sense of belonging as a measure of social capital, Saville (2021) found that area social capital only had protective mental health associations in people with high individual-level social capital, in those with low individual social capital the relationship was negative.

Findings are in line with Whitley *et al.*, (2006) who found that ethnic minority groups believed they had little in common with the majority group and felt excluded from community networks. It may be that this sense of exclusion is experienced more acutely by individuals with psychosis who might have existing negative self and other schemas (Freeman *et al.*, 2002). Further, persons with psychosis might already feel a sense of detachment from others which may be exacerbated by perceived or actual exclusion from community social capital. For example, the EAWWE describes “a sense of remoteness from others” as a typical experience of individuals with psychosis, which is described as, “feeling of being separate, apart, cut off, or profoundly out of touch with other people, of being uninvolved and observing others from a distance, like a detached spectator, without feeling or spontaneous emotional connection” (Sass *et al.*, 2017, p.27). Parallels can be drawn with the accounts of participants in the present study (*e.g.*, Morgan, Catherine, Cai, Freddie).

Finally, while both groups talked about experiences of feeling excluded, the non-Welsh group tended to describe their exclusion as more overt and antagonistic, for example, unwelcoming body language, being deliberately excluded in social settings, the belief that others were talking about them, or people acting unfriendly or abusive towards them. While some Welsh speaking participants did report some similar experiences (*e.g.*, Owain and Alaw), these sorts of reports of hostile treatment were less common in the Welsh speaking group. This is perhaps indicative of increased paranoia in the non-Welsh speaking group which is in line with a study finding that that social identity was protective against paranoia, via increased self-esteem (McIntyre *et al.*, 2018).

Again, these experiences bare a resemblance to items relating to perception of non-verbal communication in the EAWWE, for example, a typical response was, “I would really be overly attentive or critical or curious of body language. Like...if I happened to be walking toward someone and they were moving away, I might take [it to mean that] they were [intentionally] moving away from me. [unpublished data]” (Sass *et al.*, 2017, p.27). This is similar to experiences shared by non-Welsh speaking participants in the present study, *e.g.*, “*people’s body language can be quite bad, staring at you, giving you dirty looks and stuff... people not using their manners and stuff like that, people being cold and cut off*” (Liam) “*It’s a close-knit community, they have nothing to talk about and if you’re not from here, they talk about you*” (Freddie) “*I’ve picked up on their kind of sort of like...they’re side eyeing me*” (Katie).

Psychosis and rurality

The second subtheme of Theme 2, “Psychosis and rurality” pertained to participants’ experiences living in a rural environment. Given that the group density evidence-base is largely centred around ethnic minorities in urban environments, this study offers new insights into the subjective experience of group density in a rural context. When discussing their experience of living in a rural community, participants often weighed up their experiences up against what they thought their life would be like in a city. The anonymity afforded by urban living was viewed as appealing by several participants, *e.g., I think I prefer being in a city because people are doing their own stuff...they’re not like, sticking their nose in your business* (Freddie) and *there’s the anonymity of [city] where people just go their own way...* (Sarah). However, participants also perceived cities as busy and intimidating. This is akin to participant excerpts from Söderström and colleagues’ study whereby crowdedness was viewed as having both stress-inducing and protective properties because it allowed participants to remain anonymous in a crowd, “I like to immerse myself like an ant in the crowd [...] I like to hear the noise of the crowd, the musicians playing, hum... in fact I like feeling alone but surrounded. I feel I belong to society, but without being too exposed (Laure)” (participant excerpt taken from Söderström *et al.*, 2016, p.108)

Whilst cities are generally thought of as more stress-inducing and therefore more psychogenic (Heinz, Deserno & Reininghaus, 2013), participants in the present study discussed aspects of living in a rural community that they found harmful. As noted by Cai, “*you can’t live anonymously in this community, definitely not, everybody knows you.*” This sense of “*everyone knowing everyone*” which is characteristic of small town and rural living was perceived as intrusive and claustrophobic by participants in both groups. Participants also talked about the unpleasant nature of others “*gossiping*” in their local area, particularly after “*hearing something that’s not going on well in someone’s life*” (Sarah). Some talked about feeling “*judged*” and “*stigmatised*” after returning home following a hospitalisation, feeling as though everybody knew about their mental health crisis. Others talked about how living in a quiet and isolated community had made them feel less in control of their voices (Morgan) and anxious about their safety (Catherine) while younger participants talked about the lack of social opportunities and career prospects (*e.g., Liam, Dewi, Owain*) and negatively evaluating themselves against their peers who had “*moved on, moved out and achieved*” (Cai). It seems feasible that these experiences could feed into

negative self and other schemas and fuel experiences of psychosis (Freeman *et al.*, 2002; Humphrey *et al.*, 2021).

For individuals living in a rural community where they differ to others in their locality based on a socially salient characteristic, it could be argued that in some ways this might confer greater social stress than the experience of low own group density in an urban context. As reflected in the present study and elsewhere bonding social capital is higher in rural communities (Sørensen, 2016). Individuals who perceive themselves as different to their community in some sense might feel like these differences are magnified living in an area where everybody knows everyone and where community ties are exclusive and reinforcing of exclusive identities (Putnam, 2000). In turn making the individual feel even more “singled out” in their community (Boydell *et al.*, 2001). On the other hand, in cities, living in a low own group density neighbourhood might be a similarly stressful experience, but cities are more diverse and offer a wider range of social encounters so there is arguably greater opportunity and means for individual to find others they relate to outside of their immediate area.

This is reflected in Whitley *et al.*, (2006) – participants from minoritised ethnic groups living in a predominantly White British area of London explained how they would travel to surrounding areas that had culturally specific services and facilities which provided opportunities to socialise with others in their preferred language. That said, just because there is greater opportunity to connect with others in cities, this is not necessarily capitalised on by individuals with psychosis, in fact, epidemiological evidence has indicated that more urban areas are associated with fewer social contacts in persons with psychosis (Giacco *et al.*, 2021).

This study has also shed light on some of the characteristics of rural living in that are protective in individuals with psychosis. Many spoke about the sense of belonging they derive from the landscape, with some highlighting their affinity with the physical place but not the people who lived there (*e.g.*, Freddie, Katie, Liam). Participants talked about the therapeutic effects of being around nature, particularly the mountains and the sea, as well as the opportunities for outdoor activities that their location afforded them. This was particularly important for Morgan who said that the only time his voices subside is when he is engaging in outdoor activities. This is in line with studies linking access to green and blue space with reduced risk of psychosis (Engemann *et al.*, 2018; Rotenberg *et al.*, 2022) as well as the growing evidence highlighting the benefits of “adventure therapy” for persons with psychosis which

encompasses a wide range of activities carried out in the natural environment, including hiking, camping, and sailing (Rapsey & Pilcher, 2022).

3.4.4 Threat and meaning

The “threat” component of the PTMF relates to the question, “how did it affect you?” and the meaning part of the framework, “what sense did you make of it.” These components of the framework relate to the theme, “Outsider status” (Theme 3). The “Threats” are the negative psychological consequences of the participants’ experience of exclusion in their community – this includes perceived negative judgement from others and feeling like an outsider. The “Meaning” aspect relates to how participants’ made sense of these experiences, for example, by attributing their exclusion to a perceived difference between themselves and others *i.e.*, “I am an outsider because...”

Language and national identity

The first subtheme relates to feeling like an outsider because of some combination of national identity not being able to speak Welsh (Subtheme 1). The experience of not belonging and feeling like an outsider appeared to be more common in the non-Welsh speaking participants. While the categorisation of Welsh speakers and non-Welsh speakers was perceived as socially salient by both groups of participants, for many of the non-Welsh speakers, this social division appeared to present a threat and was commonly cited as the reason for their exclusion *e.g.*, “*I was still treated as the English outsider and just not accepted at all by them...*” (Catherine). This is somewhat consistent with the accounts of the Welsh speaking participants, *e.g.*, “*...it was so obvious who wasn’t from the area because they didn’t speak the same language, they would be a bit like outsiders*” (Lowri).

It has been suggested that the relationship between minority status, identity and social capital becomes more complicated when examining linguistic groups at a more local level. Findings from the present study are theoretically interesting in this regard. While the English language is the higher status language in the sense that it is associated with “greater power, prestige, influence and/or communicative reach” (May, 2012, p.1), In the context of high-density Welsh speaking communities, Englishness and speaking English was viewed less favourably by participants while the Welsh language was held in higher esteem, perceived as higher status and as an important antecedent of belonging to a Welsh speaking community. So, while the English language is, clearly, the more “powerful” language, non-Welsh speakers living

in an area with a high proportion of Welsh speakers felt that their linguistic status signalled them as an outsider in their local area which gave rise to negative social comparisons. Living in a lower own linguistic group density community appeared to be a powerful way in which social identity could be destabilised.

It has been argued how these experiences might be more harmful to individuals with psychosis, but it is important to note that similar views have been shared by individuals who do not have mental health difficulties (Williams, 2009). For example, many of the accounts shared by interviewees in the present study echo those shared by participants in Williams (2009) qualitative study of Welsh and non-Welsh speakers living in Caernarfon, a predominantly Welsh speaking community. In this study, language was also viewed as a salient marker of ingroup/outgroup status, with some non-Welsh speakers perceiving this as the reason they are not as accepted in their Welsh speaking community. Like in the present study, some participants used the term “racism” to describe this perceived intergroup hostility.

Similar to Williams (2009), participants in the present study shared similar views about the increasing Anglicisation of Welsh speaking communities – some concerns appeared to be related to the threat this poses to the Welsh language and others alluded to the second home ownership issue. Many of the Welsh participants’ views on English incomers appeared to come from a place of anxiety about what this means for Welsh people and communities (*e.g.*, Lowri, Alaw), but for one participant, this manifested as a strong anti-English sentiment (Gwen).

Several participants in the present study alluded to issues of language and power, *e.g.*, “*the English brain*” and the “*Welsh heart*” (George), “*I sort of don’t like this pedestal that English is put on where it’s kind of like intelligence is associated with being able to speak English well*” (Sarah), Lowri talked about a “*even split between the poorer side and the richer side,*” whereby the richer people “*look down*” on the poorer people. The English outgroup was commonly perceived as the more affluent group whose presence was often detrimental to Welsh communities. Some non-Welsh speaking participants felt that their communities perceived the English language as “*posh*” and stuck-up and felt this had been a reason why they had been negatively judged *e.g.*, Catherine felt she had experienced “*prejudice*” because of her “*neutral English accent.*” The use of the word neutral here underlines the cultural power of the English language over the Welsh language, even as the participant explains her powerlessness. This is a demonstration of the ambiguous balance of

power between the English and Welsh speakers which appears to become more of a salient issue when explored in the context of a predominantly Welsh speaking community. Again, this is akin to experiences reported by participants in Williams (2009), *e.g.*, “...John talked to him in his- uh- sort of London sort of accent, and Huw turns round and goes “Oh, you’re English” and he goes “I think you’re a bit too posh to work in a place like this, you talk with a plum in your mouth... (participant extract taken from Williams, 2009, p.80).

In line with Selten and colleagues (2005, 2013, 2023) social defeat hypothesis, the social comparison component of the social identity approach (Tajfel & Turner, 1979) status anxiety (Layte & Whelan, 2014), and other related theoretical frameworks (Dickerson, 2008; Collins *et al.*, 2005; Marmot, 2004), the experience of living in a linguistically dissimilar community could contribute to the development and maintenance of psychosis in the non-Welsh speaking group.

Potential pathways might involve reductions in self-esteem (McIntyre *et al.*, 2018) and increased anticipation of threat (McCutcheon *et al.*, 2018; Reininghaus *et al.*, 2016) resulting in increased paranoia. Studies also point to potential emotional and cognitive approaches involved – outsider status could trigger anxiety and negative schemas about the self and others, and jumping to conclusions bias (Ellett, Freeman, & Garety, 2008; Lincoln *et al.*, 2010; Pot-Kolder *et al.*, 2018). Indeed, in line with jumping to conclusions, the English/Welsh group distinction did seem to be a salient social heuristic that non-Welsh participants used to position themselves as outsiders in their communities, *e.g.*, Freddie explained a sense of standing out and feeling different to others in his community, when he was asked why, his first response was “*Because I’m English...*”

Participants accounts also pointed to another potential risk factor relating to the linguistic context. Some interviewees who reported having little to no proficiency in the majority language. Some non-Welsh speakers felt that Welsh was purposively used to exclude or antagonise them (*e.g.*, Liam, Freddie) and Liam found the language barrier particularly disorientating, *e.g.*, he likened it to “*watching a Chinese film without subtitles*” adding, “*there’s no point in even trying to understand it...*” Some Welsh speaking participants also felt that not being able to speak Welsh in their community could be intimidating, particularly for someone with psychosis, *e.g.*, Cai said this experience would be “*frightening.*” Challenges relating to language barriers were also shared by Welsh speaking participants (Dewi, Owain). Dewi felt excluded

at university because he lacked proficiency in English at that time. He also explained how it is more difficult to talk about his mental health to healthcare professionals when he uses his second language. For Owain, his experiences were notably different from the rest of the Welsh speaking participants. He felt like his status as a Welsh speaker signalled him as an outsider in his community even though he lives in a Welsh speaking area. Owain explained how he felt much more confident communicating in Welsh than English. It might be that English incomers might be perceived as a greater threat to individuals who have limited proficiency in English, perhaps exacerbating paranoia.

While there has been a dearth of research examining language barriers as a risk factor for psychosis. Some studies have drawn parallels with the literature on deafness and paranoia – It is proposed that the experience of not being able to understand the social world around us makes it more likely for the thoughts and intentions of others to be misinterpreted as threatening, and thus confer risk of paranoia (Thomas *et al.*, 2017; Thewissen *et al.*, 2005). Other relevant evidence comes from Hoffman (2007, 2008) who interviewed voice hearers about their experience preceding the onset of their hallucinations – the majority of individuals reported extended periods of social isolation and lone travel to a country where they did not speak the language was described a typical example. Not being able to speak the language of one's community also introduces barriers in terms of accessing social capital. This was alluded to by some of the participants, noting that not being able to speak Welsh would make it more difficult to engage in some community activities *e.g.*, “*If you spoke English, you couldn't really get involved with the community in the same way because it was through the medium of Welsh*” (Lowri).

Other identity characteristics – psychosis, appearance, non-White British status, and sexual minority status

While the linguistic difference did appear to be the most salient marker of ingroup and outgroup status, it is important to note that participants also talked about feeling like an outsider because of other facets of their identities, including their experience of psychosis (Subtheme 2), their appearance (Subtheme 3), and other minority positions *i.e.*, sexual minority status and non-white British status (Subtheme 4). Most talked about their experience of psychosis and how this made them feel different from others which made it difficult for them to feel they belong *e.g.*, Katie defined belonging as

feeling connected to other people and her environment, but she added, “[*belonging*] is very difficult for people like me because we feel so disconnected from reality.” For George, he felt it was “*the mental illness, not the Englishness*” that signalled him as an outsider in his community.

In line with “*feelings of social paranoia or social anxiety*,” reported in Sass *et al.*, (2017, p.27), a common thread through all the interviews was a strong concern about being negatively judged, whether this be because of language or national identity or some other identity characteristic, *e.g.*, “*I struggle from day to day to get from A to B because I don’t feel that connection to the world and I feel judged all the time...*” (Fiona) “*I always think the interactions are not going to be nice or useful or they’re going to judge me, they’re not going to like me. They’re going to not like me because I’m English, or not like me because I’m fat, or not like me because I’m crazy, or not like me because of this or that.*” (Catherine). This is perhaps a key mechanism behind group density associations in psychosis – for individuals living in an area where there are fewer other people like them, this is perhaps a potent reminder of one’s position as an outsider, possibly amplifying existing negative evaluations of the self in relation to others. This would also explain why mental health group density relationships extend to other salient identity characteristics *e.g.*, social class and political affiliation (Saville, 2020; Saville & Mann, 2022).

3.4.5 Response

The “response” part of the PTMF relates to the question, “what did you do to protect yourself” and relates to the theme “Protective strategies” (Theme 4). This encompasses the strategies taken by the participants to protect themselves of the negative psychological consequences of not belonging.

Navigating identity

This subtheme relates to the measures taken by the participants to construct a positive and stable social identity. For non-Welsh speakers, this often involved grappling with Welsh and English identities finding it difficult to establish a sense of belonging to either group. To address this, they either redrew the boundaries of identity to position themselves as part of a wider ingroup or rationalised their position as an outsider – often by highlighting their incompatibility with the other group. For Welsh speakers, the prevalence of Welsh speaking was commonly viewed as protective and identity affirming. The strategies taken by Welsh participants were more concerned with

protecting the boundaries of their group by defining what it means to be Welsh.

Parallels can be made with Berry's four acculturation strategies – integration, separation, assimilation, and marginalisation (Berry, 1980, 2005) which relate to how a person navigates their identity when their cultural background differs to that of the majority where they live. Individuals with integrated identities strongly identify with both their minority identity and the majority identity. In those with separated identities, the minority identity takes precedence over the majority identity. Persons with assimilated identities identify more strongly with the majority identity than their minority identity. Finally, individuals with marginalised identities fail to identify with their minority identity or the majority identity.

A case control study of ethnic minorities in the Netherlands found that individuals with psychosis were more likely to have marginalised or assimilated identities and lower self-esteem than control participants. Further, compared to controls, participants who went on to develop schizophrenia had more negative views of their minority group in the year preceding the onset of their illness (Veling *et al.*, 2010). These findings were replicated in a study by El Bouhaddani *et al.*, (2019).

This points to a potential mechanism behind the risk of low own linguistic density in the non-Welsh speaking group – marginalised identities i.e., feeling “trapped between two cultures and alienated from both” (McIntyre, Elahi, & Bentall, 2016, p.622.) appeared to be common amongst this group. For example, Catherine's quote was archetypal of a marginalised identity, “*I don't know whether I'm Welsh or English ...I don't know where home is.*” For Sarah, difficulties navigating her identity appeared to manifest in her experiences of psychosis, “*I'm not sure why that came up in the psychosis, if it was just a breaking down of identity or different themes as to where, like if I'm trying to fit, where do I fit?... I was a bit of an enigma in a place.*”

On the other hand, for many of the Welsh speaking participants, living in high density Welsh speaking areas was perceived as protective and identity strengthening, for example, when asked about her experiences living in a Welsh speaking community, Alaw responded, “*Yeah, that is good, it makes you feel in a way, more Welsh if you know what I mean...*”. That said, some Welsh speakers also appeared to have difficulties negotiating their identity, e.g., Morgan derived a sense of belonging from his position as a first language Welsh speaker but felt that strong Welsh nationalist political views in his local area created a “*bit of a disconnect*” between him and his community, adding, “*that sort of negative attitude towards them [English people], I*

find that very, very difficult and I've always wanted to distance myself from it...and because of that, that actually does set you apart you know...that's the one thing that really stands out in that respect for not belonging."

The identity strategies employed by participants can also be understood within a social identity approach framework (Tajfel & Turner, 1979). Humans are intrinsically motivated to identify with social groups from which they derive a sense of belonging, meaning and purpose (McIntyre *et al.*, 2018). Having a sense of belonging is also important for self-esteem – a key protective factor for mental health (Baumeister & Leary, 1995; Haslam *et al.*, 2009). Part of this process involves evaluating their group in relation to others. If this results in the positive distinctiveness of the individuals' group being compromised in any way, this introduces a sense of identity threat (Hornsey, 2008). Identity threat appears to be present in both groups of participants. In non-Welsh speaking participants this is related to the perception of a salient part of their identity being negatively judged and in the Welsh speaking group it appears to be related to concerns over the anglicisation of their local area and what would mean in terms of their sense of belonging, the Welsh language, and other community issues *e.g.*, English second home ownership “*squeezing out*” local people (*e.g.*, Gwen, Lowri).

Different strategies were taken to address identity threat and one factor that influences this is the perceived permeability of the boundary between the ingroup and the outgroup (Lalonde & Silverman, 1994). Some non-Welsh speakers appeared to view the boundary as permeable and took measures to identify with the ingroup Welsh group, these included learning Welsh and distancing themselves from Anglocentrism. This also included creating a larger ingroup that transcended identities based on language or national identity – sometimes this involved shifting the focus to another threat to this larger ingroup *e.g.*, rising immigration, crime, or Covid-19. However, for other non-Welsh speakers, they employed an “othering” strategy whereby they ascribed negative attributes to the Welsh ingroup to rationalise their position as an outsider (Hornsey, 2008; Søråa *et al.*, 2020). This sometimes involved resentment towards the Welsh language (*e.g.*, Catherine, Sarah) or stereotypical notions about the Welsh and English (*e.g.*, Liam, Freddie), *e.g.*, the former as closed-minded and inward looking and the latter as more educated and progressive (Brooks, 2017; Saville, 2021).

The Welsh group tended to map out the boundaries of their identity – making a clear distinction between the ingroup and the outgroup – separating themselves from

the negatively judged English outgroup (e.g., Morgan, Gwen, Lowri). This involved ascribing positive characteristics to the ingroup, e.g., highlighting Welsh values and strength, particularly in the face of past English oppression. Being born and raised in Wales and having strong family ties to one's community were also viewed as important requisites to Welsh identity. Speaking Welsh was viewed as way of affirming identity and bolstering sense of belonging, as described by Morgan, *"You're a member of the Welsh speaking club and it sort of sets you apart from the rest of Britain."*

Safety behaviours

This subtheme relates to the behaviours participants carried out to protect themselves from harm – these could be grouped under flight, freeze, fight, and fawn stress responses. Flight responses were the most common amongst interviewees and this typically involved avoidance of situations that participants believed would be anxiety inducing. There were a range of reasons participants gave for their avoidance, these included concerns over social interaction, not trusting others, fear of judgement and feeling overstimulated in crowds and busy places. Some noted that being around other people they do not know exacerbates their voices e.g., *"I experience voices at different levels sort of most of the time...when I go into social situations where I don't know people or there's a lot of people, then that stuff gets much worse...And I feel it makes me extremely anxious"* (Morgan). Other avoidance strategies included alcohol and drug use, OCD behaviours and transitory living, e.g., *"many a times, I've said "look, can we just bloody move!" like "you'll find a fault wherever we go, you'll just keep running!"* (Fiona). Participants also exhibited freeze responses, which included social withdrawal e.g., *"when I'm at home, like if somebody knocks on the door, I don't answer...I switch off the phone, it's just like...It's easier just to stay out of it..."* and masking behaviours, for example, when Cai was asked whether he feels a sense of belonging, he responded, *"If I can put on a mask then yes, if I can't then no. In terms of masking, I mean masking all the disability all the mental health problems then I would, yeah, I would feel like I belong. But otherwise, not particularly."* Finally, less commonly, participants exhibited fight responses, for example responding to perceived threat in a hostile manner (e.g., Liam, Freddie) or fawning responses, e.g., Fiona described herself as a *"people pleaser."*

Safety seeking behaviours have been a core focus in theoretical models of anxiety and panic disorders (Beck, 1963; Clark 1986) but they have also been found to be important in the development and maintenance of experiences of psychosis – for a review of the relationship between safety behaviours and psychosis, see Tully, Wells & Morrison (2016). In line with this review, avoidance was the most common safety behaviour exhibited by individuals with psychosis, Tully, Wells & Morrison (2016) cited studies by Freeman and colleagues that reported that avoidance was exhibited by 92% of participants in one study and 78% in a later study (Freeman *et al.*, 2001, Freeman *et al.*, 2007).

Safety behaviours are thought to maintain symptoms because the individual becomes trapped in a negative reinforcement contingency whereby engaging in the behaviour offers brief alleviation of anxiety but at the same time prevents future opportunities for the individual to encounter a situation that would disprove the perceived threat (Tully, Wells & Morrison, 2016). In the context of living in a low own group density area, this could result in the maintenance of experiences of psychosis – the individual might avoid the outgroup due to perceiving them as a threat, but in doing so they will not experience interactions that provide evidence to the contrary. Indeed, some participants reported that once they had built the confidence to engage with people in their local area, they had established positive relationships *e.g.*, Katie said, “*once I made that effort people were nice. You know, my next-door neighbours are absolutely lovely... I like chatting with them and stuff...once I got used to it, I didn’t feel so anxious and afraid... people are nicer when you make the effort, they’re nice, you know.*”

Social connectedness

Finally, this subtheme pertains to the social connections and relationships that participants found protective. Participants recognised the importance of social connection but establishing positive relationships was considered difficult for most. This is in line with studies that have found that individuals with psychosis generally have smaller social networks and find it more difficult to establish and maintain social connections (Palumbo *et al.*, 2015).

Being socially connected is important because it provides a source of self-esteem and buffers social stress – for individuals with psychosis having social networks has been found to be protective and is associated with reduced symptom

severity and negative symptoms specifically (Degnan *et al.*, 2018). Social isolation has been found to be particularly harmful for psychosis – studies have identified a vicious cycle of social isolation and psychosis whereby the individuals’ psychotic experiences cause them to isolate themselves and in turn, the isolation exacerbates their psychosis (Xanthopoulou *et al.*, 2022).

There has been no exploration of the relationship between group density and social support in individuals with psychosis. Looking CMDs, Das-Munshi & colleagues (2010) found some evidence that minoritised ethnic groups experience increased social support in higher own group density areas.⁴⁶ This could potentially be a protective mechanism for the Welsh speaking group – while both groups reported difficulties concerning their support networks, Welsh speaking participants tended not to move around as much as the non-Welsh speaking participants and more often spoke of family and friends living nearby.

Participants from both groups spoke of the therapeutic value of sharing their experiences with other individuals with mental health difficulties, this included having friendships with other individuals with mental illness, online forums, and spaces and groups where they can communicate with other people with similar experiences. Interviewees talked about how helped to destigmatise their experiences and feel less isolated. This is in line with the growing evidence for therapeutic approaches which focus on normalising experiences of psychosis and building support networks, *e.g.*, open dialogue and the hearing voices movement (Galbusera & Kyselo, 2017; Longden, Read & Dillon, 2017).

3.4.6 Strengths and limitations

A fundamental strength of this study is its unique contribution to addressing a significant gap in the literature. No prior studies have conducted a qualitative study to explore the experience of group density from the viewpoint of individuals with psychosis. This study offers a distinctive perspective on group density by exploring the dynamics of identity and belonging within linguistic communities situated in rural environments. This is particularly noteworthy as existing evidence predominantly

⁴⁶ Higher own group density was associated with increased social support in a combined minoritised ethnic group sample. Associations were most consistent for the Bangladeshi and Irish groups. However, group density associations were not mediated by social support.

comprises studies focused on racially minoritised groups within expansive European urban settings.

The themes derived from in-depth interviews have shed light on potential social mechanisms underpinning group density relationships. Moreover, the study perhaps indicates that group density associations traditionally observed in racially minoritised and marginalised groups, may extend to linguistic identities, possibly operating through similar processes related to identity, status and belonging. These findings open promising avenues for future studies. However, these results should be considered in light of their limitations.

It was beyond the scope of the study to determine whether participants' experiences of their local area caused or precipitated⁴⁷ their psychosis. Specifically, it is unclear whether the described stressful experiences were more causally related to the onset of their psychosis or if these experiences provide more insights into current stressors, which could be useful for understanding possible risks of relapse. It is also important to mention that similar experiences to those shared in the present study have been reported in a non-clinical sample (Williams, 2009). The present study acknowledges the complexities surrounding the experience of low own group density and suggests that individuals with psychosis may exhibit heightened sensitivity to perceived differences, potentially interpreting such distinctions as more pronounced threats. To summarise, this qualitative study cannot answer questions about causality as it is inherently unable to indicate causal relationships. The purpose of this study was to identify themes that could serve as a foundation for developing theories and hypotheses about possible social processes involved in group density phenomena in a linguistic context. These findings provide valuable insights for the quantitative analyses in Chapter 4, as well as for subsequent studies that could utilise methods that are able to indicate causal mechanisms.

Another point to consider is that, due to the qualitative nature of this study, strict eligibility criteria related to specific diagnoses were not applied. Participants varied in their experience of psychosis, some had experienced their first occurrence, while others had more established psychosis. Diagnoses included schizophrenia and

⁴⁷ Psychosis precipitation refers to the triggering or exacerbation of psychotic experiences in individuals who are already at risk of psychosis or have established psychosis. On the other hand, psychosis causation implies that the factor in question had a causal or direct role in the development of the psychotic experiences.

bipolar disorder, amongst others. Similarly, while the study was particularly interested in the experiences of Welsh and non-Welsh speakers living in pockets of “Y Fro Gymraeg” with especially high rates of Welsh speakers, participants were still included if they lived communities within this area with comparatively fewer Welsh speakers. Non-Welsh speakers were also eligible to participate if they spoke Welsh as a second language or were learning Welsh. Another note pertaining to inclusion criteria is that this study only examined the experiences of non-Welsh speakers and Welsh speakers in high density Welsh speaking areas. It did not include samples of Welsh and non-Welsh speakers living in high density non-Welsh speaking communities. This decision was made because of the high social salience of Welsh speaking areas which provided a useful lens for exploring intergroup relationships, community dynamics and belonging in individuals with psychosis in the context of linguistic group density. Pragmatically, excluding participants in this manner would have further complicated recruitment. More crucially, this study has a qualitative design and delved into a relatively unexplored area of research. Overly strict eligibility criteria might have prevented the study from capturing the full spectrum of people's experiences and could have closed off potentially interesting new avenues of research.

From an epidemiological standpoint, it could be argued that it would have been valuable to explore these experiences in healthy populations as well as across the psychosis continuum. In a similar vein, it might be suggested that a more insightful way of exploring aetiology is to assess those who are exposed and not exposed to the condition to better understand possible processes behind the risk and protective factors associated with low and high own group density, respectively.

Another possible methodological issue relates to interviewing individuals with psychosis, with evidence suggesting that some people with psychosis experience cognitive decline challenges with retrospective memory, which may have introduced some issues with accuracy and recounting of their experiences (Fett *et al.*, 2020). To offset this, some studies suggest including family members in the interview process to achieve a more comprehensive account of the experiences of the individual with psychosis (Corcoran *et al.*, 2007; Yung & McGorry, 1996).

Another decision in this study was to compare groups, a practice not typically undertaken in qualitative research. Some have noted limitations of this approach, such as the lack of methodological rigour around how the data for each group are analysed which then might increase the likelihood of biases towards reporting in a way that is

consistent with how the researcher thinks the groups will compare with the other (Lindsay, 2019). As previously discussed, issues around researcher bias are intrinsic to qualitative analysis and indeed other methods. The Reflexive TA method of analysis was selected which accepts that researcher bias is unavoidable, but it is possible to ensure reflexivity and reflection on the research process and the factors that shape it (Braun & Clarke, 2021). Comparing groups in qualitative research is in fact becoming more widespread and having a comparative lens has been described as a strength in that it helps gain a more nuanced understanding of a particular phenomenon by comparing the lived experiences of different social groupings (Lindsay, McAdam, & Mahenderin, 2017). In line with a large proportion of qualitative studies with a comparative component, the present study coded the transcripts for each group separately before assessing any similarities and differences between the groups (Lindsay, 2019). It could be argued that a fuller picture of group density was achieved through this approach of hearing the views and experiences of the “linguistic ingroup” and the “linguistic outgroup”. For a comprehensive review of the use of comparison groups in qualitative research see Lindsay (2019).

Another issue to note is that of saturation – defined as the stage at which no new information or insights are garnered from the data - at which point it is concluded that the study has reached saturation, and the sample size is sufficient (Glaser & Strauss, 1967). A systematic review has suggested that a study comprising 9-17 interviews is sufficient to reach saturation (Hennink & Kaiser, 2022). The present study comprised $n=11$ in the non-Welsh speaking group and $n=8$ in the Welsh speaking group. This could be considered a limitation of the present study – one of the samples falls slightly short of this benchmark for data saturation. However, another study found that 94% of codes that are applied consistently across the data are identified by the sixth interview (Guest, Bunce & Johnson, 2006).

These uncertainties are why the concept of saturation is heavily debated in the literature – firstly, how can the researcher confirm that they have reached saturation and secondly, how can they evidence this? A full critique of the notion of saturation in thematic analysis can be found in Braun and Clarke (2021). Perhaps a useful alternative to saturation is “theoretical sufficiency”; this means that the sample is deemed adequate if the data offers the depth of understanding required to build a theory. The present study could be considered to have reached theoretical sufficiency given that it provided a useful foundation for theory development into group density

phenomena in the context of linguistic groups which is built upon in subsequent chapters.

Another potential limitation is that I was the only researcher conducting the interviews. While this can be viewed as a strength for reasons of consistency in the data collection process, this also meant that interviews with Welsh speakers were not carried out in their language of choice. While most participants were proficient English speakers, two noted that they are not as proficient in English as they are in Welsh. These participants may not have been able to express themselves as well as would have been possible in their first language. The absence of the option to complete the study in Welsh may have also deterred some Welsh speaking participants from taking part.

I also led on the analysis of the data, but the themes were developed in close collaboration with my supervisors (CWNS and MJ) and was finalised with CWNS which included a careful assessment of themes, subthemes, and the coding of interview extracts. That said, some argue that participants with lived experience should be afforded more of an active role in the data analysis process, which could include, for example, participants checking that the generated themes accurately reflect their experiences (*e.g.*, see Sweeney *et al.*, 2013). This was not part of the research process of the present study; again, this was largely due to pragmatic reasons – the time-sensitive nature of the PhD and difficulties recontacting participants.

Finally, recruitment for this study was difficult and the Covid-19 pandemic introduced further challenges. Before Covid-19, interviews were conducted in participants' homes which was useful in terms of building trust and rapport. After the data collection procedure became virtual, HCPs reported that some eligible service users did not want to take part due to them having reservations about conducting an interview via a phone or video call. Further, the interviews conducted after the pandemic may not be comparable with the others, for example, participants' mental health may have deteriorated due to adverse impact of lockdown measures, *e.g.*, fears of contracting Covid-19, social isolation and loneliness, and disruptions to mental healthcare.

3.4.7 Conclusions and future research

This study suggests that the mechanisms that plausibly drive group density associations in minoritised ethnic groups may extend to socially salient linguistic identities. This work has also shed light on the subjective experience of group density

associations from the perspective of individuals with experience of psychosis – providing clues about the detrimental and protective influences of low and high own group density, respectively. Non-Welsh speakers felt their dissimilarity to their local area based on some combination of their linguistic and national identity signalled them as lower status outsiders and this was commonly cited as the reason for their perceived exclusion and lack of belonging to their community. For Welsh speakers, living in an area that was linguistically similar was perceived as identity affirming and a way of fitting in and bolstering belonging. Themes also fit well within the Power Threat Meaning Framework which serves as a potentially useful model for conceptualising the underlying social processes behind the risk of low own group density areas in individuals with psychosis. Implications of this study are discussed in detail in Chapter 5. The findings of this study provide a useful foundation for theory and hypothesis building. Future work should expand on these findings by quantitatively testing the presence of a linguistic group density association in Wales.

Chapter 4: Examining linguistic group density associations in mental health and conspiratorial beliefs about Covid-19

4.1 INTRODUCTION

Minority group status is a risk factor for mental illness, but this risk is somewhat context dependent – group density studies have found that in some minority group individuals living in areas where there are fewer of their own group are at an increased risk of poor mental health compared to minorities living in areas where their group comprises a larger proportion of the local population (Boydell *et al.*, 2001). The systematic review and meta-analysis of the group density effect in psychosis reported in Chapter 2 revealed that the majority of group density studies have examined associations in minoritised ethnic groups and there has been limited exploration of groups defined by other socially salient identities. This review also found that the risk of lower own group density is not uniform across different minoritised ethnic groups, with particularly strong associations observed in Black individuals. It was suggested that this was likely due to the disproportionate disempowerment and marginalisation experienced by Black individuals in White majority countries. In Black individuals, the negative psychological consequences of belonging to a “psychological minority” *i.e.*, (a minority subject to negative treatment because of their minority characteristic) might be exacerbated when the living in neighbourhoods where there are fewer others belonging to their group. In such communities, they may also be more likely to be “singled out” and subject to racism and discrimination. This negative treatment may also be more likely to go unchallenged in predominantly White areas (Boydell *et al.*, 2001; Whitley *et al.*, 2006).

A question that has been raised throughout this thesis is whether group density associations are unique to marginalised psychological minorities including minoritised ethnic groups or whether they might be found for other kinds of identities. Examining whether group density relationships are found for other identity characteristics can provide clues about the possible mechanisms behind these associations. Drawing on the social identity approach and the social defeat hypothesis (Selten & Ormel, 2023;

Tajfel, 1979; Tajfel & Turner, 1979), another possibility is that low own group density is harmful to an individual regardless of their identity characteristic. It might be that living somewhere where a larger proportion of the population differs from you based on a focal part of your identity is a salient reminder of your position as an outgroup member. So, while a particular identity characteristic might be perceived as having higher power and status more generally, it might be evaluated less favourably in a neighbourhood where it is less common. This might destabilise sense of belonging and have a detrimental effect on self-esteem. Evidence supporting this comes from studies that have found group density associations in other social characteristics, including political affiliation and social class. In the case of “leave” and “remain” voters in the UK’s EU referendum – studies have found that compared to remain voters, individuals more vulnerable to poverty were more likely to vote leave, including people of older age, lower income, and education (Goodwin & Heath, 2016). It might have therefore been expected that group density associations would only be observed in the more marginalised “leave” group, however, living in an area with a low density of others with the equivalent political view was associated with poorer mental health for both leave *and* remain voters (Saville, 2020). This pattern has also been observed for individuals with lower *and* higher social class as measured by cultural capital (Saville & Mann, 2022).

One notable gap in the literature is the lack of studies examining whether group density relationships are observed in linguistic groups. As discussed throughout this thesis, there is good theoretical justification for why this might be the case. Language is an extremely identity-laden characteristic – the language an individual speaks is a clear indicator of their group membership and a salient way in which linguistic outgroups can be excluded (Williams, 2009). Languages also differ in terms of power and status – as May (2012, p.1) explains, “the contest between majority and minority languages is, by definition, an uneven one – a mismatch.” The process of a language becoming a minority is not usually naturally occurring, rather a deliberate process of minoritisation by a more powerful linguistic majority group (May, 2012). Language can present more practical barriers in terms of accessing education and healthcare as well as social capital and other support networks. An individual living in an area where there are fewer others that share the same linguistic profile might have negative psychological consequences via a heightened sense of “outsider status” (Selten and colleagues, 2005, 2013; 2023). Given that there is evidence that group density

relationships appear to be stronger and more consistently observed in psychosis as opposed to other mental health problems (Bécares *et al.*, 2018; Shaw *et al.*, 2012), elucidating the underpinning processes might have particular relevance to the aetiological underpinning of psychosis specifically.

To shed light on this, Chapter 3 sought to explore whether the mechanisms thought to underpin group density associations are observed in linguistic identity groupings. It also aimed to gain a closer insight into the possible social processes behind these findings by exploring the subjective experience of group density from the perspective of individuals experiencing psychosis. At a more local level, issues of language, identity, and status become more complex. English speakers as a collective are the more powerful group in the sense that the English language is associated with “greater power, prestige, influence and/or communicative reach” (May, 2012, p.1) and English speakers generally are not subject to discrimination based on their language. However, qualitative findings suggested that in the context of Welsh speaking communities, English language and national identity was perceived less favourably. Experiences of not belonging and feeling like an outsider appeared to be more common in dominant language English speakers living in high density Welsh speaking areas. For the Welsh speaking group on the other hand, living in a Welsh speaking area was more often perceived as identity affirming and viewed as a way of belonging and fitting in – pointing to a possible protective influence of higher own group density. This study also shed light on the potential role of social capital in group density associations – in Welsh speaking communities, there appeared to be high bonding social capital. This was protective to those who had access to these networks of support but for individuals who perceive exclusion from this, this appeared to be especially harmful (Kirkbride *et al.*, 2008).

Based on this study it seems likely that lower own linguistic density might be associated with poorer mental health in non-Welsh speakers, and this might be driven by heightened “outsider status” and perceptions of negative judgement about a salient component of their identity (Selten and colleagues, 2005, 2013; 2023). The qualitative study did not explore the experiences of lower own linguistic group density in Welsh speaking individuals, but it seems plausible that this experience might also be associated with poorer mental health in this group, operating through similar mechanisms. Studies have examined links between linguistic status and mental health, yielding mixed results. In Wales, Saville (2022) found that the mental health of the

Welsh speaking minority (and ethnically diverse group) was significantly higher than that of English identifiers, Welsh identifying English speakers, and British identifying groups that held after adjustment for individual and area level covariates. A study in Finland found a *reduced* rate of schizophrenia in the Swedish speaking minority in Finland – this was thought to be due to the higher socioeconomic position occupied by the Swedish minority in Finland (Suvisaari *et al.*, 2014). In Canada, studies have found no significant difference in mental health status between the French-speaking minority and the English-speaking majority (Chartier *et al.*, 2014; Puchala *et al.*, 2013). Studies examining linguistic factors in minoritised ethnic groups have found that lower proficiency in the majority language and greater linguistic distance are associated with increased risk of psychosis (Anderson *et al.*, 2022; Jongsma *et al.*, 2020). A non-epidemiological study found that in a non-clinical sample in the United Arab Emirates, individuals who perceived their Emirati identity favourably and had lower proficiency in Arabic reported increased paranoia (Thomas *et al.*, 2017).

However, there is a dearth of research that has examined the association between linguistic status and mental health at a more local level. Building on findings from Chapter 3, the present study aims to quantitatively test the presence of a linguistic group density association in Welsh speakers and non-Welsh speakers in Wales. As demonstrated in Chapter 3, issues of language and identity are socially salient in Wales. The Welsh language has faced as struggle for survival – a history of marginalisation has shaped the course of the Welsh language and Welsh-English relations. However, there is a complicated power relation between the two languages in Wales, with Saville (2022) finding evidence that Welsh speakers generally occupy a more socially advantaged position and report better mental health than their English-speaking counterparts.

In Wales there is strong area-level variation in Welsh speakers – Welsh is only spoken by around 19% of the population, but when proportions of Welsh speakers are considered at a more local level, in many areas Welsh speakers comprise the majority. Further, linguistic groups in Wales are less conflated with other potential confounds such as ethnic minority status because Welsh speakers and non-Welsh speaker typically share a common White British ethnic identity. Therefore, the Welsh language context provides the opportunity for a relatively clean test of a potential group density association for language. For example, if linguistic group density associations were examined in London – in this study context, it would be more challenging to separate

the risk associated with linguistic identity from other known risk factors including minoritised ethnic group status and urbanicity – see Alherz, (2022) for a discussion of the challenges associated with exploring sociolinguistic risk factors in psychosis.

This study will test the presence of a linguistic group density association for mental illness and for a psychosis analogue variable. The original plan for this study was to examine group density associations for psychosis using a clinical measure of psychosis derived from psychosis admission data in Wales. Unfortunately, it was not possible to access these data so instead, a measure of conspiratorial beliefs about Covid-19 have been used as an analogue variable for psychosis.

There is good theoretical justification for using conspiratorial beliefs as an analogue variable for psychosis given that conspiratorial and paranoid belief systems share many characteristics. Ideas of persecution are often at the heart of conspiracy theories. According to Douglas *et al.*, (2019, p.4), Conspiracies refer to a “secret plot by two or more powerful actors” while conspiracy theories are “attempts to explain the ultimate causes of significant social and political events and circumstances with claims of secret plots by two or more powerful actors.” (Douglas *et al.*, 2019, p.4). Conspiracy belief refers to the belief in one or more conspiracy theories while conspiracy thinking refers to individuals who lean towards more conspiratorial ways of thinking. Individuals with this mindset are likely to have strong suspiciousness and opposition towards powerful groups and are more inclined to believe in a collection of conspiracy theories even if these are unrelated (Douglas *et al.*, 2019). Examples of conspiracy theories include beliefs that vaccines increase the risk of autism,⁴⁸ the moon landings were fake, that MI6 were involved in Princess Diana’s death, and that the Bush administration was responsible for 9/11 (van Prooijen & Dougless, 2017). More recent conspiratorial views have been related to vote rigging in the 2016 United Kingdom’s European Union membership and the 2020 United States presidential election, the far-right “QAnon” conspiracy theory, and beliefs that climate change is a hoax (Douglas *et al.*, 2019; Moskalenko & McCauley, 2021). The current information age means that often baseless conspiracy theories can be circulated widely – and are even propagated by powerful figures such as the former US president, Donald Trump

⁴⁸ The fear that vaccines cause autism stemmed from a 1997 study published by Andrew Wakefield, a British surgeon. The article was published in *The Lancet* and suggested that the measles, mumps, rubella (MMR) vaccines were associated with an increased risk of autism in children. This paper was discredited and retracted from the *Lancet* shortly after and Andrew Wakefield lost his medical licence because of this flawed study.

(van Bavel *et al.*, 2021). Conspiracy theories can have a hugely damaging social impact – they can be used to justify violence, prejudice, mistrust in the government and public health organisations, as well as the rejection of mainstream medicine and scientific consensus on pressing global issues such as climate change (Douglas *et al.*, 2019). Conspiracy theories surface because humans inherently look for the patterns and meanings to explain events. As Michael Shermer (1999) said, “Humans are pattern-seeking story-telling animals, and we are quite adept at telling stories about patterns, whether they exist or not.” Following stressful and ambiguous societal events, these processes can become disrupted which are often the circumstances under which conspiracy theories arise and flourish (van Prooijen & Douglas, 2017). It is argued that individuals who are more prone to believing in conspiracy theories are towards the more extreme end of the psychosis continuum (Acar *et al.*, 2022). To make sense of distressing occurrences, individuals with a more conspiratorial mindset might be more inclined to believe in conspiracy theories which is appealing because they offer a preformulated explanation for events, which is one reason prescribe to these ideas even if they are not grounded in logic or evidence (Alsuhibani *et al.*, 2022).

Significant parallels can be drawn between conspiratorial beliefs and experiences of paranoia. Paranoia is a common experience of psychosis which can be conceptualised as being excessively fearful and mistrustful of others (Freeman *et al.*, 2002). At the extreme end of the paranoia continuum are persecutory delusions – strong and unfounded beliefs that other people or forces intend to cause us harm which are strongly held even in the face of refuting evidence (Freeman & Garety, 2014). Like conspiratorial beliefs, cognitive models of paranoia suggest that stress and ambiguity drive persecutory ideation – in more psychosis prone individuals this causes anomalous experiences which are described as an altered states of consciousness which are often unusual and difficult to explain. What follows is a search for meaning which is formulated based on the individuals’ recent experiences as well as their beliefs about themselves and others (Freeman *et al.*, 2002). People more prone to psychosis have been found to have more negative schematic beliefs about themselves and others, such as beliefs that they are vulnerable and worthless, and others are dangerous and have malevolent intentions (Humphrey *et al.*, 2021). Individuals who are more prone to psychosis are also more likely to exhibit cognitive biases such as “jumping to conclusions” (Lincoln *et al.*, 2010). It has been found that social stress alters these emotional and cognitive processes which often resort to “quick and dirty”

explanations of one's experiences – this might involve forming judgements on the basis of inadequate evidence (Lincoln *et al.*, 2010, p.1141).

Reviews have highlighted evidence suggesting that paranoia is predictive of conspiratorial beliefs (Goreis & Voracek, 2019; Imhoff & Lamberty, 2018). Other studies have demonstrated similarities between specific schizotypal experiences and belief in conspiracy theories, such as suspiciousness, unusual beliefs, and ideas of reference (Baron *et al.*, 2018; Barlow and Durand, 2009). It has also been suggested that paranoia and conspiratorial beliefs are precipitated by stressful social experiences, for example, social isolation, victimisation, and poverty (Ferreira *et al.*, 2022; Greenburgh & Raihani, 2022). Alsuhibani *et al.*, (2022) found that both paranoid and conspiratorial belief systems were associated with loneliness and an external locus of control – *e.g.*, lack of control over one's life, a greater belief in chance and that one's life is controlled by “powerful others.” Further, Escolà-Gascón (2022) found that individuals with a diagnosis of a psychotic disorder are also more likely to hold conspiracy beliefs – in line with the psychosis continuum model (van Os *et al.*, 2009), this study found evidence that individuals with schizophrenia scored highest on a measure of conspiracist beliefs,⁴⁹ followed by individuals with a psychiatric history, and those with no psychiatric history.

The stress and uncertainty of the Covid-19 pandemic was predictably followed by a rise in baseless conspiracy theories relating to the origin and treatment of the virus. One such conspiracy theory was that Covid-19 was man-made and deliberately released – it was suggested that the creation of the virus would force governments to fund research and develop vaccines which would increase the wealth of the powerful elites in the technology, pharmaceutical, and global health industries. In May 2020, shortly after Covid-19 was declared a pandemic, this misinformation spread rapidly across social media platforms via the film, “Plandemic: The Hidden Agenda Behind Covid-19” which featured the former research scientist, Dr Judy Mikovits – a known anti-vaccination activist who had previously been dismissed for scientific misconduct (Nazar & Pieters, 2021). Another conspiracy theory that came into circulation was that Covid-19 can be spread via 5G wireless network technology. Again, this was widely

⁴⁹ “The Generic Conspiracist Beliefs Scale [GCBS] is a 15-item questionnaire that measures the degree to which a person believes and accepts conspiracy theories as true. This test includes five conspiracy beliefs related to government malfeasance, extra-terrestrial cover-up, malevolent global and personal wellbeing, and control of information.” (Escolà-Gascón, 2022).

shared across social media, with proponents of this theory sharing maps of the spatial distribution of Covid-19 and 5G towers to demonstrate an apparent relationship between the two (Flaherty, Sturm, & Farries, 2022). Describing the central theme of the 5G Covid-19 conspiracy theory, Flaherty, Sturm & Farries, (2022, p.2) noted, “In all iterations, 5G is depicted as either “Satan's strategy” to advance the apocalypse, or the work of a techno-capitalist government cabal that seeks to reduce the population, profit from a vaccine, or embed micro-chips into the vaccine for the purposes of surveillance or control.”

Worryingly, these conspiratorial beliefs about Covid-19 appear to be relatively well-endorsed. In the UK, the Oxford coronavirus explanations, attitudes, and narratives study found that a significant proportion of respondents believed that Covid-19 was deliberately manufactured or spread to benefit powerful people, for example, 36% of respondents agreed to some extent⁵⁰ that “The spread of the virus is a deliberate attempt by a group of powerful people to make money.” Thirty-four percent agreed that “The spread of the virus is a deliberate attempt by global companies to take control” and 23% agreed that “The United Nations (UN) and World Health Organisation (WHO) have manufactured the virus to take global control.” A considerable minority also prescribed to the conspiracy theory that mobile 5G is related to Covid-19 – with 20% agreeing that “COVID-19 is caused by 5G and is a form of radiation poisoning transmitted through radio waves.” (Freeman *et al.*, 2022).

Studies have demonstrated links between psychotic-like experiences and conspiratorial beliefs about Covid-19 specifically. Ferreira *et al.*, (2022) found that unusual experiences, persecutory ideation, and perceptive abnormalities were positively and moderately correlated to conspiracy theories related to Covid-19.⁵¹ Acar *et al.*, (2022) found evidence that conspiratorial views about Covid-19 were strongly associated with a delusion proneness trait phenotype. Additionally, Kuhn *et al.*, (2020) found evidence that paranoid ideation and cognitive biases involved in psychosis (*e.g.*, jumping to conclusions) were associated with belief in conspiracies about Covid-19.

To summarise, there is evidence that experiences of psychosis exist on a

⁵⁰ Participants who responded “agree a little, agree moderately, or agree a lot” to these statements.

⁵¹ Conspiratorial beliefs about Covid-19 were measured using the *COVID-19 Conspiracy Theories Beliefs Questionnaire* (<https://osf.io/c82gs/>). Psychotic-like experiences were operationalised using the Community Assessment of Psychotic Experience (CAPE) (Brenner *et al.*, 2007).

continuum with “normal” functioning (van Os *et al.*, 2009). The conceptual framework for this study is that psychosis prone individuals are more likely to endorse conspiratorial beliefs about Covid-19 and both experiences are likely to share common underpinning mechanisms. This will therefore be used as an analogue variable for psychosis. Evidence has shown that the social stress, (including living in a lower own group density area) has negative psychological effects in non-clinical populations (McCutcheon *et al.*, 2018; Veling *et al.*, 2016). However, adverse environments are thought to have a more detrimental impact on more psychosis prone individuals because they have been found to have a heightened sensitivity to social stress (Reininghaus *et al.*, 2016). In individuals more vulnerable to psychosis, studies have found that stressful experiences precipitate the emotional and cognitive processes that have been found to drive experiences of psychosis (Ellet, Freeman, & Garety, 2008. Freeman *et al.*, 2015; Pot-Kolder *et al.*, 2018).

This study aims to test the presence of a linguistic group density association in Welsh speaking and non-Welsh speaking individuals in Wales. For Welsh speaking and non-Welsh speaking groups, it is hypothesised that living in lower own group density areas will be a risk factor for mental illness, while higher own linguistic density will have protective mental health associations. It is hypothesised that there will be weaker or absent associations in the non-fluent Welsh speaking group as this is arguably a less socially salient linguistic identity.

Drawing on evidence that suggests the processes involved in group density associations might have particular relevance to the development and maintenance of psychosis specifically (Bécares, Dewey & Das-Munshi, 2018; Shaw *et al.*, 2012), it is hypothesised that more marked associations will be observed in Welsh speaking and non-Welsh speaking groups for the psychosis analogue variable (conspiratorial beliefs about Covid-19).

It is also expected that “outsider status” will have a role in linguistic group density associations. It is hypothesised that in Welsh speaking and non-Welsh speaking groups, living in lower own linguistic areas will be associated with increased reporting of feeling like an outsider. It is also hypothesised that “outsider status” will attenuate linguistic group density associations for mental illness and conspiratorial beliefs about Covid-19.

4.2 METHOD

4.2.1 Ethical approval

The original data and analyses used in this study was approved by the Bangor University School of Human and Behavioural Sciences Ethics Committee.

4.2.2 Data

Individual-level data

Individual-level survey data was collected for the project, “Covid and the coalfield: Vaccine hesitance in Wales and Appalachia” which was funded by the British Academy and led by the primary supervisor of this PhD, Dr Christopher W.N. Saville. Data collection was completed by the UK survey company, YouGov who aimed to recruit a sample representative of the Welsh adult population, including n=3500 participants in addition to a n=500 non-representative “boost sample” from former coal mining areas. The final sample comprised n=4187 individuals. Data collection was conducted via YouGov’s participant panel which includes individuals who have volunteered to complete surveys for reimbursement. Further details of the fieldwork procedure can be found in the report (Saville *et al.*, 2022).

The following variables were used from these data: *Bangor_HealthConditions_6* is a dichotomous variable measuring whether the respondent has a mental health condition, for the present study this was relabelled ‘*Mental health condition*’ and coded 0=no, 1=yes. To measure conspiratorial beliefs (psychosis analogue variables), the variable *Bangor_Q18_4* was used which measures whether the extent to which respondent agrees with the statement “*Covid-19 was deliberately planned*” on a five-point scale from strongly agree to strongly disagree. This was renamed ‘*Covid-19 was deliberately planned*’ and recoded into a dichotomous variable (0=strongly disagree, disagree, neither agree nor disagree, 1=strongly agree, agree). The same was applied to *Bangor_Q18_6*, relabelled, ‘*Covid-19 linked to 5G*’ which measures participants’ sentiment on arguably a more unusual conspiratorial belief – that symptoms of Covid-19 are linked to mobile 5G.

Bangor_Q24, measured participants level of agreement with the statement “*I feel a sense of belonging to where I live*” on a five-point scale from strongly agree to strongly disagree. For this study, this was recoded into the dichotomous variable ‘*Outsider status*’ which was defined as disagreement or strong disagreement with this statement, *i.e.*, 0=strongly agree, agree, neither agree nor disagree, 1=disagree,

strongly disagree).

The variable, *welsh_speakers_full*, relabelled '*Welsh language ability*' measured respondents' self-reported Welsh language ability, in response to the question, "Can you speak Welsh" respondents answered either – "*Yes fluently*", "*Yes, but not fluently*" or "*No.*" For *Profile_gender*, respondents answered Male or Female (*Gender*) and *age* (*Age*) was a continuous variable, with respondents having an age range of 16-92. The variable, *profile_education_level* recorded participants' highest level of education – there were eighteen options, which were recoded into a new variable, '*Education*' which had three levels, (Higher qualifications *i.e.*, University or CNAAs first degree, University or CNAAs higher degree, Other qualifications, and participants who reported having no formal qualifications.) The variable, *profile_socialgrade_cie* ('*Social Grade*') measured the social grade of the respondents' chief income earner – there were six levels: (A=higher managerial, administrative, or professional, B=Intermediate managerial, administrative or professional, C1=supervisory or clerical and junior managerial, administrative or professional", C2=skilled manual workers, D=semi-skilled and unskilled manual workers, E=casual or lowest grade workers, pensioners, and others who depend of the welfare state for their income). This corresponds to "upper middle class", "middle class", "lower middle class", "skilled working class", "working class", and "non-working", respectively (National Readership Survey, 2016).

The variable *xethnicity_new* recorded ethnic group in line with the 18-category self-ascribed classification system used by the 2011 UK census (Office for National Statistics, 2012), this variable was dichotomised into White British which included respondents who were *English / Welsh / Scottish / Northern Irish / British* and non-White British, which comprised all remaining ethnic groups (*Irish, Gypsy or Irish Traveller, Any other White background, White and Black Caribbean, White and Black African, White and Asian, Any other Mixed/Multiple ethnic background, Indian, Pakistani, Bangladeshi, Chinese, Any other Asian background, African, Caribbean, Any other Black/African/Caribbean background, Arab or Any other ethnic group.*). The non-White British group was aggregated because sample sizes stratified by specific minoritised ethnic groups were too small to allow for meaningful analysis.

Geographical data

Data for each respondent included their Middle Super Output Area [MSOA] of residence, which is a unit of UK census geography comprising an average of 7,787 people (Office for National Statistics, 2012). Participants' MSOA codes were matched with geographical datasets from the 2011 census which were downloaded from the Office for National Statistics' Nomis website (Office for National Statistics, 2012) except for area deprivation data in Wales which were calculated in 2017 and obtained from StatsWales (Welsh Government, 2019).

The variable, '*Welsh speaking density*' was estimated from the percentage of people in the respondents' MSOA who reported that they can speak Welsh in the 2011 census. '*Percentage of non-White British*' is the proportion of the MSOA population who identified as non-White British in the census and '*Population density*' is calculated as the number of persons per hectare within each MSOA. The variable '*Income deprivation*' is the proportion of the population who living in low-income households – defined as households that have a total income that is below 60% of the UK median income adjusted for inflation (UK Government, 2023).

4.2.3 Statistical analysis

Data were subset so that the models for each of the three analyses comprised only complete cases *i.e.*, any respondents who answered 'don't know' or 'prefer not to answer' for any of the required variables were coded as NAs and removed. There were missing data for ethnicity (n=23), education (n=156), social grade (n=2) belief in whether Covid-19 was deliberately planned (n=80) and belief in Covid-19 being linked to 5G (n=58).

For the outsider status and mental health analyses, n=193 cases were removed for missing data, leaving a sample of n=3994 respondents. For the models examining belief that Covid-19 was deliberately planned as the dependent variable, n=258 cases with missing data were removed, leaving a sample of n=3929 complete cases. Finally, for the additional analysis using the belief that Covid-19 is linked to 5G as the outcome variable, n=233 cases were removed resulting in a complete sample of n=3954.

Binomial generalised linear mixed effects models were fitted to test whether linguistic group density associations would be observed for outsider status, mental illness, and conspiratorial beliefs. For each of the dependent variables (outsider status, mental illness, and holding a conspiratorial belief), eight models were fitted, which

incrementally adjusted for covariates.

Models were fitted using the R statistical package *glmmTMB* (Magnusson *et al.*, 2017; R Core Team, 2021). The first set of eight models tested whether the association between individual-level language and feeling like an outsider was moderated by MSOA-level proportion of Welsh speakers.

Model 1 comprised of the interaction term (area-level Welsh z-scored) with `Outsider status` as the dependent variable. Random intercepts of respondents were nested within MSOAs, and residuals were weighted by sampling weights. Individual-level covariates were then gradually added to each model – Model 2 was equal to Model 1 but with age and gender added as control variables, Model 3 added education, Model 4: social grade, and Model 5: Ethnic group. From Model 6 onwards, area-level covariates were added – Model 6 was as Model 5 but with the addition of area income deprivation, Model 7 added population density, and Model 8 (the fully adjusted model), added ethnic density (proportion of non-White British). The Akaike information criterion [AIC] and the Bayesian information criterion [BIC] were examined after the addition of each covariate to assess the fit of the model to the data. Multicollinearity was checked for each model – the *collin.diag* function in the R package *misty* (Yanagida, 2020) was used to run diagnostics and the Variance Inflation Factor and Tolerance levels were assessed. If these values were ≥ 4 and ≤ 0.25 respectively multicollinearity was not deemed an issue. Data visualisation of the fully adjusted models was created using the *ggpredict* package in *ggplot2* (Wickham, 2016).

The same process was followed to examine linguistic group density associations for the other dependent variables (mental illness and conspiratorial beliefs) a ninth model was fitted for these analyses to assess whether adding outsider status to the model modified the interaction term.

4.3 RESULTS

4.3.1 Sample characteristics

Of the full sample (n=4187), n=2712 respondents were non-Welsh speakers (65%), n=372 were fluent Welsh speakers (9%) and n=1103 reported they can speak Welsh but not fluently (26%). On average the non-Welsh speaking sample were slightly older (M=54.36, SD=15.89) than the Welsh speaking respondents (M=45.37, SD=17.44) and the non-fluent Welsh speaking group (M=48.77, SD=17.12). The gender split was similar for each sample and the three groups were over 95% white British.

Compared to the non-Welsh speakers (n=799, 29%), a greater proportion of the fluent Welsh speaking (n=162, 44%) and non-fluent Welsh speaking samples were educated at degree level or above (n=427, 39%). On average, more non-Welsh speakers (n=188, 7%) reported having no formal qualifications than the fluent Welsh speakers (n=11, 3%) and non-fluent Welsh speaking respondents (n=41, 4%), and more of the Welsh speaking sample were categorised as upper middle class (n=64, 17%) than the non-Welsh speakers (n=294, 11%) and non-fluent Welsh speakers (n=152, 14%). Non-working social grade was less common in the Welsh speaking sample (n=21, 6%) than in the non-Welsh speaking (n=399, 15%) and non-fluent Welsh speaking groups (n=132, 12%).

On average, fluent Welsh speakers lived in more Welsh speaking areas (M=33%, SD=24.31) than non-fluent Welsh speakers (M=22%, SD=17.86) and non-Welsh speakers (M=17%, SD=13.63). Mean income deprivation, ethnic density and population density were similar across the three samples. A larger proportion of the non-Welsh speaking (n=475, 18%) and non-fluent Welsh speaking samples (n=167, 15%) reported that they do not belong where they live (outsider status) compared with the fluent Welsh speaking group (n=39, 10%).

Finally, the groups were similar in terms of self-reported mental illness – with n=523 (19%) of non-Welsh speakers, n=83 (22%) of fluent Welsh speakers and n=282 (26%) of Non-fluent Welsh speakers reporting a mental health condition. Slightly more non-Welsh speakers endorsed the conspiratorial belief that Covid-19 was deliberately planned (n=524, 19%) compared with fluent Welsh speakers (n=41, 11%) and non-fluent Welsh speakers (n=143, 13%). Across the three groups, there was very low endorsement of the conspiratorial belief that the symptoms of Covid-19 are linked to 5G. However, a marginally higher proportion of Welsh speaking respondents endorsed this view (n=10, 3%) than non-fluent Welsh speakers (n=16, 1%) and non-Welsh speakers (n=31, 1%). Further details of descriptive data for the samples can be found in Table 1.

4.3.2 Outsider status

As hypothesised, a group density interaction was observed for outsider status whereby more Welsh speaking areas were associated with lower reporting of outsider status in fluent Welsh speakers (OR=0.65, 95% CI, 0.48-0.88, p=0.006). There was no evidence of an interaction in non-fluent Welsh speakers (OR=1.01, 95% CI, 0.81-1.25,

p=0.943). Figure 1. shows a plot of the interaction from the fully adjusted model (Model 8).

The fully adjusted model revealed a significant main effect of language group on outsider status such that fluent Welsh speakers (OR=0.67, 95% CI, 0.47-0.95, p=0.026) and non-fluent Welsh speakers (OR=0.72, 95% CI, 0.58-0.90, p=0.003) were less likely to report feeling like an outsider where they live relative to non-Welsh speaking reference group. However, no main effect of area-level Welsh was observed (OR=1.05, 95% CI 0.90-1.22, p=0.567).

In addition, older age (OR=0.97, 95% CI, 0.97-0.98, p=<0.001) was associated with lower reporting of outsider status as was being female (OR=0.73, 95% CI, 0.61-0.87, p=<0.001). Non-working respondents were significantly more likely to report feeling like an outsider (OR=1.82, 95% CI, 1.22-2.73, p=0.003) and more deprived areas were associated with increased reporting of outsider status (OR=1.02, 95% CI, 1.01-1.04, p=0.009). The results from each of the eight mixed effects models are shown in Table 2. Multicollinearity diagnostics were carried out for each of the eight models. All variance inflation factors [VIF] were lower than 4 and all tolerance levels exceeded 0.25 indicating no multicollinearity issues.

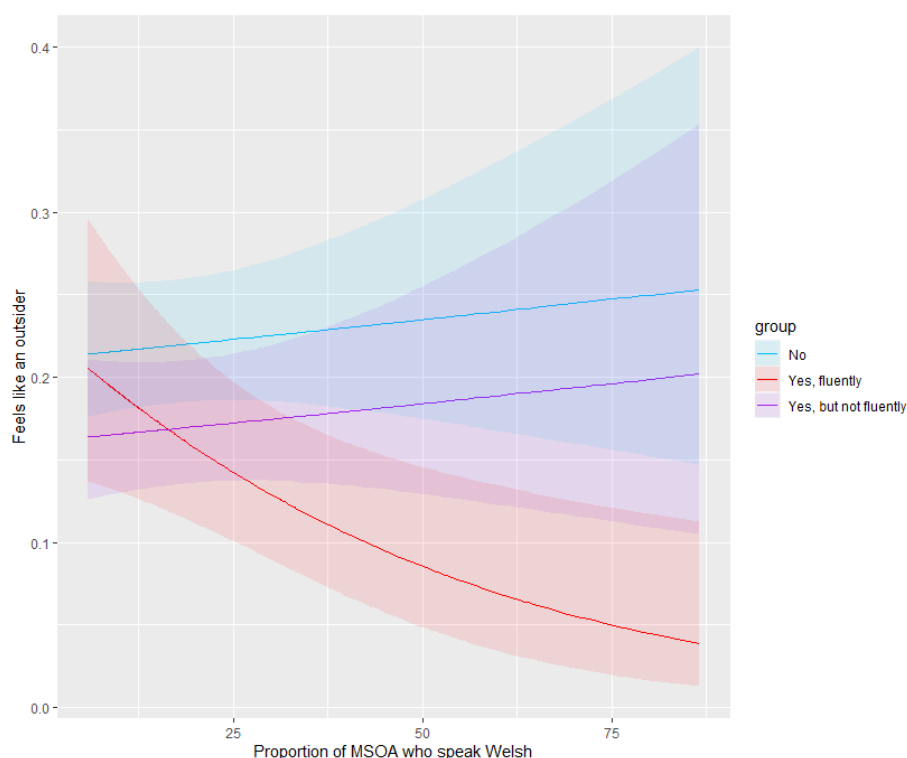


Figure 1. *ggpredict* plot estimated from the fully adjusted model (Model 8) showing the interaction between individual and area-level language for “outsider status.”

Table 1. Descriptive data for non-Welsh speakers, fluent Welsh speakers and non-fluent Welsh speakers (n=4187)

	n (%) Total sample = 4187	Age (mean, SD)	Gender, Female (n/%)	White British (n/%)	Education (n/%)	Social grade (n/%)	Welsh speaking density (mean, SD)	Income deprivation (mean, SD)	Ethnic density (mean, SD)	Population density (mean, SD)	Outsider status (n/%)	Reported a mental health condition (n/%)	Believe Covid-19 was deliberately planned (n/%)	Believe Covid-19 symptoms are related to 5G (n/%)
Non-Welsh speakers	2712 (65%)	54.36 (45.89)	1380 (51%)	2563 (95%)	Higher = 799 (29%) No formal qualifications = 188 (7%) Other = 1614 (60%) NA = 111 (4%)	A = 294 (11%) B = 488 (18%) C1 = 738 (27%) C2 = 450 (17%) D = 342 (13%) E = 399 (15%)	17% (13.63)	15.50 (6.94)	7% (7.09)	15.81 (23.01)	475 (18%)	524 (19%)	524 (19%)	31 (1%)
Can speak Welsh fluently	372 (9%)	45.37 (17.44)	199 (53%)	362 (97%)	Higher = 162 (44%) No formal qualifications = 11 (3%) Other = 192 (52%) NA = 7 (2%)	A = 64 (17%) B = 97 (26%) C1 = 108 (29%) C2 = 54 (14%) D = 28 (8%) E = 21 (6%)	33% (24.31)	14.93 (6.17)	6% (7.79)	11.52 (20.00)	39 (10%)	83 (22%)	41 (11%)	10 (3%)
Can speak Welsh - not fluently	1103 (26%)	48.77 (17.12)	615 (56%)	1055 (96%)	Higher = 427 (39%) No formal qualifications = 41 (4%) Other = 597 (54%) NA = 38 (3%)	A = 152 (14%) B = 228 (21%) C1 = 301 (27%) C2 = 181 (16%) D = 108 (10%) E = 132 (12%) NA=1	22% (17.86)	15.15 (6.74)	6% (6.30)	12.55 (20.27)	167 (15%)	282 (26%)	143 (13%)	16 (1%)

4.3.3 Mental illness

As hypothesised, a linguistic group density association for mental illness was observed – the relationship between linguistic status and mental illness was moderated by the linguistic composition of the area. The odds of reporting mental illness were significantly reduced in Welsh speaking individuals living in areas where more of the population can speak Welsh (OR=0.70, 95% CI, 0.55-0.89, $p=0.004$) but in those who cannot speak Welsh, living in an area with more Welsh speakers was associated with elevated risk of mental illness. There was no association in non-fluent Welsh speakers (OR=1.00, 95% CI, 0.83-1.21, $p=0.994$). In the fluent Welsh speaking group, this was a robust group density association that remained significant after adjustment for all covariates. Figure 2 shows a plot of the interaction from the fully adjusted model (Model 8).

Other results from the model revealed no main effect of language group – fluent Welsh speaking respondents (OR=1.14, 95% CI, 0.83-1.58, $p=0.410$) and participants who reported that they can speak Welsh but not fluently (OR=1.17, 95% CI, 0.97-1.43, $p=0.109$) were no more likely to report a mental health condition relative to the non-Welsh speaking reference group. There was, however, a significant main effect of area-level Welsh speaking whereby higher Welsh-speaking MSOAs were associated with increased reporting of mental illness (OR=1.21, 95% CI, 1.04-1.40, $p=0.014$).

Additionally, being older was associated with lower reporting of a mental illness (OR=0.97, 95% CI, 0.96-0.97, $p<0.001$) and female respondents were significantly more likely to report a mental health condition (OR=1.38, 95% CI, 1.17-1.64, $p<0.001$). Relative to those who were degree level educated and above, respondents with no formal qualifications (OR=1.96, 95% CI, 1.40-2.75, $p<0.001$) and other qualifications (OR= 1.26, 95% CI, 1.03-1.54, $p=0.027$) were more likely to report a mental health condition. Being skilled working class was associated with reduced risk of mental illness (OR=0.63, 95% CI, 0.44-0.91, $p=0.014$) but increased risk in non-working individuals (OR=2.02, 95% CI, 1.40-2.92, $p<0.001$) relative to upper middle-class respondents. Finally, non-White British individuals (OR=0.52, 95% CI, 0.34-0.79, $p=0.002$) were less likely to report a mental health condition than White British respondents and more deprived areas were associated with increased risk of mental illness (OR=1.03, 95% CI 1.01-1.04, $p<0.001$).

An additional model was fitted to assess whether adding “outsider status” to the fully adjusted model attenuated the linguistic group density association (Model 9). Outsider status was associated with a significantly increased risk of reporting mental illness (OR=2.35, 95% CI, 1.92-2.87, $p < 0.001$). However, the group density interactions for Welsh speakers (OR=0.73, 95% CI, 0.57-0.93, $p = 0.010$) and non-fluent Welsh speakers (OR=1.00, 95% CI, 0.83-1.22, $p = 0.974$) remained similar. The results from each of the nine mixed effects models are shown in Table 3.

There were no issues of Multicollinearity evident in any of the nine models – with all variance inflation factors [VIF] lower than 4 and all tolerance levels exceeding 0.25.

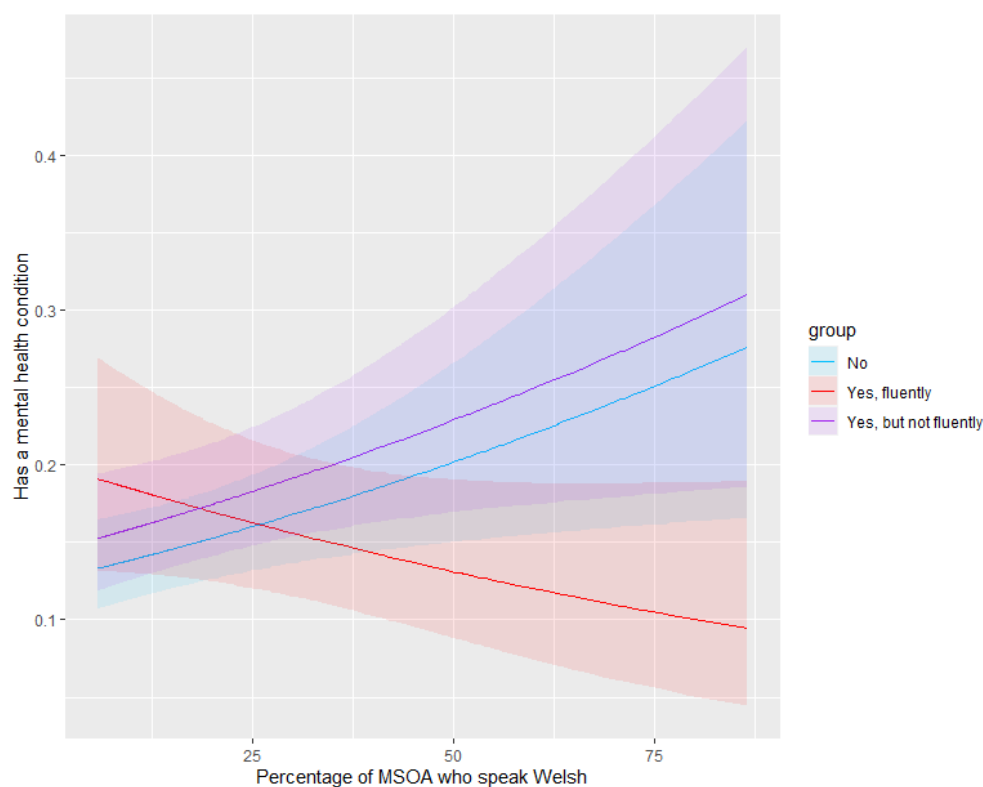


Figure 2. *ggpredict* plot estimated from the fully adjusted model (Model 8) showing the interaction between individual and area-level language for mental illness.

4.3.4 Endorsement of conspiracy theories about Covid-19

Contrary to the hypothesis, there was no evidence of a linguistic group density relationship for conspiratorial beliefs – the association between linguistic status and the conspiratorial beliefs was not moderated by MSOA level Welsh speaking density in fluent Welsh speakers (OR=1.04, 95% CI, 0.78-1.38, $p = 0.810$) or non-fluent Welsh

speakers (OR=1.09, 95% CI, 0.87-1.37, $p=0.459$), relative to non-Welsh speakers. See Figure 3. for a plot of the interaction from the fully adjusted model (Model 8).

Additionally, no main effect of individual-level language was observed – fluent Welsh speakers (OR=0.87, 95% CI, 0.57-1.33, $p=0.527$) and those who speak Welsh but not fluently (OR=1.10, 95% CI, 0.87-1.38, $p=0.444$) were no more likely than non-Welsh speakers to believe Covid-19 was deliberately planned. There was also no main effect of area-level Welsh speaking (OR=0.95, 95% CI, 0.79-1.14, $p=0.571$).

The model did reveal a significant main effect of education – relative to respondents educated at degree level or above, respondents with no formal qualifications were over three times more likely to endorse the conspiratorial view that Covid-19 was deliberately planned (OR=3.79, 95% CI, 2.57-5.59, $p<0.001$). Individuals with other qualifications were also significantly more likely to hold this view (OR=2.04, 95% CI 1.56-2.66, $p<0.001$). Areas with more income deprivation were also associated with increased reporting of this conspiratorial belief (OR=1.03, 95% CI, 1.01-1.05, $p=0.004$) as were areas with lower population density (OR=0.99, 95% CI, 0.98-1.00, $p=0.036$).

Relative to respondents who feel they belong where they live, individuals who feel like outsiders were no more likely to report that Covid-19 was deliberately planned (OR=1.10, 95% CI, 0.86-1.42, $p=0.433$). Again, adding “outsider status” did not change the outcome of the model. See table Table 4. for the results of the nine mixed effects models.

Additional analyses were conducted to test the presence of a group density association for what could be considered more of an unusual conspiratorial view – the belief that symptoms of Covid-19 are related to mobile 5G (see Appendix 16. for fully adjusted model). Results of these analyses should be interpreted with caution because very few participants endorsed this view (see Table 1). As with respondents who believed Covid-19 was deliberately planned, fluent and non-fluent Welsh speakers were no more likely than non-Welsh speakers to report the conspiratorial belief that symptoms of Covid-19 are related to 5G. Contrary to the hypothesis, the relationship between individual language status and belief in this conspiratorial view was not moderated by area-level Welsh speaking.

There were, however, significant main effects of age, gender, and education such that younger age, being female, and having no formal qualifications were associated with increased endorsement of this conspiratorial view. Adding outsider

status to the model did not moderate the association between individual and area-level language. Again, no issues of multicollinearity were evident in these analyses.

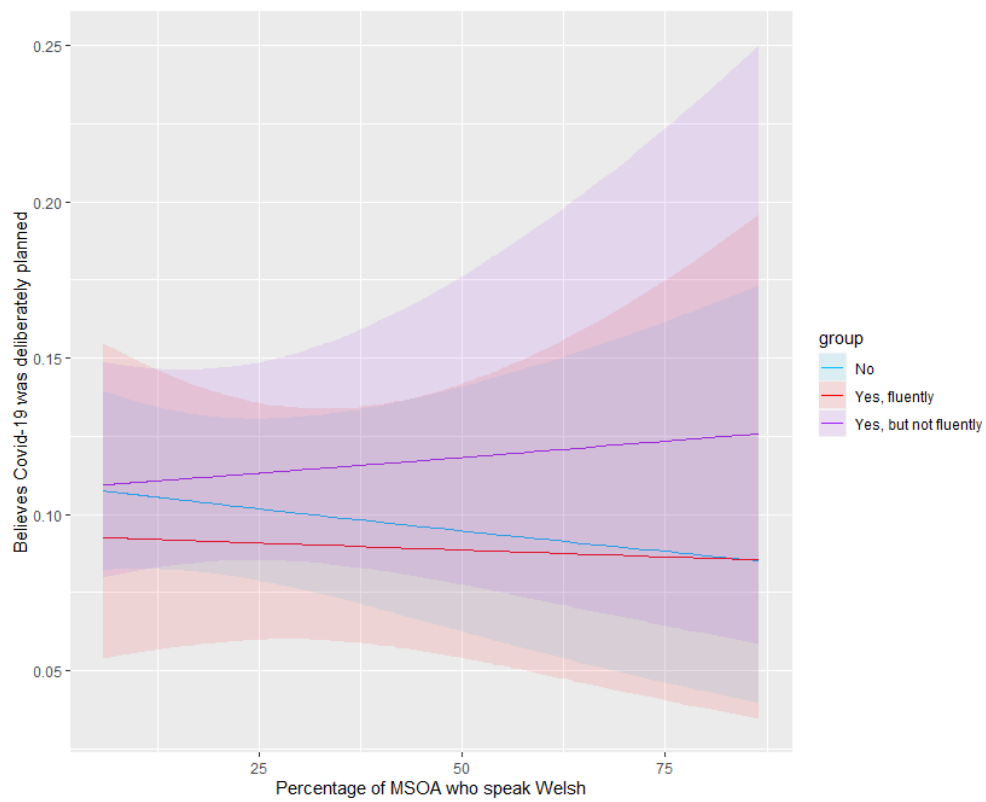


Figure 3. *ggpredict* plot estimated from the fully adjusted model (Model 8) showing the interaction between individual and area-level language for the belief that Covid-19 was deliberately planned.

Table 2. Results from each of the eight mixed effects model for the “outsider status” analyses.

	Model 1 AIC=3717.9 BIC=3762.0				Model 2 AIC=3615.4 BIC=3672.1				Model 3 AIC=3612.3 BIC=3681.6				Model 4 AIC=3592.4 BIC=3693.1				Model 5 AIC=3594.2 BIC=3701.2			
Term	Odds Ratio (OR)	Lower 95% CI	Upper 95% CI	p-value	OR	Lower 95% CI	Upper 95% CI	p-value	OR	Lower 95% CI	Upper 95% CI	p-value	OR	Lower 95% CI	Upper 95% CI	p-value	OR	Lower 95% CI	Upper 95% CI	p-value
Welsh language ability [Can speak Welsh fluently] * Percentage of MSOA that can speak Welsh	0.61	0.44	0.83	0.002*	0.64	0.47	0.87	0.004*	0.64	0.47	0.87	0.005*	0.65	0.49	0.88	0.006*	0.65	0.48	0.88	0.006*
Welsh speaking ability [Can speak Welsh, but not fluently] * Percentage of MSOA that can speak Welsh	0.97	0.79	1.20	0.804	1.00	0.81	1.24	0.982	1.00	0.81	1.24	0.984	1.00	0.81	1.24	0.973	1.00	0.81	1.24	0.977
Welsh language ability [Can speak Welsh fluently]	0.94	0.67	1.31	0.716	0.64	0.45	0.91	0.014*	0.64	0.45	0.91	0.014*	0.68	0.48	0.97	0.034*	0.68	0.48	0.98	0.004*
Welsh speaking ability [Can speak Welsh, but not fluently]	0.87	0.71	1.06	0.167	0.72	0.58	0.89	0.002*	0.72	0.58	0.89	0.003*	0.73	0.59	0.91	0.004*	0.73	0.59	0.91	0.005*
Percentage of MSOA that can speak Welsh (z scored) SD=16.79	0.99	0.86	1.15	0.945	1.06	0.91	1.23	0.482	1.05	0.91	1.22	0.496	1.05	0.90	1.22	0.531	1.05	0.90	1.22	0.531
Age					0.97	0.97	0.98	<0.001*	0.97	0.97	0.98	<0.001*	0.97	0.97	0.98	<0.001*	0.97	0.97	0.98	<0.001*
Gender [Female]					0.77	0.65	0.917	0.003*	0.77	0.65	0.92	0.004*	0.74	0.62	0.88	<0.001	0.74	0.62	0.88	<0.001*
Education [No formal qualifications]									1.06	0.73	1.55	0.752	0.87	0.59	1.29	0.478	0.87	0.58	1.28	0.470
Education [Other qualifications]									1.30	1.06	1.59	0.012*	1.21	0.98	1.49	0.080	1.21	0.98	1.49	0.079
Social grade [B – Middle class]													0.76	0.49	1.16	0.202	0.76	0.49	1.16	0.204
Social grade [C1 – Lower Middle class]													1.23	0.85	1.78	0.278	1.23	0.85	1.78	0.273

Social grade [C2 – Skilled working class]													1.05	0.71	1.55	0.817	1.05	0.71	1.55	0.813
Social grade [D – Working class]													1.23	0.81	1.84	0.330	1.23	0.82	1.85	0.325
Social grade [E – Non-working]													1.88	1.26	2.81	0.002*	1.89	1.27	2.82	0.002*
Ethnic group [Non-White British]																	1.09	0.75	1.60	0.657

Model 1: `glmmTMB(‘Outsider status’ ~ ‘Welsh language ability’ * scale(‘Welsh speaking density’) + (1 | msoa11), data = CoalfieldsData_Outsider, family = 'binomial', weights = Weight)`

Model 2: `glmmTMB(‘Outsider status’ ~ ‘Welsh language ability’ * scale(‘Welsh speaking density’) + as.numeric(Age) + Gender + (1 | msoa11), data = CoalfieldsData_Outsider, family = 'binomial', weights = Weight)`

Model 3: `glmmTMB(‘Outsider status’ ~ ‘Welsh language ability’ * scale(‘Welsh speaking density’) + as.numeric(Age) + Gender + Education + (1 | msoa11), data = CoalfieldsData_Outsider, family = 'binomial', weights = Weight)`

Model 4: `glmmTMB(‘Outsider status’ ~ ‘Welsh language ability’ * scale(‘Welsh speaking density’) + as.numeric(Age) + Gender + Education + ‘Social Grade’ + (1 | msoa11), data = CoalfieldsData_Outsider, family = 'binomial', weights = Weight)`

Model 5: `glmmTMB(‘Outsider status’ ~ ‘Welsh language ability’ * scale(‘Welsh speaking density’) + as.numeric(Age) + Gender + Education + ‘Social Grade’ + Ethnicity + (1 | msoa11), data = CoalfieldsData_Outsider, family = 'binomial', weights = Weight)`

Model 6: `glmmTMB(‘Outsider status’ ~ ‘Welsh language ability’ * scale(‘Welsh speaking density’) + as.numeric(Age) + Gender + Education + ‘Social Grade’ + Ethnicity + ‘Income deprivation’ + (1 | msoa11), data = CoalfieldsData_Outsider, family = 'binomial', weights = Weight)`

Model 7: `glmmTMB(‘Outsider status’ ~ ‘Welsh language ability’ * scale(‘Welsh speaking density’) + as.numeric(Age) + Gender + Education + ‘Social Grade’ + Ethnicity + ‘Income deprivation’ + ‘Population density’ + (1 | msoa11), data = CoalfieldsData_Outsider, family = 'binomial', weights = Weight)`

Model 8: `glmmTMB(‘Outsider status’ ~ ‘Welsh language ability’ * scale(‘Welsh speaking density’) + as.numeric(Age) + Gender + Education + ‘Social Grade’ + Ethnicity + ‘Income deprivation’ + ‘Population density’ + ‘Ethnic density’ + (1 | msoa11), data = CoalfieldsData_Outsider, family = 'binomial', weights = Weight)`

Table 2. Continued...

	Model 6 AIC=3590.8 BIC=3704.1				Model 7 AIC=3587.5 BIC=3707.1				Model 8 AIC= 3589.0 BIC=3714.8			
Term	Odds Ratio (OR)	Lower 95% CI	Upper 95% CI	p-value	OR	Lower 95% CI	Upper 95% CI	p-value	OR	Lower 95% CI	Upper 95% CI	p-value
Welsh language ability [Can speak Welsh fluently] * Percentage of MSOA that can speak Welsh	0.64	0.47	0.87	0.005*	0.67	0.47	0.95	0.006*	0.65	0.48	0.88	0.006*
Welsh speaking ability [Can speak Welsh, but not fluently] * Percentage of MSOA that can speak Welsh	1.00	0.81	1.23	0.980	0.72	0.58	0.90	0.940	1.01	0.81	1.25	0.943
Welsh language ability [Can speak Welsh fluently]	0.68	0.47	0.97	0.033*	0.67	0.47	0.95	0.027*	0.67	0.47	0.95	0.026*
Welsh speaking ability [Can speak Welsh, but not fluently]	0.73	0.59	0.91	0.005*	0.72	0.58	0.90	0.003*	0.72	0.58	0.90	0.003*
Percentage of MSOA that can speak Welsh (z scored) SD=16.79	1.09	0.93	1.26	0.292	1.04	0.89	1.22	0.588*	1.05	0.90	1.22	0.567
Age	0.97	0.97	0.98	<0.001*	0.97	0.97	0.98	<0.001	0.97	0.97	0.98	<0.001*
Gender [Female]	0.74	0.62	0.88	<0.001*	0.73	0.61	0.87	<0.001	0.73	0.61	0.87	<0.001*
Education [No formal qualifications]	0.85	0.57	1.26	0.408	0.83	0.56	1.23	0.358	0.83	0.56	1.22	0.341
Education [Other qualifications]	1.20	0.97	1.48	0.096	1.19	0.97	1.47	0.100	1.19	0.96	1.47	0.107
Social grade [B – Middle class]	0.75	0.49	1.14	0.180	0.75	0.49	1.14	0.179	0.75	0.49	1.15	0.183
Social grade [C1 – Lower Middle class]	1.21	0.84	1.75	0.313	1.22	0.84	1.77	0.288	1.23	0.85	1.78	0.281
Social grade [C2 – Skilled working class]	1.02	0.69	1.51	0.926	1.01	0.68	1.50	0.963	1.01	0.68	1.50	0.959
Social grade [D – Working class]	1.19	0.79	1.79	0.410	1.20	0.79	1.80	0.394	1.20	0.80	1.81	0.382

Social grade [E – Non-working]	1.81	1.21	2.71	0.004*	1.81	1.21	2.71	0.004*	1.82	1.23	2.73	0.003*
Ethnic group [Non-White British]	1.09	0.75	1.60	0.645	1.13	0.77	1.65	0.535	1.15	0.78	1.68	0.486
Income deprivation (MSOA)	1.02	1.00	1.04	0.019*	1.02	1.01	1.04	0.008*	1.02	1.01	1.04	0.009*
Population density (MSOA)					0.99	0.99	1.00	0.024*	1.00	0.99	1.00	0.345
Percentage of non-White British (MSOA)									0.99	0.97	1.01	0.451

Table 3. Results from each of the nine mixed effects model for the mental illness analyses.

	Model 1 AIC=4131.9 BIC=4175.9				Model 2 AIC=4012.0 BIC=4068.7				Model 3 AIC=3982.2 BIC=4051.5				Model 4 AIC=3906.7 BIC=4007.4				Model 5 AIC=3897.5 BIC=4004.5			
Term	Odds Ratio (OR)	Lower 95% CI	Upper 95% CI	p-value	OR	Lower 95% CI	Upper 95% CI	p-value	OR	Lower 95% CI	Upper 95% CI	p-value	OR	Lower 95% CI	Upper 95% CI	p-value	OR	Lower 95% CI	Upper 95% CI	p-value
Welsh language ability [Can speak Welsh fluently] * Percentage of MSOA that can speak Welsh	0.65	0.51	0.82	<0.001*	0.67	0.52	0.85	<0.001*	0.67	0.53	0.85	0.001*	0.70	0.55	0.89	0.004*	0.70	0.55	0.90	0.005*
Welsh speaking ability [Can speak Welsh, but not fluently] * Percentage of MSOA that can speak Welsh	0.98	0.81	1.18	0.838	0.99	0.82	1.20	0.927	1.00	0.83	1.21	0.994	1.00	0.82	1.21	0.993	1.00	0.83	1.22	0.968
Welsh language ability [Can speak Welsh fluently]	1.71	1.26	2.31	<0.001*	1.16	0.84	1.58	0.378	1.20	0.87	1.65	0.260	1.21	0.88	1.67	0.239	1.17	0.84	1.61	0.351
Welsh speaking ability [Can speak Welsh, but not fluently]	1.37	1.14	1.65	<0.001*	1.14	0.94	1.38	0.175	1.19	0.98	1.44	0.073	1.19	0.99	1.46	0.066	1.18	0.97	1.43	0.104
Percentage of MSOA that can speak Welsh (z scored) SD=16.79	1.10	0.95	1.27	0.187	1.16	1.01	1.35	0.038*	1.17	1.01	1.35	0.036*	1.17	1.01	1.36	0.034*	1.17	1.01	1.36	0.035*
Age					0.97	0.97	0.98	<0.001*	0.97	0.97	0.98	<0.001*	0.97	0.96	0.98	<0.001*	0.97	0.96	0.97	<0.001*
Gender [Female]					1.39	1.18	1.64	<0.001*	1.41	1.19	1.67	<0.001*	1.39	1.17	1.65	<0.001*	1.40	1.18	1.66	<0.001*
Education [No formal qualifications]									2.57	1.88	3.56	<0.001*	1.99	1.43	2.79	<0.001*	2.03	1.45	2.85	<0.001*
Education [Other qualifications]									1.37	1.13	1.66	0.002*	1.28	1.05	1.57	0.016*	1.04	1.28	1.56	0.018*
Social grade [B – Middle class]													0.77	0.52	1.13	0.187	0.75	0.52	1.12	0.163
Social grade [C1 – Lower Middle class]													0.79	0.56	1.12	0.183	0.78	0.55	1.09	0.147

Social grade [C2 – Skilled working class]													0.66	0.46	0.96	0.029*	0.66	0.46	0.95	0.025*
Social grade [D – Working class]													0.94	0.65	1.37	0.748	0.92	0.64	1.35	0.692
Social grade [E – Non-working]													2.18	1.52	3.14	<0.001*	2.14	1.48	3.08	<0.001
Ethnic group [Non-White British]																	0.51	0.33	0.77	0.001*

Model 1: `glmmTMB(Mental health condition ~ `Welsh language ability` * scale(`Welsh speaking density`) + (1 | msoa11), data = CoalfieldsData_MH, family = 'binomial', weights = Weight)`

Model 2: `glmmTMB(Mental health condition ~ `Welsh language ability` * scale(`Welsh speaking density`) + as.numeric(Age) + Gender + (1 | msoa11), data = CoalfieldsData_MH, family = 'binomial', weights = Weight)`

Model 3: `glmmTMB(Mental health condition ~ `Welsh language ability` * scale(`Welsh speaking density`) + as.numeric(Age) + Gender + Education + (1 | msoa11), data = CoalfieldsData_MH, family = 'binomial', weights = Weight)`

Model 4: `glmmTMB(Mental health condition ~ `Welsh language ability` * scale(`Welsh speaking density`) + as.numeric(Age) + Gender + Education + `Social Grade` + (1 | msoa11), data = CoalfieldsData_MH, family = 'binomial', weights = Weight)`

Model 5: `glmmTMB(Mental health condition ~ `Welsh language ability` * scale(`Welsh speaking density`) + as.numeric(Age) + Gender + Education + `Social Grade` + Ethnicity + (1 | msoa11), data = CoalfieldsData_MH, family = 'binomial', weights = Weight)`

Model 6: `glmmTMB(Mental health condition ~ `Welsh language ability` * scale(`Welsh speaking density`) + as.numeric(Age) + Gender + Education + `Social Grade` + Ethnicity + `Income deprivation` + (1 | msoa11), data = CoalfieldsData_MH, family = 'binomial', weights = Weight)`

Model 7: `glmmTMB(Mental health condition ~ `Welsh language ability` * scale(`Welsh speaking density`) + as.numeric(Age) + Gender + Education + `Social Grade` + Ethnicity + `Income deprivation` + `Population density` + (1 | msoa11), data = CoalfieldsData_MH, family = 'binomial', weights = Weight)`

Model 8: `glmmTMB(Mental health condition ~ `Welsh language ability` * scale(`Welsh speaking density`) + as.numeric(Age) + Gender + Education + `Social Grade` + Ethnicity + `Income deprivation` + `Population density` + `Ethnic density` + (1 | msoa11), data = CoalfieldsData_MH, family = 'binomial', weights = Weight)`

Model 9: ``Mental health condition` ~ `Welsh language ability` * scale(`Welsh speaking density`) + as.numeric(Age) + Gender + Education + `Social Grade` + Ethnicity + `Income deprivation` + `Population density` + `Ethnic density` + `Outsider status` + (1 | msoa11), data = CoalfieldsData_MH, family = 'binomial', weights = Weight)`

Table 3. Continued...

	Model 6 AIC=3887.7 BIC=4000.9				Model 7 AIC=3888.7 BIC=4008.2				Model 8 AIC=3890.3 BIC=4016.1				Model 9 AIC=3824.0 BIC=3956.1			
Term	Odds Ratio (OR)	Lower 95% CI	Upper 95% CI	p-value	Odds Ratio (OR)	Lower 95% CI	Upper 95% CI	p-value	Odds Ratio (OR)	Lower 95% CI	Upper 95% CI	p-value	Odds Ratio (OR)	Lower 95% CI	Upper 95% CI	p-value
Welsh language ability [Can speak Welsh fluently] * Percentage of MSOA that can speak Welsh	0.69	0.55	0.88	0.003*	0.70	0.55	0.90	0.004*	0.70	0.55	0.89	0.004*	0.73	0.57	0.93	0.011*
Welsh speaking ability [Can speak Welsh, but not fluently] * Percentage of MSOA that can speak Welsh	1.00	0.82	1.21	0.974	1.00	0.83	1.21	0.991	1.00	0.83	1.21	0.994	1.00	0.83	1.22	0.974
Welsh language ability [Can speak Welsh fluently]	1.15	0.83	1.59	0.390	1.14	0.83	1.58	0.412	1.14	0.83	1.58	0.410	1.21	0.88	1.68	0.244
Welsh speaking ability [Can speak Welsh, but not fluently]	1.18	0.97	1.43	0.098	1.17	0.96	1.42	0.110	1.17	0.97	1.43	0.109	1.23	1.01	1.50	0.041*
Percentage of MSOA that can speak Welsh (z scored) SD=16.79	1.23	1.06	1.42	0.007*	1.21	1.04	1.40	0.015*	1.21	1.04	1.40	0.014*	1.03	1.40	1.20	0.019*
Age	0.97	0.96	0.97	<0.001*	0.97	0.96	0.97	<0.001*	0.97	0.96	0.97	<0.001*	0.97	0.97	0.98	<0.001*
Gender [Female]	1.39	1.18	1.65	<0.001*	1.39	1.17	1.64	<0.001*	1.38	1.17	1.64	<0.001*	1.46	1.23	1.73	<0.001*
Education [No formal qualifications]	1.99	1.42	2.78	<0.001*	1.97	1.41	2.76	<0.001*	1.96	1.40	2.75	<0.001*	2.05	1.46	2.88	<0.001*
Education [Other qualifications]	1.26	1.03	1.54	0.025*	1.26	1.03	1.54	0.025*	1.26	1.03	1.54	0.027*	1.23	1.00	1.51	0.045*
Social grade [B – Middle class]	0.74	0.51	1.10	0.134	0.74	0.51	1.10	0.135	0.75	0.51	1.10	0.138	0.78	0.52	1.15	0.204
Social grade [C1 – Lower Middle class]	0.76	0.54	1.07	0.116	0.77	0.54	1.08	0.123	0.77	0.54	1.08	0.126	0.75	0.53	1.06	0.099
Social grade [C2 – Skilled working class]	0.63	0.44	0.91	0.014*	0.63	0.44	0.91	0.013*	0.63	0.44	0.91	0.014*	0.63	0.43	0.91	0.013*
Social grade [D – Working class]	0.89	0.61	1.29	0.530	0.89	0.61	1.30	0.541	0.89	0.61	1.30	0.552	0.88	0.60	1.29	0.519

Social grade [E – Non working]	2.01	1.40	2.90	<0.001*	2.02	1.40	2.91	<0.001*	2.02	1.40	2.92	<0.001*	1.90	1.31	1.75	<0.001*
Ethnic group [Non White British]	0.51	0.34	0.77	0.001	0.52	0.34	0.78	0.002*	0.52	0.34	0.79	0.002*	0.50	0.33	0.76	0.001*
Income deprivation (MSOA)	1.03	1.01	1.04	<0.001	1.03	1.01	1.04	<0.001*	1.03	1.01	1.04	<0.001*	1.03	1.01	1.04	0.001*
Population density (MSOA)					1.00	0.99	1.00	0.312	1.00	0.99	1.00	0.829	1.00	0.99	1.01	0.946
Percentage of non-White British (MSOA)									0.99	0.97	1.02	0.548	0.99	0.97	1.02	0.618
Outsider status (individual-level)													2.35	1.92	2.87	<0.001*

Table 4. Results from each of the nine mixed effects model for the conspiratorial beliefs about Covid-19 analyses.

	Model 1 AIC=3185.8 BIC=3229.7				Model 2 AIC= 3188.3 BIC=3244.8				Model 3 AIC=3121.8 BIC=3190.8				Model 4 AIC=3120.3 BIC=3220.7				Model 5 AIC=3121.7 BIC=3228.3			
Term	Odds Ratio (OR)	Lower 95% CI	Upper 95% CI	p-value	OR	Lower 95% CI	Upper 95% CI	p-value	OR	Lower 95% CI	Upper 95% CI	p-value	OR	Lower 95% CI	Upper 95% CI	p-value	OR	Lower 95% CI	Upper 95% CI	p-value
Welsh language ability [Can speak Welsh fluently] * Percentage of MSOA that can speak Welsh	1.03	0.78	1.37	0.840	1.04	0.78	1.38	0.794	1.03	0.77	1.37	0.847	1.04	0.78	1.38	0.806	1.04	0.78	1.38	0.812
Welsh speaking ability [Can speak Welsh, but not fluently] * Percentage of MSOA that can speak Welsh	1.09	0.86	1.36	0.481	1.09	0.87	1.36	0.472	1.10	0.88	1.39	0.407	1.08	0.86	1.36	0.498	1.08	0.86	1.36	0.502
Welsh language ability [Can speak Welsh fluently]	0.83	0.56	1.25	0.372	0.79	0.52	1.20	0.265	0.86	0.56	1.30	0.467	0.88	0.58	1.35	0.554	0.89	0.58	1.36	0.595
Welsh speaking ability [Can speak Welsh, but not fluently]	1.03	0.82	1.29	0.787	1.01	0.80	1.27	0.943	1.10	0.87	1.39	0.407	1.11	0.88	1.40	0.394	1.11	0.88	1.41	0.368
Percentage of MSOA that can speak Welsh (z scored) SD=16.81	0.95	0.79	1.14	0.580	0.96	0.80	1.14	0.624	0.96	0.80	1.15	0.648	0.96	0.80	1.15	0.679	0.96	0.80	1.15	0.676
Age					1.00	0.99	1.00	0.305	0.99	0.99	1.00	0.070	0.99	0.99	1.00	0.066	0.99	0.99	1.00	0.093
Gender [Female]					1.07	0.88	1.30	0.498	1.08	0.89	1.32	0.418	1.07	0.88	1.31	0.476	1.07	0.88	1.31	0.481
Education [No formal qualifications]									4.56	3.14	6.63	<0.001*	3.91	2.66	5.76	<0.001*	3.90	2.65	5.75	<0.001*
Education [Other qualifications]									2.22	1.71	2.88	<0.001*	2.05	1.57	2.67	<0.001*	2.05	1.57	2.68	<0.001
Social grade [B – Middle class]													0.99	0.61	1.59	0.958	0.99	0.61	1.60	0.968
Social grade [C1 – Lower Middle class]													0.97	0.63	1.49	0.881	0.97	0.63	1.49	0.898

Social grade [C2 – Skilled working class]													1.39	0.90	2.15	0.141	1.39	0.90	2.16	0.139
Social grade [D – Working class]													1.32	0.83	2.09	0.239	1.32	0.83	2.10	0.238
Social grade [E – Non-working]													1.45	0.92	2.28	0.110	1.46	0.93	2.30	0.104
Ethnic group [Non-White British]																	1.20	0.77	1.89	0.423

Model 1: `glmmTMB(Covid-19 deliberately planned ~ `Welsh language ability` * scale(`Welsh speaking density`) + (1 | msoa11), data = CoalfieldsData_Plandemic, family = 'binomial', weights = Weight)`

Model 2: `glmmTMB(Covid-19 deliberately planned ~ `Welsh language ability` * scale(`Welsh speaking density`) + as.numeric(Age) + Gender + (1 | msoa11), data = CoalfieldsData_Plandemic, family = 'binomial', weights = Weight)`

Model 3: `glmmTMB(Covid-19 deliberately planned ~ `Welsh language ability` * scale(`Welsh speaking density`) + as.numeric(Age) + Gender + Education + (1 | msoa11), data = CoalfieldsData_Plandemic, family = 'binomial', weights = Weight)`

Model 4: `glmmTMB(Covid-19 deliberately planned ~ `Welsh language ability` * scale(`Welsh speaking density`) + as.numeric(Age) + Gender + Education + `Social Grade` + (1 | msoa11), data = CoalfieldsData_Plandemic, family = 'binomial', weights = Weight)`

Model 5: `glmmTMB(Covid-19 deliberately planned ~ `Welsh language ability` * scale(`Welsh speaking density`) + as.numeric(Age) + Gender + Education + `Social Grade` + Ethnicity + (1 | msoa11), data = CoalfieldsData_Plandemic, family = 'binomial', weights = Weight)`

Model 6: `glmmTMB(Covid-19 deliberately planned ~ `Welsh language ability` * scale(`Welsh speaking density`) + as.numeric(Age) + Gender + Education + `Social Grade` + Ethnicity + `Income deprivation` + (1 | msoa11), data = CoalfieldsData_Plandemic, family = 'binomial', weights = Weight)`

Model 7: `glmmTMB(Covid-19 deliberately planned ~ `Welsh language ability` * scale(`Welsh speaking density`) + as.numeric(Age) + Gender + Education + `Social Grade` + Ethnicity + `Income deprivation` + `Population density` + (1 | msoa11), data = CoalfieldsData_Plandemic, family = 'binomial', weights = Weight)`

Model 8: `glmmTMB(Covid-19 deliberately planned ~ `Welsh language ability` * scale(`Welsh speaking density`) + as.numeric(Age) + Gender + Education + `Social Grade` + Ethnicity + `Income deprivation` + `Population density` + `Ethnic density` + (1 | msoa11), data = CoalfieldsData_Plandemic, family = 'binomial', weights = Weight)`

Model 9: `glmmTMB(Covid-19 deliberately planned ~ `Welsh language ability` * scale(`Welsh speaking density`) + as.numeric(Age) + Gender + Education + `Social Grade` + Ethnicity + `Income deprivation` + `Population density` + `Ethnic density` + `Outsider status` + (1 | msoa11), data = CoalfieldsData_Plandemic, family = 'binomial', weights = Weight)`

Table 4. Continued...

	Model 6 AIC=3117.8 BIC=3230.8				Model 7 AIC=3112.8 BIC=3232.0				Model 8 AIC=3114.5 BIC=3240.1				Model 9 AIC=3115.9 BIC=3247.7			
Variable	Odds Ratio (OR)	Lower 95% CI	Upper 95% CI	p-value	OR	Lower 95% CI	Upper 95% CI	p-value	OR	Lower 95% CI	Upper 95% CI	p-value	OR	Lower 95% CI	Upper 95% CI	p-value
Welsh language ability [Can speak Welsh fluently] * Percentage of MSOA that can speak Welsh	1.02	0.77	1.36	0.897	1.04	0.78	1.38	0.811	1.04	0.78	1.38	0.810	1.04	0.78	1.39	0.783
Welsh speaking ability [Can speak Welsh, but not fluently] * Percentage of MSOA that can speak Welsh	1.08	0.86	1.35	0.534	1.09	0.87	1.37	0.461	1.09	0.87	1.37	0.459	0.87	1.37	1.09	0.455
Welsh language ability [Can speak Welsh fluently]	0.89	0.58	1.36	0.579	0.87	0.57	1.33	0.526	0.87	0.57	1.33	0.527	0.88	0.57	1.34	0.542
Welsh speaking ability [Can speak Welsh, but not fluently]	1.11	0.88	1.40	0.369	1.10	0.87	1.38	0.440	1.10	0.87	1.38	0.444	1.10	0.87	1.39	0.427
Percentage of MSOA that can speak Welsh (z scored) SD=16.81	1.00	0.84	1.20	0.977	0.95	0.79	1.14	0.591	0.95	0.79	1.14	0.571	0.95	0.79	1.14	0.564
Age	0.99	0.99	1.00	0.091	0.99	0.99	1.00	0.049*	0.99	0.99	1.00	0.052	0.99	0.99	1.00	0.073
Gender [Female]	1.07	0.88	1.30	0.502	1.06	0.87	1.29	0.570	1.06	0.87	1.29	0.559	1.06	0.87	1.30	0.535
Education [No formal qualifications]	3.83	2.60	5.64	<0.001*	3.78	2.56	5.56	<0.001*	3.79	2.57	5.59	<0.001*	3.80	2.58	5.60	<0.001*
Education [Other qualifications]	2.03	1.56	2.66	<0.001*	2.04	1.16	2.66	<0.001*	2.04	1.56	2.66	<0.001*	2.03	1.56	2.66	<0.001*
Social grade [B – Middle class]	0.97	0.60	1.57	0.911	0.97	0.60	1.57	0.909	0.97	0.60	1.57	0.901	0.98	0.60	1.58	0.922
Social grade [C1 – Lower Middle class]	0.95	0.62	1.47	0.830	0.96	0.63	1.48	0.857	0.96	0.62	1.48	0.851	0.96	0.62	1.47	0.845
Social grade [C2 – Skilled working class]	1.35	0.87	2.09	0.183	1.33	0.86	2.07	0.199	1.33	0.86	2.07	0.200	1.34	0.86	2.07	0.196
Social grade [D – Working class]	1.28	0.80	2.03	0.300	1.28	0.81	2.03	0.295	1.28	0.80	2.03	0.298	1.28	0.80	2.03	0.301

Social grade [E – Non-working]	1.39	0.88	2.19	0.158	1.39	0.88	2.19	0.157	1.39	0.88	2.19	0.162	1.38	0.87	2.18	0.169
Ethnic group [Non-White British]	1.20	0.77	1.88	0.425	1.25	0.80	1.97	0.327	1.24	0.79	1.95	0.360	1.24	0.79	1.95	0.360
Income deprivation (MSOA)	1.02	1.00	1.04	0.015*	1.03	1.01	1.05	0.004*	1.03	1.01	1.05	0.004*	1.03	1.01	1.05	0.004*
Population density (MSOA)					0.99	0.98	1.00	0.010*	0.99	0.98	1.00	0.036*	0.99	0.98	1.00	0.039*
Percentage of non-White British (MSOA)									1.01	0.98	1.04	0.612	1.01	0.98	1.04	0.615
Outsider status (individual-level)													1.10	0.86	1.42	0.433

4.4 DISCUSSION

4.4.1 Summary

This study is the first to test the presence of a linguistic group density associations for mental health. As hypothesised, there was evidence of a linguistic group density association for general mental illness – in fluent Welsh speakers and non-Welsh speakers, living in a more linguistically dissimilar area was a risk factor for reporting a mental health condition which remained robust after adjustment for individual- and area-level covariates. This association was not observed for non-fluent Welsh speakers.

However, contrary to hypotheses, there was no evidence of an association between own-linguistic density and endorsement of a conspiratorial belief about Covid-19, which was used as an analogue variable for psychosis.

Exploring “outsider status” as a potential mechanism yielded inconsistent results. In line with study predictions, living in lower own linguistic group area was associated with increased reporting of outsider status in fluent Welsh speakers and non-Welsh speakers, but not in non-fluent Welsh speakers. The addition of “outsider status” to fully adjusted models did not moderate group density interactions for mental illness or conspiratorial beliefs. This is somewhat unexpected given that “outsider status” has been argued as a key mechanism influencing group density associations.

4.4.2 Comparisons with previous studies

With reference to other studies examining the association between linguistic minority status and mental health, the present study found that reporting of a mental health condition was similar across the three linguistic groups. This is similar to findings in Canada that found no difference in mental health status between the French speaking linguistic minority group and the English-speaking majority after adjustment for individual and area-level confounds (Chartier *et al.*, 2014; Puchala *et al.*, 2013). Though findings differ to studies in Wales and Finland that found positive associations between linguistic minority status and mental health in Welsh and Swedish speaking linguistic minority groups respectively (Saville, 2022; Suvisaari *et al.*, 2014).

However, as predicted, a more complicated picture emerged when examining linguistic status and a more fine-grained geographical unit. A linguistic group density association was observed whereby the association between individual-level linguistic

identity and reporting of a mental health condition was moderated by local level linguistic composition. Group density associations are traditionally observed in minoritised ethnic groups and migrants so evidence of an association in linguistic groups is a novel and exciting finding in the literature and is in line with studies that have found that associations extend to groups defined by other socially salient identity characteristics (Saville, 2020; Saville & Mann, 2022).

In regard to group density analyses for the psychosis analogue variable (Covid-19 related conspiracy beliefs), level of endorsement of the conspiratorial belief that Covid-19 was deliberately planned were similar to the findings from the Oxford coronavirus explanations, attitudes, and narratives study [OCEAN] (Freeman *et al.*, 2022). However, in the present study, fewer participants believed that Covid-19 was related to mobile 5G compared to OCEAN respondents.

It was expected that the linguistic group density associations for the psychosis analogue variable would be more marked than those observed for mental illness. This is based on previous reviews which have suggested that group density associations are stronger and more consistently observed for psychosis as opposed to more common mental health problems (Bécares, Dewey & Das-Munshi, 2018; Shaw *et al.*, 2012). This is thought to be because more psychosis prone individuals have heightened sensitivity to social stress (Reininghaus *et al.*, 2016). Therefore, while lower own group density might confer mental health risks for all (McCutcheon *et al.*, 2018; Veling *et al.*, 2016), it is thought to be a stronger risk factor for psychosis. The presence of a linguistic group density association for mental illness was consistent with this, however, contrary to hypotheses, no association was observed for the psychosis analogue variable.

Building on findings from Chapter 3 that experiences of feeling like an outsider were a common theme in non-Welsh speakers living in high density Welsh speaking communities, it was also expected that Welsh speakers living in more linguistically dissimilar areas might experience similarly heightened experiences of outsider status. The present study was consistent with this – in fluent Welsh speakers and non-Welsh speakers living in lower own linguistic density areas was associated with increased reporting of feeling like an outsider. However, linguistic group density associations were not attenuated by “outsider status”. It appears that the present study is the first to examine outsider status as a moderator of group density associations.

4.4.3 Interpretation of findings

This thesis has drawn on the literature around social defeat and other similar frameworks *e.g.*, the social identity approach, status syndrome, and social evaluative threat to theorise the possible mechanisms behind group density associations – all of which centre around “identity threat” or the psychological experience of perceiving oneself as an “unwanted outsider” with inferior or lower status in relation to others (Reininghaus *et al.*, 2016; Selten & Ormel, 2023). These could be important mechanisms behind the poorer mental health observed in individuals living in areas where they differ to a large proportion of the population based on their linguistic profile. Given that “outsider status” did not attenuate group density associations in the present study, this might reflect an issue with the validity of the measure. The experience of low social status and negative social comparison might not have been adequately captured by the “outsider status” variable which was measured in terms of disagreement or strong disagreement with the statement “*I feel a sense of belonging to where I live*”.

Alternatively, it might be that issues of identity and social comparison are more important causal mechanisms linking lower own group density with psychosis specifically. The idea that the experience of being negatively judged could be a risk factor for psychosis is consistent with the evidence base around the mechanisms underpinning psychotic experiences (Freeman & Garety, 2014). There may be other pathways linking lower own linguistic group density associations to general mental illness. While factors such as social support and loneliness are also plausible mechanisms involved in group density relationships for psychosis, these factors might have more relevance to explaining associations for general mental illness. There is evidence to suggest that minoritised ethnic groups in higher own group density communities report higher social support and less loneliness (Tseng *et al.*, 2021). These social factors might also extend to Welsh speakers and non-Welsh speakers living in higher own linguistic density which could explain the lower reporting of mental health conditions in these groups in the present study.

In terms of analyses for the psychosis analogue variable, there are a few possible reasons why linguistic group density associations were not found for conspiratorial beliefs about Covid-19. Firstly, it might be that group density associations for psychosis do not extend to linguistic groups. For psychological minorities such as marginalised ethnic minority groups, individuals living in a lower

own group density might feel more “singled out” and be subject to more negative judgement and discrimination relating to their identity characteristic (Boydell *et al.*, 2001; Whitley *et al.*, 2006). This is in line with studies that have found stronger group density associations for psychosis in visible minority groups (Baker *et al.*, 2021; Dykxhoorn *et al.*, 2020). While some of these experiences might be shared by linguistic groups living in lower own group density areas, the psychological impact might not be severe enough to be associated with an increased risk of psychosis.

The second explanation relates to the validity of the use of a variable measuring conspiratorial beliefs about covid as an analogue for psychosis. This is perhaps reflected in the rates of beliefs about Covid-19 conspiracy theories and experiences of psychosis. Covid-19 conspiratorial beliefs are relatively common (Freeman *et al.*, 2022), however the prevalence of subclinical experience of psychosis is around 7% and diagnosed psychotic disorders around 1-3% (Mwesiga *et al.*, 2020).

Thirdly, the conspiratorial belief variable might not adequately capture the specific experience of psychosis that is perhaps associated with lower own linguistic group density. Evidence suggests that environmental stress is strongly associated with experiences of paranoia (Ellet, Freeman, & Garety, 2008). For example, experience-based studies that have involved exposing individuals with psychosis to social stressors *e.g.*, walking in a busy urban street, have found that this exacerbated emotional and cognitive processes that have been found to drive psychotic experiences, particularly paranoia. Specifically, these experiences exacerbated negative schemata about the self and other, had a deleterious impact on self-esteem, and increased reasoning biases such as jumping to conclusions, and exacerbated existing experiences of paranoia (Ellet, Freeman & Garety, 2008; Freeman *et al.*, 2015). Further, neurobiological evidence suggests that lower own group density is associated with increased activity in brain areas related to threat anticipation (McCutcheon *et al.*, 2018) and VR studies have found that more psychosis prone individuals had heightened physical stress responses to virtual low own group density conditions. Evidence also suggests that the deleterious effect that social stress has on psychotic experiences is moderated by cognitive biases and low self-esteem (Jongeneel *et al.*, 2018; Pot-Kolder *et al.*, 2017). This is in line with theoretical models of paranoia (Ellet, Freeman & Garety, 2008; Freeman *et al.*, 2002), which suggest that paranoid thoughts reach “delusional levels of conviction in the presence of reasoning biases such as jumping to conclusions” (Ellet, Freeman & Garety, 2008, p.82).

From this it is likely that lower own linguistic density might confer risk of paranoia specifically – an individual might feel more negatively judged living in a linguistically dissimilar area which could drive paranoia through the same pathways outlined about – negative schemas about the self and others, which might progress to persecutory delusions via low self-esteem and cognitive biases (Freeman *et al.*, 2002; McIntyre *et al.*, 2018).

There are several studies demonstrating the overlap between belief in conspiracy theories and psychosis (Goreis & Voracek, 2019), including conspiratorial beliefs about Covid-19 specifically (Acar *et al.*, 2022; Ferreira *et al.*, (2022)). However, in terms of paranoia in particular, there are some key distinctions between paranoid and conspiratorial beliefs that might explain the absence of a linguistic group density association for the reporting of conspiracy beliefs about Covid-19.

With reference to studies that have found correlations of around .30 between paranoia and conspiratorial thinking, it has been argued that these two belief systems should be understood as related but distinct constructs (Imhoff & Lamberty, 2017; Wilson & Rose, 2014). Some of these differences have been delineated by Alsuhbani *et al.*, (2022) – low self-esteem was strongly associated with paranoia while high self-esteem and narcissism was associated with conspiratorial thinking. Key similarities and differences between the two belief systems are illustrated in Figure 4 taken from this study. This study also found that belief in conspiracy theories was associated with poorer scores on the Cognitive Reflection Test but this was not observed for paranoia. This is unexpected given the links between cognitive biases and paranoia (*e.g.*, jumping to conclusions). However, a review of the relationship between paranoia and conspiracy thinking noted that the evidence concerning this is mixed, with several studies finding that cognitive biases are a common feature of both belief systems (Greenburgh & Raihani, 2022).

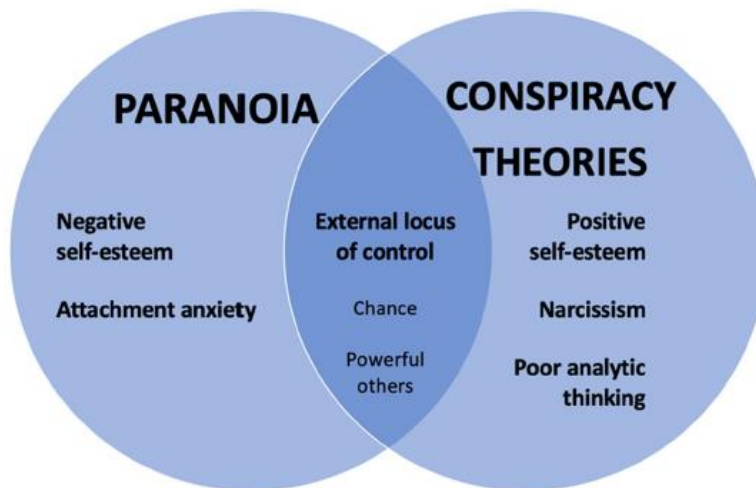


Figure 4. The key differences between paranoia and belief in conspiracy theories – taken from Alsuhbani *et al.*, (2022)

Greenburgh and Raihani (2022) argue that self-referential concern is the key distinguishing feature between paranoia and conspiratorial thinking. The authors point out that interpersonal threat tends to be at the core of paranoid ideas – individuals experiencing paranoia tend to have excessive concerns that harm will come to them personally. Conspiratorial beliefs on the other hand tend to be centred around powerful entities (*e.g.*, the government) harming a particular cultural group or way of life or society as a whole (Greenburgh *et al.*, 2022). By virtue of this, conspiracy theories often tend to be more political in nature.

Reflecting on these ideas, Greenburgh and Raihani (2022, p.2) stated, “it is possible that the self-referential beliefs that are more characteristic of paranoia are more common when individuals perceive themselves as being socially isolated or as not belonging to any specific social group, whereas conspiracy thinking may be more common when individuals feel a stronger sense of belonging and group identity.”

In the context of this study, it has been argued that the concerns that an individual has when living in low own linguistic group density areas are likely to be more paranoid and self-referential in nature – related to heightened outsider status and feelings of negative judgement the social threat this poses to them as an individual rather than a collective group.

Alternatively, in the context of the present study, individuals might not necessarily endorse conspiracy theories about the origin of Covid-19, but they could potentially have conspiratorial ideas related to threats to their linguistic ingroup. For example, Welsh speakers could believe that the English-speaking outgroup are

conspiring against them in some way. Individuals are more likely to prescribe to conspiracy theories that they think their ingroup believe (Cookson *et al.*, 2021). It is perhaps more likely that such conspiratorial beliefs would circulate amongst the ingroup, and therefore might be more prevalent in higher own linguistic group density areas.

4.4.4 Strengths and limitations

A key strength of this study is its novel application of group density methods to linguistic groups. Robust evidence of a linguistic group density association was found, which persisted after adjusting for individual and area level covariates. This adds to existing studies that have found group density associations for other socially salient identities (Saville, 2020; Saville & Mann, 2022). Another considerable strength is the study setting – the Welsh context is useful in that it allows for a relatively clean test of linguistic group density associations.

An additional strength of this study lies in its utilisation of a high-quality secondary data source which comprises a large sample that is representative of the adult population of Wales (Saville *et al.*, 2022). That said, questions may be raised about the sampling method in terms of its effectiveness in acquiring a representative racially minoritised sample. Therefore, findings pertaining to the non-White British group in this study should be interpreted with caution. Acquiring a representative sample of racialised communities is a consistent issue with survey data conducted globally (*e.g.*, see Lynn *et al.*, 2018) but it is perhaps particularly challenging in Wales, which has an especially low population of racially minoritised groups (~5%). This is a recurring challenge for studies attempting to stratify findings by ethnic group in Wales (*e.g.*, see Welsh Government, 2023).

The key limitation to note is that the present study did not use a validated measure of psychosis. It is therefore unclear whether a linguistic group density association in Wales exists for psychosis. The use of a conspiratorial belief about Covid-19 as an analogue for psychosis perhaps explained the absence of an association when this variable was used. A further limitation relates to the predictive value of the psychosis analogue variable. Consistent with findings in other studies (*e.g.*, Freeman *et al.*, 2022), conspiratorial beliefs about Covid-19 were highly endorsed in the present study. Substantial endorsement of these beliefs across the different groups could have influenced the predictive value for the psychosis analogue variable in the present

study. This again underscores the importance of using a measure of psychosis with good reliability, validity, and sensitivity.

Finally, this study is also cross-sectional so the direction of causation cannot be established. Future work should test the presence of a linguistic group density association using longitudinal methods.

4.4.5 Conclusions and future research

This study found evidence of a linguistic group density association for mental illness whereby the association between individual-level linguistic identity and reporting of a mental health condition was moderated by local level linguistic composition. Group density relationships have not been examined in linguistic groups, so this is an interesting and novel finding in the literature which suggests that group density associations typically observed in minoritised ethnic groups extend to linguistic identities.

However, contrary to hypotheses, there was evidence of a linguistic group density association for a psychosis analogue variable (conspiratorial beliefs about Covid-19). This might mean that group density associations for psychosis are exclusively observed for minoritised ethnic groups and not for linguistic characteristics. Other explanations for this finding are connected to the validity of considering conspiratorial beliefs about Covid-19 as an analogue for psychosis. For instance, it is likely that lower own group density introduces an interpersonal threat – related to perceptions of negative judgement, heightened feeling of outsider status, and depleted self-esteem. It could therefore be argued that this presents a risk for paranoia specifically. Paranoid and conspiratorial belief systems are related but distinct concepts – the latter is less concerned with interpersonal threat and more associated with higher self-esteem (Alsuhibani *et al.*, 2022; Greenburgh & Raihani, 2022). These differences are another plausible explanation for the absence of a linguistic density association for conspiratorial belief about Covid-19.

To conclude, examining group differences in density associations is useful in terms of shedding light on the possible social processes behind these findings. More work is needed to empirically test the mechanisms that have been proposed in the present study.

Chapter 5: General discussion

5.1 RESTATING THESIS BACKGROUND AND AIMS

In order to reduce mental health inequalities, it is vital to understand how the social context can have protective and detrimental psychological consequences (Marmot, 2017). **Chapter 1** began by introducing the social gradient in mental illness which relates to findings that individuals who are more socially disadvantaged have markedly poorer mental health than those who are more advantaged (Marmot, 2020). Citing the work of Adler (Adler & Wolfe, 1927), Pickett and Wilkinson (2010, p.40) have said, “to be human means being highly sensitive about being regarded as inferior.”

It has been argued that the poorer mental health observed in people lower down in the social hierarchy is driven by negative social comparisons – Marmot has called this “status syndrome”. (Marmot, 2006). Given that the social gradient is particularly steep for psychotic disorders (Marmot, 2010), it appears that status syndrome is particularly relevant in terms of understanding the processes involved in the development and maintenance of psychosis.

The fact that the social and structural determinants of mental health empower some groups but disempower others based on their social characteristics is thought to be behind findings that some minority groups are at increased risk of mental illness, particularly psychosis (Anglin, 2020; Jongsma *et al.*, 2021). This has mostly been observed in racially minoritised groups but there is some evidence that this extends to other groups *e.g.*, sexual minorities (*e.g.*, Post & Veling, 2021).

Spurred by early ecological studies finding evidence of marked geographical variation in rates of mental illness (*e.g.*, Faris & Dunham, 1939), studies began to examine the association between minority group status and mental health at a more local level (Halpern, 1993). Group density studies found that the degree of risk associated with belonging to a minority group is somewhat dependent the local level proportion of others belonging to the same group (Boydell *et al.*, 2001). These studies found evidence that minority group individuals living in neighbourhoods where there were fewer of their own group were at higher risk of mental illness than minorities living in areas where their group was well-represented. These associations remained after adjustment of individual and area-level covariates *e.g.*, age, gender, and

deprivation (Bosqui, Hoy, & Shannon, 2014).

Despite group density findings being well-established in the literature, little is known about the mechanisms behind these associations (Baker *et al.*, 2021; Bosqui, Hoy, & Shannon, 2014). Chapter 1 proposed theoretical frameworks that could shed light on this. Drawing on Marmot's status syndrome (Marmot, 2006) and the social identity approach (Tajfel, 1979; Tajfel & Turner, 1979), it could be that group density associations are exclusively observed in marginalised minority group, including racially minoritised groups, because existing negative social comparisons might be exacerbated in individuals living in neighbourhoods where there are fewer others who are in a similar social position to them. On the other hand, for individuals who perceive themselves as higher in the social hierarchy, living in a lower own group density area might not trigger the same degree of social evaluative threat (Dickerson, 2008).

Another possibility proposed is that lower own group density is harmful regardless of the group the individual belongs to. While a certain identity characteristic might be perceived as higher status more generally, it might be evaluated more negatively in a neighbourhood where it is less common. Humans are highly attuned to ingroup and outgroup categorisations (Hornsey, 2008), therefore the experience of being different to a large proportion of others in one's local area based on a socially salient characteristic might be a pertinent reminder of one's position as an outsider. This alone may be sufficient to cause negative social comparisons and a risk to mental health. This is consistent with studies finding group density associations in mental health for social characteristics other than minoritised ethnic group status *e.g.*, social class and political affiliation (Saville, 2020; Saville & Mann, 2022).

Social capital was also proposed as a potentially important mechanism involved in group density associations. This thesis has largely focussed on Putnam's theory of social capital *i.e.*, "connections among individuals – social networks and the norms of reciprocity and trustworthiness that arise from them." (Putnam, 1993, p.36). Social capital is thought to buffer social stress – lower own group density could therefore be harmful because of restricted access to protective social capital.

Tying these ideas of group membership and negative social comparison to psychosis specifically, Selten and colleagues' (2005, 2013, 2023) social defeat hypothesis suggests that "unwanted outsider status or subordinate position" sensitises the mesolimbic dopamine system which increases risk of psychotic experiences (Selten & Ormel, 2023, p.610). The authors argue that this offers a parsimonious

explanation behind findings of elevated rates of psychosis in groups in socially defeating positions, *e.g.*, racially minoritised groups.

The experience of social defeat arising from living in lower own group density area likely has detrimental mental health consequences for all (*e.g.*, McCutcheon *et al.*, 2018; Veling *et al.*, 2016), but this is perhaps especially harmful for individuals who are more prone to psychosis, who have been found to have a heightened sensitivity to social stress (Freeman *et al.*, 2015; Myin-Germeys & van Os, 2007; Reininghaus *et al.*, 2016; Veling *et al.*, 2016). Further, recurrent exposure to psychosocial result in increasingly sensitised responses (Longden & Read, 2016; van Winkel, Stefanis & Myin-Germeys, 2008). The stress-vulnerability model suggests that psychotic symptoms arise when “a threshold of stressors exceeds the individual’s vulnerability level” (Myin-Germeys & van Os, 2007, p.410).

This thesis sought to gain an insight to these possible mechanisms by exploring group density phenomena in linguistic groups in Wales. The Welsh social context provided the opportunity for a relatively clean test of linguistic group density associations because Welsh speakers and non-Welsh speakers typically share a common White British ethnic identity⁵² but there is significant geographical variation in the rates of Welsh speakers. Welsh speakers comprise the minority at a national level but when considered at a more fine-grained geographical level, they are a majority in many areas. The relationship between language, status, and mental illness is complex when considered at a local level. The Welsh language has faced a long history of marginalisation and a struggle for survival, while English on the other hand is the language associated with “greater power, prestige, influence and/or communicative reach”. That said, In Wales, Welsh speakers generally occupy a more socially advantaged position and have better mental health relative to English speakers who are more disadvantaged and have poorer mental health (Saville, 2020).

Some studies have examined the association between linguistic status and mental health, yielding mixed results (Charter *et al.*, 2014; Puchala *et al.*, 2013; Saville, 2022; Suvisaari *et al.*, 2014). However, there is a dearth of research exploring this at a more local level – this thesis aimed to address this key gap in the literature.

The primary aim of this thesis was to use methods to test the presence of a linguistic group density association for mental health in Wales and its possible

⁵² Identify as White English, Scottish, Welsh, Cornish, Northern Irish, or British

mechanisms. This novel application of group density methods to language groups in Wales provided the opportunity to gather clues about the processes driving group density phenomena.

5.2 SUMMARY OF KEY FINDINGS

Chapter 2 reported the results of a systematic review and multilevel meta-analysis of the group density effect in psychosis which provided the foundation for this thesis. This review sought to gain a deeper understanding of the group density literature – this involved applying broader eligibility criteria to examine associations in racially minoritised groups, in addition to any studies that included groups defined by other identity characteristics. As well as epidemiological studies, the review also sought to include studies that had examined group density associations using alternative methods to gather any evidence that could provide more clues about the mechanisms behind these findings.

A key aim of this study was to derive an up-to-date estimate of the group density effect in psychosis and examine potential moderating variables. Of particular interest was whether there was any evidence that group density relationships differed by minority group. Group differences are theoretically interesting because they shed light on the possible social processes driving associations. In addition to this, country, time, area size and whether studies used clinical or non-clinical psychosis outcomes were also tested as moderators.

Thirty-two studies were included in the narrative review and ten in the meta-analysis. The majority of studies were cross-sectional epidemiological studies conducted in urban areas in the UK and the Netherlands. Most studies examined associations in ethnic minority and migrant groups, with three including groups defined by other social characteristics, namely, single marital/household status, disadvantaged social class, social fragmentation, and low academic grades.

Notable studies using other methods included Veling and colleagues (2014, 2016) studies of virtual group density provided some insight into the possible mechanisms behind group density associations. Individuals with higher psychosis liability had an elevated physical stress responses to socially stressful virtual environments, including low own group density conditions (Veling *et al.*, 2014; Veling *et al.*, 2016). Cognitive biases and low self-esteem were also found to moderate the association between exposure to social stress and psychosis (Pot-Kolder *et al.*, 2018).

Another study found evidence that *perceived* group density (as opposed to an objective measure of group density) was also associated with psychosis risk. This study found that Black individuals who reported change in the ethnic density of their neighbourhood during childhood reported more psychotic experiences than those who did not (Anglin *et al.*, 2020).

Results from the meta-analysis revealed that a ten-percentage-point decrease in group density was associated with a 20% increase in psychosis risk, but this was effect was strongly moderated by specific minority group, with particularly marked associations being found in Black groups. There was some evidence that associations were stronger in studies that used measures of clinical psychosis as opposed to subclinical experiences for example. Further, there was some weak evidence that group density associations were stronger when examined at less populous geographical units. The meta-analysis revealed no evidence of a group density association for other social characteristics, however, there due to the small number of studies, this should be tentatively accepted.

This review highlighted significant gaps in the literature, notably the absence of studies exploring associations in groups defined by other social characteristics, including linguistic groups. Furthermore, the evidence base primarily comprises studies conducted in similar settings, such as urban areas in the UK and the Netherlands. Lastly, there is a scarcity of research examining group density using alternative methods better equipped to capture the subjective experience of group density.

This brings us to **Chapter 3** – a qualitative study exploring sense of belonging in individuals with psychosis living in linguistically similar and dissimilar communities in North Wales. This study involved recruiting Welsh speaking and non-Welsh speaking participants with experience of psychosis who live in communities within two majority Welsh speaking local authorities in Wales – Gwynedd and Ynys Môn. This study addressed key gaps in the literature that were identified in Chapter 1 and 2 by exploring the subjective experience of high- and low own group density from the perspective of individuals experiencing psychosis. This provided a window to the potential protective and detrimental influences of own group density. Secondly, there has been limited exploration of linguistic status in the context of group density studies (Baker *et al.*, 2021). This study therefore adopted a qualitative approach to explore the mechanisms proposed in Chapter 1 and Chapter 2 with interviews exploring issues

relating to identity, belonging and social capital. Finally, this study also a novel exploration of the experience of group density in a rural context.

Four themes⁵³ were derived from the reflexive thematic analysis of the interview transcripts (Theme 1. Exposure to social adversity, Theme 2. Place as a reservoir of risk or resilience, Theme 3. Outsider status, Theme 4. Protective strategies). The experience of not belonging and feeling like an outsider appeared to be more common in non-Welsh speakers living in high density Welsh speaking communities. Frequently participants perceived negative judgement because of some combination of their English national identity or their inability to speak Welsh and commonly felt this signalled them as outsiders in their community. For Welsh speakers, however, living in a predominantly Welsh speaking area was more frequently viewed as identify affirming and seen as a way of belonging and fitting in.

While language was viewed as a particularly salient marker of ingroup and outgroup membership, it is important to note that participants also perceived outsider status and negative judgement based on other social characteristics. This was predominantly related to their experiences of psychosis, but others talked about feeling different because of their appearance or another salient identity characteristic (sexual minority status and non-White British status).

In terms of social capital, what was described by both Welsh speakers and non-Welsh speakers was typical of bonding social capital *e.g.*, “close-knit” and exclusive communities. This appeared to be harmful for individuals who perceived exclusion from these close community support networks (more frequently the non-Welsh speaking participants.)

In terms of the experience of group density in a rural context, participants from both groups noted the lack of privacy in rural communities which was perceived as intrusive and claustrophobic. In relation to protective influences, many spoke of their affinity to the natural environment and the opportunities for outdoor activities that their location afforded them.

⁵³ Full list of themes and subthemes: **Theme 1:** Exposure to social adversity, Subtheme i: Childhood and young adulthood, Subtheme ii: Present social adversity. **Theme 2:** Place as a reservoir of risk or resilience, Subtheme i: Bonding social capital, Subtheme ii: Psychosis and rurality. **Theme 3:** Outsider status, Subtheme i: Welsh language and national identity, Subtheme ii: Experiencing psychosis, Subtheme iii: Appearance, Subtheme iv: Other minority identity. **Theme 4:** Protective strategies, Subtheme i: Navigating identity, Subtheme ii: Safety behaviours, Subtheme iii: Social connectedness.

This study also captured some of the strategies that participants took to shield themselves from the negative psychological consequences of exclusion – these included measures to construct a positive and stable social identity, engaging in safety behaviours, and social connection.

To summarise, living in a low own linguistic group density area appeared to heighten experience of outsider status and perceptions of negative judgement. It seems feasible that these experiences would extend to Welsh speakers living in low own linguistic group density, but this was not explored in this study.

Building on these findings, **Chapter 4.** aimed to quantitatively test the presence of a linguistic group density association for mental health in Welsh speakers, non-Welsh speakers, and non-fluent Welsh speakers. To measure mental illness, this study used self-reporting of a mental health condition. As an analogue variable for psychosis, endorsement of a conspiratorial theory about Covid-19 was used – specifically, the belief that Covid-19 was deliberately planned. In addition, “outsider status” was explored as a potential mechanism which was measured in terms of disagreement or strong disagreement with the statement *“I feel a sense of belonging to where I live”*.

In line with findings from Chapter 3 low own linguistic density was associated with increased “outsider status” such that individuals living in a more linguistically dissimilar area reported a low sense of belonging to their area. This was observed in both Welsh speakers and non-Welsh speakers but not non-fluent Welsh speakers. As hypothesised, there was also evidence of a linguistic group density relationship for mental illness – living in a lower own linguistic group density area was associated with increased reporting of a mental health condition in Welsh speaking and non-Welsh speaking respondents. Again, there was no evidence of an association for non-fluent Welsh speakers.

Contrary to the hypothesis, there was no evidence of a linguistic group density interaction for conspiratorial beliefs about Covid-19 (the psychosis analogue variable). It was also found that “outsider status” did not attenuate linguistic group density interactions for mental illness or conspiratorial beliefs.

5.3 CONTEXTUALISING FINDINGS

The pooled effect size estimate reported in Chapter 2 was similar in magnitude to previous meta-analyses of the group density effect in psychosis (Bécares, Dewey, &

Das-Munshi, 2018; Bosqui, Hoy, & Shannon, 2014). However, contrary to previous reviews, this review was the first to find meta-analytic evidence that lower own group density does not confer the same risk across minority groups. Associations were markedly stronger in Black groups, particularly Antillean Caribbean migrants in the Netherlands. There was also evidence of a stronger association in the White other group.

Linking in with mechanisms proposed in Chapter 1, the more deleterious associations observed in Black groups might be related to their experience of belonging to a marginalised and disempowered group in a lower own group density area. The negative consequences associated with this may be exacerbated when living in an area where there are fewer others who are in a similar social position. With reference to Whitley and colleagues (2006), visible minorities may feel more “singled out” and subject to greater discrimination which is perhaps more likely to go unchallenged living predominantly White neighbourhoods (Boydell *et al.*, 2001; Whitley *et al.*, 2006).

The limited studies that explored group density associations for other identity characteristics tended to look at other types of marginalised identities, *e.g.*, deprived socioeconomic status and poor academic attainment (Zammit *et al.*, 2010).

While no studies examined mechanisms relating to identity and social capital that were proposed in Chapter 1. Studies that examined group density using other methods provided some useful insights into possible mechanisms. In line with previously reported evidence (Ellet, Freeman, & Garety, 2008; Myin-Germeys *et al.*, 2001, Myin-Germeys & van Os, 2007; Reininghaus *et al.*, 2016), Veling and colleagues VR studies found evidence that compared to controls, psychosis prone individuals had heightened stress responses to virtual environments simulating social stress, including lower group density (Veling *et al.*, 2014; Veling *et al.*, 2016). Anglin and colleagues’ (2020) study of perceived group density can perhaps be understood in relation to the social identity framework (Tajfel, 1979; Tajfel & Turner, 1979), and Selton and colleagues social defeat hypothesis (2005; 2013; 2023). Perceived changes to the ethnic composition of their local area may precipitate feelings of identity threat and social defeat, which may drive experiences of psychosis.

VR studies also found that the association between socially stressful virtual environments and psychosis was moderated by low self-esteem and cognitive biases (Jongeneel *et al.*, 2018; Pot-Kolder *et al.*, 2018). This is in line with Freeman and

colleagues experience-based studies that found that exposure to a busy urban area had a deleterious impact on anxiety, depression, negative self and other schemas, and jumping to conclusions cognitive bias – key emotional and cognitive processes that have been found to drive experience of psychosis, particularly paranoia (Ellet, Freeman, & Garety, 2008; Freeman *et al.*, 2015).

Further evidence comes from an fMRI study by McCutcheon (2018) finding that in a non-clinical sample of Black individuals, living in lower own group density areas, exposure to White outgroup faces was associated with increased right amygdala response – a brain area associated with threat anticipation.

In line with McCutcheon's study (2018), the social identity approach (Tajfel, 1979; Tajfel & Turner, 1979), and the social defeat hypothesis (Selten & Ormel, 2023), Abed, Abbas & St John-Smith (2022) submitted a letter highlighting the role of social threat in group density associations and proposing evolutionary models as another useful framework for understanding the group density effect. The authors wrote:

“A relevant example of an evolutionary formulation based on the concept of mismatch is the Outgroup Intolerance Hypothesis (Abed and Abbas, 2011 & 2014). This model proposes that novel aspects of the modern human environment whereby humans live in close proximity of many strangers and/or cut off from access to kinship/ingroup networks is of pivotal importance in increasing the risk of psychosis in vulnerable individuals.”

The experience of low own group density involves living amongst a high proportion of outgroup members – which is a relatively novel experience in our evolutionary history which included strong ingroup/outgroup distinctions. Abed and Abbas (2011, p.136) suggest that this deviation from our ancestral environment (the environment of evolutionary adaptedness) is thought to cause a mismatch in the social brain system which has been “shaped by selection over thousands of generations within a specific set of social/environmental conditions”.

This theory is also relevant to linguistic group density associations – language is a clear marker of ingroup and outgroup membership and living in linguistically diverse communities is a social context that would not have been experienced in our environment of evolutionary adaptedness. See Appendix 17. for correspondence from Abed, Abbas & St John-Smith (2022).

To summarise the evidence presented so far, it is surmised that living in a lower

own group density area precipitates anxiety over outgroup status and one's social position in relation to others. This is likely to have negative mental health consequences for all, however, these experiences are perhaps particularly harmful for psychosis prone individuals, who have been found to have heightened emotional and cognitive responses in response to socially stressful environments, including low own group density (Veling *et al.*, 2014; Veling *et al.*, 2016; McCutcheon *et al.*, 2018). This provides an explanation for why epidemiological studies into group density associations appear to be more marked for psychosis (Bécares, Dewey & Das-Munshi, 2018; Shaw *et al.*, 2012).

These possible mechanisms were explored in depth in Chapter 3, which added to a growing body of research that has explored how individuals with psychosis navigate their social environment (Freeman *et al.*, 2015; Söderström *et al.*, (2016 Stanghellini *et al.*, 2020). While Whitley *et al.*, (2006) has explored group density in a non-clinical sample of ethnic minorities living in a predominantly white community, as far as I am aware, this is the first study to explore the experiences of high and low own group density in individuals with psychosis.

In the context of Welsh speaking communities, English language and identity was perceived as lower status this appeared to drive negative social comparisons and feelings of “outsider status” in non-Welsh speaking participants. These findings suggest that the group density mechanisms proposed in Chapter 1 appear to extend to linguistic identities. That is, living in a low own linguistic group density area could lead to the development and maintenance of psychotic experiences through experiences of social defeat i.e., “unwanted outsider status or subordinate position” (Selten & Ormel, 2023) and other related processes *e.g.*, negative social comparison (Tajfel & Turner, 1979) status anxiety (Layte & Whelan, 2014) and fear of negative evaluation (Colins *et al.*, 2005) and social evaluative threat (Dickerson, 2008).

While language appeared to the most salient way in which ingroups and outgroups were established, participants from both groups has strong concerns about being negative judged – whether this be related to their language or national identity or another salient part of their identity. Sass *et al.*, (2017, p.27) reports this as a typical experience of psychosis – specifically, “feelings of social paranoia or social anxiety,” for example, “feeling as though others are unusually focused on oneself, whether commenting, judging, or simply staring in a way that makes the subject feel self-conscious, guilty, ashamed, or anxious”. Given that lower own group density appears

to trigger negative social comparisons, this perhaps explains why it might pose a particularly strong risk to psychosis prone individuals.

This study also shed light on the potential role of social capital in group density associations. Studies examining the association between social capital and psychosis risk have yielded mixed results (Kirkbride *et al.*, 2007; Kirkbride *et al.*, 2008). Bonding social capital may be protective for the ingroup, but because of its inward looking and exclusive nature, it is perhaps particularly damaging to outsiders (Kirkbride *et al.*, 2008; Putnam, 2000; Saville, 2020).

This study provided insights into the experience of group density in a rural context. It might be that the experience of lower own group density is more harmful in areas with high bonding social capital. This sense of “everyone knowing everyone” which is characteristic of small town and rural living might make an individual feel more “singled out” when they differ to their community based on a socially salient characteristic (Boydell *et al.*, 2001).

Study findings can also be understood within Berry’s five acculturation strategies (Berry, 1980, 2005). Parallels can be made between the non-Welsh speakers negotiating with Welsh and English identities but finding it difficult to establish a sense of belonging to either group. This is characteristic of a marginalised identity i.e., “feeling trapped between two cultures and alienated from both” (McIntyre, Elahi, & Bentall, 2016, p.622) which has been found to be associated with an increased risk of psychosis (El Bouhaddani *et al.*, 2019; Veling *et al.*, 2010). For Welsh speakers on the other hand, living in Welsh speaking community appeared to strengthen identity and belonging. Lower own group density perhaps increases the risk of a marginalised identity, conferring psychosis risk via reduced self-esteem (McIntyre *et al.*, 2018; Veling *et al.*, 2010).

Participants took measures to protect their self-esteem and shield themselves from the negative psychological consequences of not belonging. These included strategies to construct a positive and stable social identity, engaging in safety behaviours, and establishing healthy and meaningful connections with others.

Themes fit well within the Power Threat Meaning Framework (Johnstone *et al.*, 2018) which provides a useful model for understanding the processes behind group density associations. The operation of power included participants past and present experiences of social adversity as well as the perceived protective and detrimental aspects of their local area relating to access to social capital and their experiences of

living in a rural environment. “Threat and meaning” captured participants experience of feeling like an outsider in their community and how they made sense of this. Response referred to the protective strategies that participants took to protect their mental health.

The next step was to quantitatively test the presence of a linguistic group density association. Chapter 4 found that the association between linguistic status and mental health was moderated by local level linguistic composition – in Welsh speakers and non-Welsh speakers, living in a lower own linguistic density area was associated with increased reporting of mental illness. This is in line with evidence that has found that group density associations for mental health extend to other socially salient characteristics (Saville, 2020; Saville & Mann, 2022).

Given evidence that lower own group density appears to be a stronger risk factor for psychosis, our finding that a linguistic group density association was not observed the psychosis analogue variable (conspiratorial belief about Covid-19) was unexpected. Further, our finding that “outsider status” did not attenuate group density associations was also not expected given that this has been proposed as a key mechanism. Unpacking these findings, it might be that lower own group density might pose a risk because it triggers negative social comparisons and exacerbates “unwanted outsider status or subordinate position” (Selten & Ormel, 2023, p.610). This may not have been adequately captured by the “outsider status” variable.

Alternatively, the presence of a linguistic group density interaction for mental illness but not the psychosis analogue variable might reflect differential causal mechanisms. For example, the general mental health risk could be more related to social isolation or reduced social support (Tseng *et al.*, 2021), while the processes driving psychosis risk might be more related to issues of identity and negative social comparison.

Three explanations are proposed for the absence of a linguistic group density interaction for conspiratorial beliefs about Covid-19. Firstly, it might be that group density relationships do not extend to linguistic groups – supported by Chapter 2 findings, associations might only be found in marginalised minority groups *e.g.*, racially minoritised groups. Secondly, conspiratorial views about Covid-19 are reasonably common (Freeman *et al.*, 2022), therefore might not represent a useful analogue for psychosis. Finally, lower own group density is likely to confer risk of paranoia specifically. There are key distinctions between paranoid and conspiratorial

belief systems which might explain the absence of an effect for endorsement of a Covid-19 related conspiracy theory. Chiefly, the former is associated with low self-esteem and the latter high self-esteem and grandiosity. Further, paranoia is more tied to interpersonal threat than conspiratorial thinking (Alsuhbani et al., 2022; Greenburgh & Raihani, 2022).

5.4 A PROPOSED GROUP DENSITY THEORETICAL MODEL

Synthesising the findings of this thesis, this section introduces a comprehensive model delineating the possible mechanisms that underlie associations between group density and psychosis, this is shown in Figure 1.

The formulation of a theoretical model has been described by Smaldino (2020, p.299): “To construct a theory of a given phenomenon, we must initially deconstruct our system into pertinent components, delineating the potential attributes of these components, elucidating the interconnections between them, and articulating the temporal dynamics through which these attributes and relationships may undergo change.” The theoretical framework presented in this section has evolved and undergone refinement throughout the entire research process of this thesis. It serves as a comprehensive synthesis of the research findings, aligning them with existing theories to gain insight into group density phenomena on a broader scale. Additionally, it offers a theoretical foundation for testing in future studies. Whilst it might be challenging, the development of theories and the conduct of theory-driven research is of critical importance, especially considering the ongoing replicability crisis in the social sciences (Smaldino, 2020).

This model incorporates ideas from a range of interdisciplinary theoretical frameworks discussed throughout this thesis, including cognitive models of psychosis (Freeman *et al.*, 2002), the integrated sociodevelopmental-cognitive model (Howes & Murray, 2014), the social defeat hypothesis (Selton & colleagues, 2005, 2013; 2023), the social identity approach (Tajfel, 1979; Tajfel & Turner, 1979), and Putnam’s theory of social capital (1993, 2000). This model is also based on studies finding that exposure to social stress exacerbates anxiety, negative beliefs about the self and others, low self-esteem, and cognitive biases, and is associated with increased experiences of psychosis, including paranoia and hearing voices (Ellet, Freeman, & Garety, 2008; Freeman *et al.*, 2015; Veling *et al.*, 2014, 2016).

Prior exposure to social adversity might make individuals more vulnerable to

psychotic experiences when exposed to a low own group density environment. Howes and Murray (2014, p.1677) suggest that adversity “biases the cognitive schema that the individual uses to interpret experiences towards paranoid interpretations.” with repeated exposure leading to increasingly sensitised responses to psychosocial stressors (Longden & Read, 2016; van Winkel, Stefanis & Myin-Germeys, 2008). In Chapter 3, participants had commonly experienced significant adversity and trauma which often centred around early experiences of alienation, rejection, and victimisation. Many noted how these experiences shaped the way they perceive themselves and others, for example, Morgan commented, “*In the village where I was brought up, I was always an outsider. I always felt like an outsider, felt different to everybody else*”. Participants accounts might reflect the initial formation of negative self and other schemas which would then shape how they respond to subsequent experiences of social stress (Humphrey *et al.*, 2021).

Living in a low own group density highlights a salient difference between the self and others. Drawing on cognitive models of psychosis (Freeman *et al.*, 2002). The stress arising from this may then precipitate an anomalous experience (an altered state of consciousness) (Freeman *et al.*, 2002). What follows is a search for the meaning behind this experience whereby the individual draws upon their experiences and their beliefs about themselves and others (Freeman *et al.*, 2002; Humphrey *et al.*, 2021). Negative self and other schemas and low self-esteem might then exacerbate negative social comparisons and heightened experiences of “unwanted outsider status or subordinate position” (Selten & Ormel, 2023). This may be further aggravated in areas with high bonding social capital – it has been argued that perceiving the closeness and togetherness of a community from the perspective of an outsider looking in is perhaps especially harmful (Putnam, 2000).

example, Freddie explained a sense of standing out and feeling different to others in his community, when he was asked why, his first response was “*Because I’m English...*”

The presence of a theory of mind cognitive bias might also be relevant in terms of the risk of low own linguistic group density, particularly in contexts where the individual lacks proficiency in the majority language. In individuals vulnerable to psychosis, language barriers might present an additional layer of complexity when attempting to judge the thoughts and intentions of others, perhaps increasing the risk of the individual misinterpreting the actions or behaviours of others as threatening (Bora & Pantelis, 2013).

Similar mechanism might also apply to the development and maintenance of hallucinations which are thought to arise via an internal or external trigger that the individual then tries to make sense of. Howes & Murray (2014) argue that exposure to psychosocial stress can also exacerbate cognitive biases, which might cause biases behind hallucinatory experiences, *e.g.*, source monitoring errors whereby the individual misattributes internal speech as occurring externally.

Hoffman (2007, 2008) also suggests that a lack of social contact has a role in the development and maintenance of hallucinations. The social deafferentation hypothesis suggests that isolation cause the “social brain” to compensate for the loss of social input in the form of hallucinations. Supporting this hypothesis, Hoffman (2007, 2008) reported that interviews with voice hearers revealed that long experiences of isolation commonly preceded the onset of hallucinations. One example reported by participants was travelling alone to a country where they could not speak the language

In Chapter 3, participants often discussed difficulties with social interaction and relationships, there is also evidence that individuals report lower social support in lower own group density areas (Das-Munshi *et al.*, 2010). It is also likely that perceived or actual exclusion to social capital is higher in lower own group density areas. This lack of social contact may contribute to the formulation of a persecutory belief (Freeman *et al.*, 2002). In the absence of social interaction, it is more likely that unusual beliefs will go unchallenged and untested and are therefore more likely to be sustained (Freeman *et al.*, 2002).

Safety behaviours may also be a process by which psychotic experiences are developed and maintained. In line with previous research (Freeman *et al.*, 2001; Freeman *et al.*, 2007), avoidance was the most common safety behaviour exhibited by

participants in Chapter 3. An example of this might be avoiding the linguistic outgroup due to perceiving them as a threat. This could contribute to the continuation of psychotic experiences because of reduced opportunities for their beliefs to be refuted.

To summarise, the process outlined above provides explains why an individual might move up the paranoia hierarchy when exposed to low own group density – concerns over feeling different and negatively judged may activate negative schemas about the self and others, (*e.g.*, the self as vulnerable and others as a threat) which might then progress to persecutory delusions via cognitive biases (jumping to conclusions or theory of mind). Exclusion from social capital, reduced social support, and safety behaviours (*e.g.*, avoidance) may contribute to the maintenance of psychosis. In line with Reininghaus *et al.*, (2016) sensitivity to outsider status may then progress into more generalised sensitivity to the social environment and increased threat anticipation during episodes of frank psychosis.

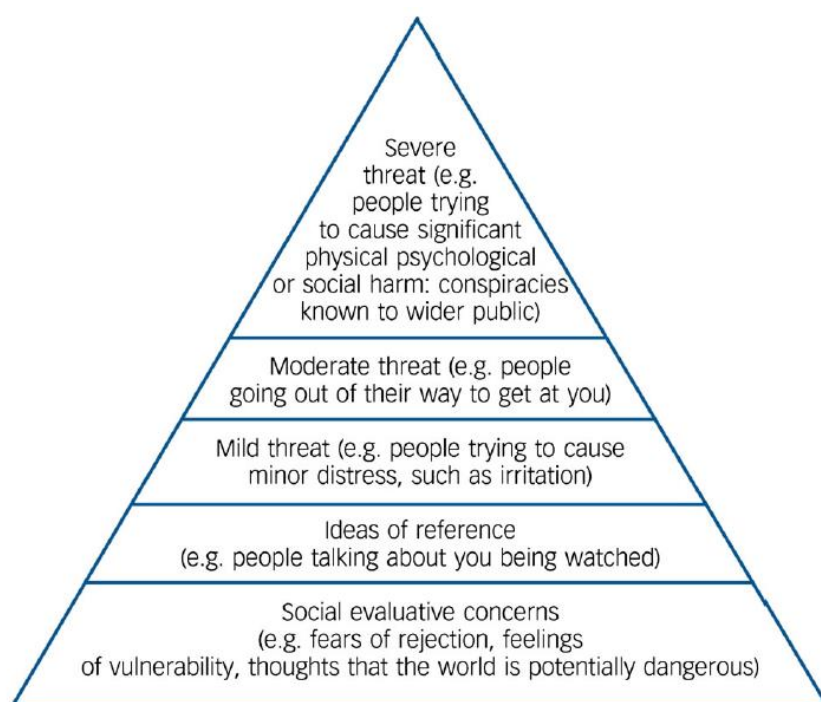


Figure 2. The paranoia hierarchy – taken from Freeman & Garety (2014)

5.5 IMPLICATIONS

This thesis has built on the evidence-base for the group density effect in psychosis and argued that outsider status and perceptions of belonging to a lower status or inferior group might drive the risk of low own group density. While this thesis found evidence of a linguistic group density association for self-reported mental illness, it is not possible to arrive at any firm conclusions regarding whether group density associations in psychosis extend to linguistic groups. There was, however, qualitative evidence that experiences relating to outsider status and negative social comparison appeared to extend to individuals living in low own linguistic group density communities. This section discusses the clinical and policy implications of thesis findings.

Interventions aiming to reduce the risk of minority groups living in low own group density areas should centre around increasing sense of belonging reducing outsider status. Having a sense of belonging has been found to reduce risk of psychotic experiences via increased self-esteem (McIntyre *et al.*, 2018). This may be a particularly important target for early intervention in psychosis services (Reininghaus *et al.*, 2016).

There are additional barriers to achieving this in individuals with psychosis who may be more attuned to ingroup/outgroup categorisation and more likely to perceive this as anxiety inducing. For example, in Chapter 3, many participants made use of safety behaviours to protect themselves from potentially stressful social encounters, for example, isolating themselves from others and avoiding social interaction, which would perhaps serve to maintain any negative beliefs they might have about the outgroup. In line with the evidence around psychosis and social support (Degnan *et al.*, 2018), participants also noted difficulties in terms of establishing and maintaining positive and meaningful social connection.

However, in participants who did build the confidence to connect with people in their local area, this commonly resulted in positive experiences and increased sense of belonging, *e.g.*, “*once I made that effort people were nice. You know, my next-door neighbours are absolutely lovely... I like chatting with them and stuff...once I got used to it, I didn’t feel so anxious and afraid... people are nicer when you make the effort, they’re nice, you know.*” (Katie).

Drawing on the contract hypothesis (Pettigrew & Tropp, 2005), interventions

should therefore focus on facilitating social participation in individuals with psychosis. The importance of this is captured in this participant quote:

“I feel from kind of my learning experience, being connected to society is a huge part of acceptance and belonging and I think that’s something that I think as a mental health thing needs to be addressed. Because yeah, instead of just looking at the drugs or whatever, try and get people socially involved again...”
(Fiona).

Social participation could be in the form of inclusive social spaces that foster and positive intergroup relations and bridging social capital between different social groups in communities, which might include providing opportunities for learning Welsh. One especially powerful source of support appears to be contact with others with lived experience of psychosis – this helps individuals feel less alone in their experiences and helps them to develop connections with others who they can relate to. This idea is supported by growing studies demonstrating the efficacy of interventions that have focussed on normalising experiences and building social networks, for example, the hearing voices network and open dialogue (Galbusera & Kyselo, 2017; Longden, Read & Dillon, 2017). Making these services widely accessible in Wales would likely be highly beneficial to individuals experiencing psychosis.

Harnessing the protective characteristics of the natural environment could also be a useful target for interventions aimed at improving social participation and bolstering belonging. This is in line with evidence linking increased access to green space and blue space with reduced risk of psychosis (Engemann *et al.*, 2018; Rotenberg *et al.*, 2022). These characteristics of place are thought to be protective against psychosis via their stress-reducing properties (Rotenberg *et al.*, 2022). The natural environment also promotes physical activity which has been linked to a range of positive outcomes in individuals with psychosis, including reduced symptom severity and improved social and cognitive functioning (Firth *et al.*, 2016; Firth *et al.*, 2017).

In line with this there is also growing evidence highlighting the benefits of “adventure therapy” for persons with psychosis which encompasses a wide range of activities carried out in the natural environment, including hiking, camping, and sailing. The social participation aspect of these projects is perceived as the main therapeutic ingredient – activities provide a shared experience, which require individuals to work together as a team to pursue a goal, sometimes in challenging

circumstances (Rapsey & Pilcher, 2022). As well as improving mental health symptoms (Bowen, Neill, & Crisp, 2016), adventure therapy has been found to boost self-esteem and sense of belonging, particularly in young people (Girard *et al.*, 2021; Schell, Cotton, & Luxmoore, 2012).

There is growing evidence demonstrating the importance of place in promoting recovery individuals with psychosis through an increased sense of belonging, meaning, and purpose (Whitley & Drake, 2010). Based on Doroud, Fossey and Fortune's (2018) meta-ethnography of place in mental health recovery, Baumann *et al.*, (2022) delineated four different ways in which place can shape recovery – this provides a useful starting point for creating “enabling places” that are conducive to recovery in individuals with psychosis (Table 1).

This thesis also highlights some important implications for mental health services in rural communities. Rural areas with high bonding social capital might heighten experiences of outsider status in individuals with psychosis who perceive exclusion from community networks. This might be more common for individuals living in lower own linguistic group density communities. Additionally, measures should be taken to prepare individuals for returning home following hospitalisation, several participants talked about the intrusiveness and lack of anonymity in rural communities which presented further challenges to their recovery.

Throughout this thesis, a mixed methods approach has been used to explore the intricate interaction between individual characteristics and those of their local area. While there has been a predominant focus on individual-level approaches in understanding and mitigating the risk of lower own group density, it is important to step back and take a broader perspective to explore factors beyond individual characteristics and behaviours. This includes wider systemic and environmental factors such as the social, economic, political, and cultural context of individuals and groups.

In addition to interventions that facilitate bridging social capital and positive intergroup contact across diverse social groupings, this would also involve taking measures to create an equitable environment for all, rather than solely concentrating on the “out-group” at risk. This might include policies aimed at creating equitable access to resources, opportunities, and privileges across diverse social identities. To this end, potential strategies might include programs to improve community engagement and infrastructure, educational initiatives promoting cultural

understanding, empathy, and respect, the implementation of anti-racist and inclusive policies, as well as identity-affirming events such as cultural festivals.

Table 1. Characteristics of place that influence recovery from Doroud, Fossey and Fortune (2018) – table taken from Baumann *et al.*, (2022)

Place Impacts on Recovery	
Being	<ul style="list-style-type: none"> • Security, privacy and stability • Identity and self-esteem • Emotional bonds and place attachment • <i>Restorative properties*</i>
Doing	<ul style="list-style-type: none"> • Every day and routine activities • Recovery-promoting activities • Choice and control over doing
Becoming	<ul style="list-style-type: none"> • Hope and exploration • Overcoming challenges, goal-setting and determination • Growth and development
Belonging	<ul style="list-style-type: none"> • Connecting with others • Inclusion and integration • Affiliation and belonging • <i>Place attachment*</i>
Interrelated impacts (i.e. balancing between different ‘functions’)	<ul style="list-style-type: none"> • Being and belonging; balancing private and social lives • Moving forward; doing, being and belonging

5.6 STRENGTHS AND LIMITATIONS

This thesis has undertaken a comprehensive investigation of the group density effect across various social groupings, methods, and settings. Additionally, it has incorporated interdisciplinary theories to elucidate the possible mechanisms behind these findings. This work has built on the group density evidence-base in several ways. Firstly, the main contribution of the review reported in Chapter 2 is that it was the first to use a multilevel method of meta-analysis to provide evidence that group density relationships in psychosis are not uniform across minority groups. This suggests that understanding the different social experiences of minority groups who are more at risk might be a fruitful way of elucidating mechanisms.

Secondly, while group density associations in minoritised ethnic groups are well-established, a key gap in the literature was the lack of studies examining whether associations are also present in other socially salient identity characteristics. Another valuable contribution of this thesis is its novel application group density methods to linguistic identities. Qualitative evidence provided an in-depth insight into the subjective experience of group density from the perspective of individuals

experiencing psychosis. Findings suggest that experiences of social defeat *i.e.*, “unwanted outsider status or subordinate position” (Selten & Ormel, 2023, p.610) deriving from negative social comparisons extend to individuals living in low own-linguistic density areas.

Thirdly, this thesis found robust evidence of a linguistic group density relationship for mental illness. In addition to its use of a large generalisable sample, a key strength of this study is its use of multilevel modelling which is a powerful method that is able to examine cross-level (individual-neighbourhood) interactions, while controlling for confounds at both levels. Additionally, the study setting allowed for a relatively clean test of a linguistic group density association. Based on thesis findings, possible mechanisms behind group density associations have been proposed – these can be understood within the Power Threat Meaning Framework and the group density theoretical model shown in Figure 1.

In terms of limitations, this thesis originally set out to examine density associations for Welsh and non-Welsh speaking language groups using psychosis admission data. As these data were unavailable, the study reported in Chapter 4 was partly carried out as a conceptual exercise to examine whether conspiratorial beliefs about Covid-19 could serve as a useful analogue for psychosis (specifically paranoia). It is important to note that while these concepts share some key features, they cannot be understood as like-for like concepts as they diverge in significant ways. Additionally, this study used self-reporting of a mental health condition to measure mental illness which may have lacked validity. The mechanisms presented in this thesis are largely theoretical and based on qualitative evidence – there has been limited quantitative testing of the role of these mechanisms in linguistic group density associations.

It is important to again note that due to the cross-sectional nature of the studies presented in this thesis, the direction of causation cannot be inferred. It remains unclear whether the linguistic group density relationship observed in this thesis is driven by contextual or compositional effects – *i.e.*, is the risk of lower own group density related to the kinds of people who live in these communities or the social experience of these areas (Maxwell, 2019). Issues around causation are a limitation for the group density evidence-base more broadly given the lack of studies using longitudinal methods.

There are some limitations to note in relation to the proposed theoretical model of group density. The model largely focuses on individual-level mechanisms for

understanding group density phenomena, but it is crucial to acknowledge the complexity of multi-level causation and the interplay between ecological and individual levels. Additionally, the model borrows from interdisciplinary theoretical frameworks, and while this could be considered a strength, challenges may arise in terms of neatly integrating these diverse approaches into a single framework. Therefore, this model should be approached with caution and subjected to testing in future studies employing methods capable of conducting multilevel analyses and establishing causation.

Finally, while this thesis has discussed how early experiences of social adversity and trauma shape subsequent experiences of group density, given the well-established evidence for adverse childhood experiences [ACEs] as a significant risk factor for psychosis (*e.g.*, see Grindey & Bradshaw, 2022), perhaps a more in-depth discussion of the contribution of ACEs in group density relationships is warranted. It is plausible that ACEs play a key moderating role in the relationship between group density, distress and psychotic experiences – this idea is supported by evidence from Veling and colleagues (2016).

5.7 FUTURE RESEARCH

This thesis has paved the way for further exploration of group density associations in linguistic groups and other socially salient identity characteristics. To build on these findings, future studies should test the presence of a linguistic group density association in psychosis using a validated measure of psychosis *e.g.*, psychosis admission or symptoms data. Given there is some theoretical justification that low own group density might be a stronger risk factor for paranoia specifically, it might also be fruitful for future studies to test group density associations for specific psychotic experiences.

This body of work has also suggested key mechanisms that might drive group density associations – studies should test these proposed mechanisms using epidemiological methods, in addition to other methods that are better able to shed light on the in-situ experience of group density *e.g.*, VR, neurobiological studies, experience sampling, and further qualitative studies. Future studies should examine whether differential causal mechanisms drive group density associations for common mental health problems and psychosis. Investigation into potential moderators (*e.g.*, ACEs) is also warranted.

It would also be beneficial build on these findings by examining whether linguistic group density associations extend to other linguistic contexts, this could include other countries with Celtic linguistic minorities *e.g.*, Gaelic speakers in Scotland and Irish speakers in Ireland. This might also include other countries where a national language comprises a linguistic minority, *e.g.*, French speakers in Canada. Future studies should also use longitudinal methods to establish the direction of causation and assess when in the life course exposure to low own group density confer the greatest risk.

As well as objective measures of group density, future work should also explore perceived group density (Anglin *et al.*, 2020). It may be that individuals who are vulnerable to psychosis, (who are more sensitive to differences between themselves and others) may overestimate outgroup density, which may confer greater risk of psychotic experiences. This is a potentially interesting avenue for future research.

There has also been limited investigation of area-level sentiment towards particular identity groups which may have an important role in group density associations. For example, lower own group density in Welsh speakers is likely to confer a greater risk in areas where there are high levels of anti-Welsh sentiment – likewise for non-Welsh speakers. Another potential factor influencing group density associations which has received little attention is the rate of demographic change in areas. For example, individuals living in communities where there has been a relatively rapid change in the linguistic composition of their local area might perceive this as more of an identity threat, which would perhaps have negative mental health consequences.

5.8 CONCLUDING REMARKS

This thesis presents a novel application of group density methods to linguistic groups. offering evidence that group density associations in mental illness, conventionally observed in racially minoritised groups may also extend to other socially salient identities, including linguistic groupings. Negative social comparison and outsider status are suggested as key psychosocial processes behind these findings. Future studies should replicate and build upon these findings by verifying the presence of a linguistic group density association, employing a validated measure of psychosis. Further work should draw from mixed methods to elucidate mechanisms in addition to longitudinal approaches, which are capable of establishing causation.

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Appendices

Appendix 1. Deviations from protocol

- i. We used a quality assessment tool that was developed to assess ethnic density studies specifically (see *Appendix 5*) and GRADE assessments (*Appendix 6*) rather than the assessment specified in the protocol.
- ii. In the protocol it was not specified that a three-level meta-analysis would be used. The justification for using this method rather than a method of meta-analysis that does not account for the hierarchical structure of data is outlined in the main paper.
- iii. Methods used to categorise minority group samples were not detailed in the protocol. We also did not specify how we would decide which studies to include if there were overlapping datasets. Justifications for both are outlined in the main paper.
- iv. Our eligibility criteria were refined to only include within-groups ethnic density studies *i.e.*, those that compared risk within the ethnic minority group between ethnic density exposures, as opposed to between-groups studies which compare risk between the ethnic minority and majority at different ethnic density exposures. It would not have been appropriate to combine within- and between-group studies in the meta-analysis. We opted to only include the former given evidence of social drift in majority groups into high ethnic density areas (*e.g.*, Termorshuizen *et al.*, 2014) which may result in artefactually stronger between-group effect sizes. To derive a more reliable estimate, we also decided to only include studies that used multilevel modelling to account for non-independence of data and studies that adjusted for individual- and area-level confounds (minimally age, sex, and area-level deprivation).
- v. The protocol did not specify that effect sizes would be standardised. This decision was made after observing that included studies measured exposure differently which presented challenges for the meta-analysis. Rather than excluding studies based on how they quantified group density, we chose to rescale each effect size to estimate the response in risk to a ten percentage-point decrease in group density. Ten percentage-point was used because this was a common method used by included studies. Strengths and limitations of this approach have been outlined in the main paper.

Appendix 2. Full list of search terms

A) Population

Psychosis*
Psychotic*
Schizophrenia
Schizoaffective*
Bipolar*
“Manic depress*”
“Severe mental illness”
“Mental distress”
Hallucinat*
Delusion*
Paranoi*

B) Ethnic density terms

Minorit*
“Ethnic density”
“Ethnic enclave”
“Ethnic composition”
“Group density”

C) Outcome measures

Incidence
Prevalence
ICD*
DSM*
PANSS
CAARMS
SIPS
PSQ
Symptom*
“Psycho* proneness”
“Psycho* experiences”
“Psycho* syndrome”
“Psycho* disorder”
“Psycho* risk”
“Ultra-high risk”
“At-risk mental state”

D) Geographical terms

Neighbo*
Residential
County
Local*
Area
Zone
District
Ecological
Geograph*

Community
Municipal
Spatial
State
Tract
“Electoral ward”
“Output area”
“Dissemination area”

Combine each term in A, B, C, D with OR

Then A AND B AND C AND D AND E

Appendix 3. PsycINFO search

Set#	Searched for	Databases	Results
S1	MAINSUBJECT.EXACT.EXPLODE("Psychosis")	PsycINFO	111926
S2	Psychotic*	PsycINFO	99406
S3	Schizophrenia*	PsycINFO	141692
S4	Schizoaffective*	PsycINFO	6880
S5	Bipolar*	PsycINFO	47111
S6	"Manic depress"	PsycINFO	5157
S7	"Severe mental illness"	PsycINFO	4871
S8	"Mental distress"	PsycINFO	1548
S9	Hallucinat*	PsycINFO	16724
S10	Delusion*	PsycINFO	16174
S11	Paranoi*	PsycINFO	16040
S12	S1 OR S2 OR S3 OR S4 OR S4 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11	PsycINFO These databases are searched for part of your query.	203429
S13	MAINSUBJECT.EXACT.EXPLODE("Minority Groups")	PsycINFO	14945
S14	Minorit*	PsycINFO	57035
S15	"Ethnic density"	PsycINFO	151
S16	"Ethnic enclave"	PsycINFO	93
S17	"Ethnic composition"	PsycINFO	644
S18	"Group density"	PsycINFO	61
S19	S14 OR S15 OR S16 OR S17 OR S18	PsycINFO These databases are searched for part of your query.	57714
S20	Incidence	PsycINFO	58024
S21	Prevalence	PsycINFO	119359
S22	ICD*	PsycINFO	9800
S23	DSM*	PsycINFO	81940
S24	PANSS	PsycINFO	3461
S25	CAARMS	PsycINFO	91
S26	SIPS	PsycINFO	1146

S27	PSQ	PsycINFO	322
S28	Symptom*	PsycINFO	341715
S29	"Psycho* proneness"	PsycINFO	393
S30	"Psycho* experiences"	PsycINFO	914
S31	"Psycho* syndrome"	PsycINFO	278
S32	"Psycho* disorder"	PsycINFO	3228
S33	"Psycho* risk"	PsycINFO	585
S34	"Ultra-high risk"	PsycINFO	861
S35	"At-risk mental state"	PsycINFO	467
S36	S20 OR S21 OR S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR S28 OR S29 OR S30 OR S31 OR S32 OR S33 OR S34 OR S35	PsycINFO These databases are searched for part of your query.	525155
S37	Neighbo*	PsycINFO	26715
S38	Residential	PsycINFO	36892
S39	County	PsycINFO	32611
S40	Local*	PsycINFO	118264
S41	Area	PsycINFO	340290
S42	Zone	PsycINFO	15557
S43	District	PsycINFO	40986
S44	Ecological	PsycINFO	32296
S45	Geograph*	PsycINFO	30787
S46	Community	PsycINFO	380131
S47	Municipal	PsycINFO	5491
S48	Spatial	PsycINFO	98692
S49	State	PsycINFO	933384
S50	Tract	PsycINFO	18706
S51	"Electoral ward"	PsycINFO	18
S52	"Output area"	PsycINFO	35
S53	"Dissemination area"	PsycINFO	4
S54	S37 OR S38 OR S39 OR S40 OR S41 OR S42 OR S43 OR S44 OR S45 OR	PsycINFO These databases are searched for part of your query.	167931 3

	S46 OR S47 OR S48 OR S49 OR S50 OR S51 OR S52 OR S53		
S55	S12 AND S19 AND S36 AND S54	PsycINFO These databases are searched for part of your query.	456

Appendix 4. Screening for non-English papers (n=14)

Author	Paper	Language	Eligible for narrative review or meta-analysis?
Adriaanse <i>et al.</i> , (2018)	Psychotische ervaringen bij jeugdigen met een migratieachtergrond: Prevalentie, impact en culturele context (<i>English translation: Prevalence, impact and cultural context of psychotic experiences among ethnic minority youth</i>)	Dutch	Exclude – no group density analyses
Binbay <i>et al.</i> , (2016)	Yeni Bir Sosyal Ortama Uyum Sürecinde Psikotik Yaşantılar (<i>English translation: Psychotic Experiences in the Adaptation Process to a New Social Environment</i>)	Turkish	Exclude – no group density analyses
Chapireau (2005)	Les nouveaux longs séjours en établissements de soins spécialisés en psychiatrie : résultats d’une enquête nationale sur un échantillon représentatif (1998-2000) (<i>English translation: Old and new long stay patients in French psychiatric institutions : results from a national random survey with two-year follow-up (1998-2000)</i>)	French	Exclude – outcomes not specific to psychosis, no group density analyses
Egea <i>et al.</i> , (2004)	Trastorno esquizofreniforme. Estudio prospectivo de 5 años de seguimiento (<i>English translation: Schizophreniform disorder. A five year prospective study</i>)	Spanish	Exclude – no group density analyses
Faerden, Waal, & Rønnow (1995)	Langsiktige psykiatriske pasienter i en sektor av Oslo (<i>English translation: Long-term psychiatric patients in a sector of Oslo</i>)	Norwegian	Exclude – outcomes not specific to psychosis, no group density analyses
Hódi (1989)	A pszichózisok és öngyilkosságok területi és etnikai megoszlása a Vajdaságban	Hungarian	Exclude – no group density analyses

	<i>(English translation: The regional and ethnic distribution of psychoses and suicides in Voivodina Province, Yugoslavia).</i>		
Wenxing <i>et al.</i> , (2015)	云南省西盟佤族自治县精神障碍现况调查 <i>(English translation: A cross-sectional study of mental disorders in Ximeng Wa Autonomous County of Yunnan Province)</i>	Chinese	Exclude – no group density analyses
Melle <i>et al.</i> , (2016)	Verbesserung der Ergebnisse: Einflussfaktoren auf das Hilfesuchverhalten von Zuwanderern und ethnischen Minderheiten mit psychotischen Ersterkrankungen <i>(English translation: Improving outcomes: Factors influencing help-seeking behaviors in immigrants and ethnic minorities with first-episode psychosis)</i>	German	Exclude – no primary data (confirmed by author)
Meurice <i>et al.</i> , (2013)	Peut-on prédire, dès l'enfance, les risques de développer la schizophrénie à l'âge adulte ? Une étude rétrospective centrée sur l'hypersensibilité prémorbide; premiers résultats <i>(English translation: Is it possible to predict, as early as childhood, the risk of developing schizophrenia in adulthood? A retrospective study focused on premorbid hypersensitivity; first results)</i>	French	Exclude – no group density analyses
Mena <i>et al.</i> , (2002)	Estudio descriptivo de trastornos mentales en minorías étnicas residentes en un área urbana de Barcelona <i>(English translation: Descriptive study of mental disorders in</i>	Spanish	Exclude – no group density analyses

	<i>ethnic minorities residing in an urban area of Barcelona)</i>		
Picarda & Ineichen (1995)	La santé mentale des minorités ethniques au Royaume-Uni (<i>English translation: The mental health of ethnic minorities in the United Kingdom</i>)	French	Exclude – review paper, no primary data, no new papers found in reference list
Plancke & Amariei (2017)	Hospitalisations psychiatriques de longue durée (<i>English translation: Long-term psychiatric hospitalizations</i>)	French	Exclude – no group density analyses, outcomes not specific to psychosis
van der Stoep (2016)	Culturele diversiteit in de forensische psychiatrie; een exploratief onderzoek in Forensisch Psychiatrisch Centrum de Oostvaarderskliniek (<i>English translation: Cultural diversity in the forensics psychiatry; an exploratory study in Forensic Psychiatric Center the Oostvaarders clinic</i>)	Dutch	Exclude – no group density analyses
Vilain <i>et al.</i> , (2013)	Les facteurs de risque environnementaux de la schizophrénie (<i>English translation: Environmental risk factors for schizophrenia: A review</i>)	French	Exclude – review paper, no primary data, no new papers found in reference list

Appendix 5. Quality assessment checklist for ethnic density studies taken from Bécaries, Dewey, & Das-Munshi (2018)

Quality criteria	Score
Type of study	
Cross-sectional, case-control	1
Cohort	2
Exposure	
Explicitly defines ethnic density exposure	1
Ethnicity	
Self-ascribed ethnicity	1
Language of interview	
Language of interview in own language if English not preferred language	1
Outcome	
Assessed with structured instrument	1
Validated instrument used to assess outcome	1
Reliable instrument used to assess outcome	1
Instrument validated in racial/ ethnic group	1
Outcome assessment blind to exposure status	1
Sample size and power calculation	
n>500	1
Response rates	
For case-control/ cross-sectional studies – Response rates >60%	1
For cohort studies – Rate of attrition compared to baseline >60%	1
Response rates similar across racial/ ethnic groups or weighted to allow for differential non-response	1
Methods	
Estimate available adjusted for area-level deprivation	
Adjusts with one variable for area-level deprivation	1
Adjusts with composite measure of area-level deprivation	2
Appropriate statistical methods used (e.g. multi-level modelling or robust standard errors to account for clustered data)	1
Cohort studies - Assesses dose-response	1

Appendix 6. GRADE assessments

GRADE assessment table for psychosis outcomes:

Group	No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Pooled ES (95% CI) for subgroup ⁵⁴	Certainty
Non-affective psychosis	5	2 observational 3 longitudinal	Not serious	Not serious	Not serious	Not serious	Dose response gradient	OR 1.14 (1.04 to 1.25)	⊕⊕⊕○ MODERATE
Subclinical psychosis	3	3 observational	Not serious	Not serious	Not serious	Not serious	Dose response gradient	OR 1.12 (0.96 to 1.31)	⊕⊕⊕○ MODERATE
Antipsychotic prescriptions	1	1 observational	Not serious	Not serious	Serious ⁵⁵	Not serious	Dose response gradient	OR 1.04 (0.95 to 1.17)	⊕⊕○○ LOW
Any psychosis	1	1 observational	Not serious	Not serious	Not serious	Serious ⁵⁶	Strong association Dose response gradient	OR 1.90 (1.43 to 2.53)	⊕⊕⊕○ MODERATE
Affective psychosis	2	1 observational 1 longitudinal	Not serious	Not serious	Not serious	Not serious	Dose response gradient	OR 1.16 (1.04 to 1.28)	⊕⊕⊕○ MODERATE
Other psychoses	1	Longitudinal	Not serious	Not serious	Not serious	Not serious	Dose response gradient	OR 1.07 (1.00 to 1.16)	⊕⊕⊕○ MODERATE

⁵⁴ Estimates not from original papers, these represent the recalculated ESs & CIs for subgroup i.e., each estimate has been standardised to reflect 10% decrease in group density

⁵⁵ Outcome used in one large scale study (Termorshuizen *et al.*, 2018) - antipsychotic prescriptions

⁵⁶ Large ES, Wide CIs and only one study in subgroup

GRADE assessment table for crude minority subgroups:

Group	No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Pooled ES (95% CI) for subgroup ⁵⁷	Certainty
Black	7	5 observational 2 longitudinal	Not serious	Not serious	Serious ⁵⁸	Not serious	Strong association, dose response gradient	OR 1.62 (1.17 to 2.24)	⊕⊕⊕○ MODERATE
Asian	4	2 observational 2 longitudinal	Not serious	Not serious	Not serious	Not serious	Dose response gradient	OR 1.16 (0.93 to 1.45)	⊕⊕⊕○ MODERATE
White other	3	observational studies	Not serious	Not serious	Not serious	Serious ⁵⁹	Dose response gradient	OR 1.24 (0.77 to 1.97)	⊕⊕○○ LOW
Other ethnic group	3	1 observational 1 longitudinal	Not serious	Not serious	Serious ⁶⁰	Not serious	Dose response gradient	OR 1.07 (0.97 to 1.17)	⊕⊕○○ LOW
Combined migrant group	2	1 observational 1 longitudinal	Serious ⁶¹	Not serious	Not serious	Not serious	Dose response gradient	OR 1.08 (1.00 to 1.16)	⊕⊕○○ LOW
Combined ethnic minority group	1	observational study	Not serious	Not serious	Not serious	Serious ⁶²	-	OR 1.13 (0.63 to 2.03)	⊕⊕○○ LOW
Other social characteristic	2	1 observational 1 longitudinal	Not serious	Not serious	Not serious	Not serious	Dose response gradient	OR 1.02 (0.86 to 1.20)	⊕⊕⊕○ MODERATE

⁵⁷ Estimates not from original papers, these represent the recalculated ESs & CIs for subgroup i.e., each estimate has been standardised to reflect 10% decrease in group density

⁵⁸ Outcome used in one large scale study (Termorshuizen *et al.*, 2018) - antipsychotic prescriptions

⁵⁹ Wide CIs for subgroup's pooled estimate

⁶⁰ Outcome used in one large scale study (Termorshuizen *et al.*, 2018) - antipsychotic prescriptions

⁶¹ Concerns regarding the reliability and validity of the psychosis measure in one study (Menezes, Georgiades, & Boyle, 2011) - self-reported lifetime prevalence of diagnosed Schizophrenia or other psychosis

⁶² Wide CIs for subgroup's pooled estimate and only one study

Appendix 7. Output showing full model and model fit after each of the levels were removed

Full model:

```
> MVMETARESULTS<-rma.mv(LogES,
+                        LogSV,
+                        random = list(~ 1 | SampleID,
+                                     ~ 1 | Authors),
+                        tdist = TRUE,
+                        data = MVMETADATASET,
+                        slab=paste(Authors,`Specific Minority Group`, sep =", "),
+                        method = "REML")
> summary(MVMETARESULTS)
```

Multivariate Meta-Analysis Model (k = 75; method: REML)

logLik	Deviance	AIC	BIC	AICc
-23.1173	46.2346	52.2346	59.1468	52.5775

Variance Components:

	estim	sqr	nlvls	fixed	factor
sigma^2.1	0.0385	0.1961	75	no	SampleID
sigma^2.2	0.0115	0.1071	10	no	Authors

Test for Heterogeneity:

Q(df = 74) = 369.4118, p-val < .0001

Model Results:

estimate	se	tval	pval	ci.lb	ci.ub
0.1816	0.0476	3.8111	0.0003	0.0866	0.2765

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Level two removed:

```
> L2.REMOVED<-rma.mv(LogES,
+                     LogSV,
+                     random = list(~ 1 | SampleID,
+                                   ~ 1 | Authors),
+                     tdist = TRUE,
+                     data = MVMETADATASET,
+                     slab=Paper,
+                     method = "REML",
+                     sigma2=c(0,NA))
> summary(L2.REMOVED)
```

Multivariate Meta-Analysis Model (k = 75; method: REML)

logLik	Deviance	AIC	BIC	AICc
-72.0192	144.0385	148.0385	152.6466	148.2075

Variance Components:

	estim	sqr	nlvls	fixed	factor
sigma^2.1	0.0000	0.0000	75	yes	SampleID
sigma^2.2	0.0270	0.1645	10	no	Authors

Test for Heterogeneity:

Q(df = 74) = 369.4118, p-val < .0001

Model Results:

estimate	se	tval	pval	ci.lb	ci.ub
0.1369	0.0543	2.5192	0.0139	0.0286	0.2451

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```
> anova(MVMETARESULTS, L2.REMOVED)
```

	df	AIC	BIC	AICc	logLik	LRT	pval	QE
Full	3	52.2346	59.1468	52.5775	-23.1173			369.4118
Reduced	2	148.0385	152.6466	148.2075	-72.0192	97.8038	<.0001	369.4118

Level three removed:

```
> L3.REMOVED<-rma.mv(LogES,
+                      LogSV,
+                      random = list(~ 1 | SampleID,
+                                   ~ 1 | Authors),
+                      tdist = TRUE,
+                      data = MVMETADATASET,
+                      slab=Paper,
+                      method = "REML",
+                      sigma2=c(NA,0))
> summary(L3.REMOVED)
```

Multivariate Meta-Analysis Model (k = 75; method: REML)

	logLik	Deviance	AIC	BIC	AICc
	-24.3717	48.7433	52.7433	57.3514	52.9123

Variance Components:

	estim	sqr	nlvls	fixed	factor
sigma^2.1	0.0489	0.2212	75	no	SampleID
sigma^2.2	0.0000	0.0000	10	yes	Authors

Test for Heterogeneity:
Q(df = 74) = 369.4118, p-val < .0001

Model Results:

estimate	se	tval	pval	ci.lb	ci.ub	
0.1708	0.0304	5.6206	<.0001	0.1102	0.2313	***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```
> anova(MVMETARESULTS, L3.REMOVED)
```

	df	AIC	BIC	AICc	logLik	LRT	pval	QE
Full	3	52.2346	59.1468	52.5775	-23.1173			369.4118
Reduced	2	52.7433	57.3514	52.9123	-24.3717	2.5087	0.1132	369.4118

Appendix 8. Moderator test results for crude groupings of ethnic minorities and migrants.

```
> ModCrudeEthnicMinority <-rma.mv(LogES,
+                               LogSV,
+                               random = list(~ 1 | SampleID,
+                                             ~ 1 | Authors),
+                               tdist = TRUE,
+                               data = EthnicDensityData,
+                               slab=Paper,
+                               method = "REML",
+                               mods = ~ factor (CrudeETHNICORMIGRANTminorityGroup))
> summary(ModCrudeEthnicMinority)
```

Multivariate Meta-Analysis Model (k = 61; method: REML)

	logLik	Deviance	AIC	BIC	AICC
	-13.7234	27.4467	43.4467	59.5054	46.5771

Variance Components:

	estim	sqrt	nlvs	fixed	factor
sigma^2.1	0.0317	0.1779	61	no	SampleID
sigma^2.2	0.0104	0.1020	10	no	Authors

Test for Residual Heterogeneity:
QE(df = 55) = 254.5439, p-val < .0001

Test of Moderators (coefficients 2:6):
F(df1 = 5, df2 = 55) = 6.7183, p-val < .0001

Model Results:

	estimate	se	tval	pval	ci.lb	ci.ub
intrcpt	-0.0119	0.0773	-0.1540	0.8782	-0.1667	0.1429
factor(CrudeETHNICORMIGRANTminorityGroup)Asian	0.1760	0.1080	1.6289	0.1090	-0.0405	0.3924
factor(CrudeETHNICORMIGRANTminorityGroup)Black	0.5401	0.0966	5.5938	<.0001	0.3466	0.7337 ***
factor(CrudeETHNICORMIGRANTminorityGroup)Combined ethnic minority group	0.1577	0.1881	0.8388	0.4052	-0.2191	0.5346
factor(CrudeETHNICORMIGRANTminorityGroup)Combined migrant group	0.0888	0.1380	0.6437	0.5224	-0.1877	0.3653
factor(CrudeETHNICORMIGRANTminorityGroup)white other	0.2213	0.1066	2.0756	0.0426	0.0076	0.4349 *

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Appendix 9. Moderator test results for specific groupings of ethnic minorities and migrants.

```
> ModSpecEthnicMinority <-rma.mv(LogES,
+                               LogSV,
+                               random = list(~ 1 | SampleID,
+                                             ~ 1 | Authors),
+                               tdist = TRUE,
+                               data = EthnicDensityData,
+                               slab=Paper,
+                               method = "REML",
+                               mods = ~ factor (SpecETHNICORMIGRANTGroup))
> summary(ModSpecEthnicMinority)
```

Multivariate Meta-Analysis Model (k = 61; method: REML)

logLik	Deviance	AIC	BIC	AICc
11.4421	-22.8842	25.1158	65.0413	110.8301

Variance Components:

	estim	sqr	nlvls	fixed	factor
sigma^2.1	0.0028	0.0531	61	no	SampleID
sigma^2.2	0.0144	0.1201	10	no	Authors

Test for Residual Heterogeneity:

QE(df = 39) = 76.4916, p-val = 0.0003

Test of Moderators (coefficients 2:22):

F(df1 = 21, df2 = 39) = 7.5253, p-val < .0001

Model Results:

	estimate	se	tval	pval	ci.lb	ci.ub	
intrcpt	0.0824	0.0915	0.9001	0.3736	-0.1028	0.2675	
factor(SpecETHNICORMIGRANTGroup)Combined ethnic minority group	0.0472	0.1634	0.2885	0.7745	-0.2834	0.3777	
factor(SpecETHNICORMIGRANTGroup)Asian	0.1379	0.1655	0.8330	0.4099	-0.1969	0.4728	
factor(SpecETHNICORMIGRANTGroup)Bangladeshi	0.1459	0.1580	0.9233	0.3615	-0.1737	0.4655	
factor(SpecETHNICORMIGRANTGroup)Black or Black British	0.5611	0.1778	3.1549	0.0031	0.2014	0.9208	**
factor(SpecETHNICORMIGRANTGroup)Black African	0.3040	0.1585	1.9173	0.0625	-0.0167	0.6246	.
factor(SpecETHNICORMIGRANTGroup)Black Caribbean	0.1639	0.1636	1.0021	0.3225	-0.1670	0.4948	
factor(SpecETHNICORMIGRANTGroup)North American	0.9518	2.1754	0.4375	0.6641	-3.4483	5.3520	
factor(SpecETHNICORMIGRANTGroup)Black Caribbean (Antillean)	1.2322	0.2242	5.4959	<.0001	0.7787	1.6857	***
factor(SpecETHNICORMIGRANTGroup)Indian	0.1416	0.1528	0.9266	0.3599	-0.1675	0.4506	
factor(SpecETHNICORMIGRANTGroup)Irish	1.5351	1.0066	1.5250	0.1353	-0.5010	3.5712	
factor(SpecETHNICORMIGRANTGroup)Middle Eastern	0.0625	0.1445	0.4323	0.6679	-0.2298	0.3547	
factor(SpecETHNICORMIGRANTGroup)Middle Eastern & North African	-0.1310	0.1606	-0.8158	0.4196	-0.4559	0.1939	
factor(SpecETHNICORMIGRANTGroup)Moroccan	-0.0674	0.1557	-0.4331	0.6673	-0.3823	0.2475	
factor(SpecETHNICORMIGRANTGroup)Non-Nordic European	-0.2306	0.1651	-1.3965	0.1705	-0.5645	0.1034	
factor(SpecETHNICORMIGRANTGroup)Non-Scandinavian European	0.2824	0.1451	1.9463	0.0589	-0.0111	0.5760	.
factor(SpecETHNICORMIGRANTGroup)Nordic	-0.1703	0.1919	-0.8872	0.3804	-0.5584	0.2179	
factor(SpecETHNICORMIGRANTGroup)Pakistani	-0.2053	0.1454	-1.4119	0.1659	-0.4993	0.0888	
factor(SpecETHNICORMIGRANTGroup)South American	-0.9911	0.4804	-2.0630	0.0458	-1.9629	-0.0193	*
factor(SpecETHNICORMIGRANTGroup)Sub-Saharan African	0.3036	0.1911	1.5888	0.1202	-0.0829	0.6900	
factor(SpecETHNICORMIGRANTGroup)Surinamese	0.2003	0.1576	1.2706	0.2114	-0.1186	0.5192	
factor(SpecETHNICORMIGRANTGroup)Turkish	-0.1758	0.1564	-1.1240	0.2679	-0.4923	0.1406	

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Appendix 10. Leave-one-out analysis for individual samples ($n=75$)

Sample ID	Paper	Estimates	LBs	UBs	p.vals
1	Bécares <i>et al.</i> , (2009) - Black Caribbean - Subclinical	1.197424274	1.084689182	1.321876	0.00052
2	Bécares <i>et al.</i> , (2009) - Indian - Subclinical	1.200092336	1.089610839	1.321776	0.000335
3	Bécares <i>et al.</i> , (2009) - Pakistani - Subclinical	1.211046497	1.106794029	1.325119	6.47E-05
4	Bécares <i>et al.</i> , (2009) - Bangladeshi - Subclinical	1.196901168	1.083901406	1.321681	0.000554
5	Das-Munshi <i>et al.</i> , (2012) - Irish - Subclinical	1.196708706	1.08872372	1.315404	0.000313
6	Das-Munshi <i>et al.</i> , (2012) - Black Caribbean - Subclinical	1.202720102	1.091641903	1.325101	0.000301
7	Das-Munshi <i>et al.</i> , (2012) - Bangladeshi - Subclinical	1.198875711	1.088691361	1.320212	0.000352
8	Das-Munshi <i>et al.</i> , (2012) - Indian - Subclinical	1.19610088	1.086843051	1.316342	0.000381
9	Das-Munshi <i>et al.</i> , (2012) - Pakistani -Subclinical	1.201666787	1.09033815	1.324363	0.000333
10	Dykxhoorn, Lewis, Hollander, Kirkbride & Dalman (2020) - Nordic	1.203677629	1.093592878	1.324844	0.000249
11	Dykxhoorn, Lewis, Hollander, Kirkbride & Dalman (2020) - Non-Nordic European	1.206339827	1.095070549	1.328915	0.00024
12	Dykxhoorn, Lewis, Hollander, Kirkbride & Dalman (2020) - Asian	1.189852361	1.07821423	1.313049	0.000756
13	Dykxhoorn, Lewis, Hollander, Kirkbride & Dalman (2020) - Middle Eastern & North African	1.203726996	1.093298772	1.325309	0.000259
14	Dykxhoorn, Lewis, Hollander, Kirkbride & Dalman (2020) - Sub-Saharan African	1.188914515	1.076322354	1.313285	0.000888
15	Dykxhoorn, Lewis, Hollander, Kirkbride & Dalman (2020) - North American	1.198842474	1.090203597	1.318307	0.000292
16	Dykxhoorn, Lewis, Hollander, Kirkbride &	1.203854218	1.0944829	1.324155	0.000225

	Dalman (2020) - South American				
17	Menezes <i>et al.</i> , (2011) - Migrant status - SZ	1.204734747	1.089008711	1.332759	0.00045
18	Richardson <i>et al.</i> , (2018) - Overall minority group - NAP	1.204233366	1.091097925	1.3291	0.000347
19	Richardson <i>et al.</i> , (2018) - Overall minority group - AP	1.198759509	1.08687213	1.322165	0.000433
20	Schofield <i>et al.</i> , (2011) - Black - High ethnic density - Any psychosis	1.188286563	1.095643057	1.288764	6.56E-05
21	Schofield <i>et al.</i> , (2011) - Black - Mid ethnic density - Any psychosis	1.185638519	1.095777841	1.282868	5.1E-05
22	Schofield <i>et al.</i> , (2011) - Black - Low ethnic density - Any psychosis	1.183345833	1.095826208	1.277855	4.1E-05
23	Schofield <i>et al.</i> , (2011) - Black - Lowest ethnic density - Any psychosis	1.191329876	1.094422673	1.296818	0.000101
24	Schofield <i>et al.</i> , (2016) - Black African - Subclinical	1.200582784	1.089868981	1.322543	0.000334
25	Schofield <i>et al.</i> , (2016) - Black Caribbean - Subclinical	1.195122676	1.085041015	1.316373	0.000449
26	Schofield <i>et al.</i> , (2016) - Disadvantaged social class - Subclinical	1.213949632	1.097647762	1.342574	0.000263
27	Schofield <i>et al.</i> , (2016) - Single household status - Subclinical	1.194147187	1.083685884	1.315868	0.000501
28	Schofield <i>et al.</i> , (2017) - African - High ethnic density - NAP	1.199594665	1.090863685	1.319163	0.00028
29	Schofield <i>et al.</i> , (2017) - African - Mid ethnic density - NAP	1.200557618	1.091128951	1.320961	0.000286
30	Schofield <i>et al.</i> , (2017) - African - Low ethnic density - NAP	1.192942945	1.086721759	1.309547	0.000328
31	Schofield <i>et al.</i> , (2017) - African - Lowest ethnic density - NAP	1.19570159	1.088820934	1.313074	0.000293
32	Schofield <i>et al.</i> , (2017) - Non-Scandinavian European - High ethnic density - NAP	1.197605453	1.090075444	1.315743	0.000278

33	Schofield <i>et al.</i> , (2017) - Non-Scandinavian European - Mid ethnic density - NAP	1.199470709	1.090998445	1.318728	0.000274
34	Schofield <i>et al.</i> , (2017) - Non-Scandinavian European - Low ethnic density - NAP	1.198112541	1.090367756	1.316504	0.000275
35	Schofield <i>et al.</i> , (2017) - Non-Scandinavian European - Lowest ethnic density - NAP	1.195127947	1.088462621	1.312246	0.000297
36	Schofield <i>et al.</i> , (2017) - Asian - High ethnic density - NAP	1.201147448	1.091152846	1.32223	0.000294
37	Schofield <i>et al.</i> , (2017) - Asian - Mid ethnic density - NAP	1.201907692	1.091070536	1.324004	0.000309
38	Schofield <i>et al.</i> , (2017) - Asian - Low ethnic density - NAP	1.201214287	1.091164715	1.322363	0.000295
39	Schofield <i>et al.</i> , (2017) - Asian - Lowest ethnic density - NAP	1.196761082	1.089487527	1.314597	0.000286
40	Schofield <i>et al.</i> , (2017) - Middle Eastern - High ethnic density - NAP	1.201745699	1.091505585	1.32312	0.000291
41	Schofield <i>et al.</i> , (2017) - Middle Eastern - Mid ethnic density - NAP	1.202810381	1.091159592	1.325886	0.00032
42	Schofield <i>et al.</i> , (2017) - Middle Eastern- Low ethnic density - NAP	1.201810558	1.091528616	1.323235	0.000291
43	Schofield <i>et al.</i> , (2017) - Middle Eastern - Lowest ethnic density - NAP	1.199943168	1.091180311	1.319547	0.000275
44	Termorshuizen <i>et al.</i> , (2018) - Turkish - High ethnic density - Antipsychotic prescriptions	1.203087228	1.093213349	1.324004	0.000253
45	Termorshuizen <i>et al.</i> , (2018) - Turkish - Mid ethnic density - Antipsychotic prescriptions	1.203610931	1.093343905	1.324999	0.000256
46	Termorshuizen <i>et al.</i> , (2018) - Turkish - Low ethnic density -	1.203508814	1.093834351	1.32418	0.00024

	Antipsychotic prescriptions				
47	Termorshuizen <i>et al.</i> , (2018) - Turkish - Lowest ethnic density - Antipsychotic prescriptions	1.203217357	1.09374995	1.323641	0.000238
48	Termorshuizen <i>et al.</i> , (2018) - Moroccan - High ethnic density - Antipsychotic prescriptions	1.201005684	1.092201303	1.320649	0.000256
49	Termorshuizen <i>et al.</i> , (2018) - Moroccan - Mid ethnic density - Antipsychotic prescriptions	1.203339184	1.093777347	1.323876	0.000239
50	Termorshuizen <i>et al.</i> , (2018) - Moroccan - Low ethnic density - Antipsychotic prescriptions	1.202543675	1.093361852	1.322628	0.000241
51	Termorshuizen <i>et al.</i> , (2018) - Moroccan - Lowest ethnic density - Antipsychotic prescriptions	1.202397349	1.093260909	1.322428	0.000242
52	Termorshuizen <i>et al.</i> , (2018) - Surinamese - High ethnic density - Antipsychotic prescriptions	1.192375025	1.082514616	1.313385	0.000527
53	Termorshuizen <i>et al.</i> , (2018) - Surinamese - Mid ethnic density - Antipsychotic prescriptions	1.197478394	1.08860035	1.317246	0.000331
54	Termorshuizen <i>et al.</i> , (2018) - Surinamese - Low ethnic density - Antipsychotic prescriptions	1.200301009	1.091504171	1.319942	0.000269
55	Termorshuizen <i>et al.</i> , (2018) - Surinamese - Lowest ethnic density - Antipsychotic prescriptions	1.1963054	1.087192119	1.31637	0.000369
56	Termorshuizen <i>et al.</i> , (2018) - Antillean - High ethnic density -	1.198656216	1.090035599	1.318101	0.000296

	Antipsychotic prescriptions				
57	Termorshuizen <i>et al.</i> , (2018) - Antillean - Mid ethnic density - Antipsychotic prescriptions	1.194727694	1.085528269	1.314912	0.000416
58	Termorshuizen <i>et al.</i> , (2018) - Antillean - Low ethnic density - Antipsychotic prescriptions	1.189902843	1.079306545	1.311832	0.000674
59	Termorshuizen <i>et al.</i> , (2018) - Antillean - Lowest ethnic density - Antipsychotic prescriptions	1.184120226	1.071832397	1.308172	0.001164
60	Zammit <i>et al.</i> , (2010) - Migrant status - NAP	1.200938676	1.093541232	1.318884	0.000215
61	Zammit <i>et al.</i> , (2010) - Migrant status - AP	1.199727832	1.09069797	1.319657	0.000288
62	Zammit <i>et al.</i> , (2010) - Migrant status - SZ	1.200389611	1.092191228	1.319307	0.000248
63	Zammit <i>et al.</i> , (2010) - Migrant status - Other	1.200428084	1.092242738	1.319329	0.000247
64	Zammit <i>et al.</i> , (2010) - Socially fragmented - NAP	1.200616293	1.092737024	1.319146	0.000234
65	Zammit <i>et al.</i> , (2010) - Socially fragmented - AP	1.198384969	1.088089957	1.31986	0.000369
66	Zammit <i>et al.</i> , (2010) - Socially fragmented - SZ	1.199842192	1.090996199	1.319547	0.00028
67	Zammit <i>et al.</i> , (2010) - Socially fragmented - Other	1.200024152	1.091332208	1.319541	0.000271
68	Zammit <i>et al.</i> , (2010) - Deprived - NAP	1.200212626	1.091840045	1.319342	0.000257
69	Zammit <i>et al.</i> , (2010) - Deprived - AP	1.198502777	1.088405795	1.319737	0.000357
70	Zammit <i>et al.</i> , (2010) - Deprived - SZ	1.200726735	1.093304114	1.318704	0.000219
71	Zammit <i>et al.</i> , (2010) - Deprived - Other	1.19998113	1.091294803	1.319492	0.000271
72	Zammit <i>et al.</i> , (2010) - Low grades - NAP	1.20117337	1.094621132	1.318098	0.000189
73	Zammit <i>et al.</i> , (2010) - Low grades - AP	1.200628663	1.093225531	1.318584	0.00022
74	Zammit <i>et al.</i> , (2010) - Low grades - SZ	1.200057175	1.091826955	1.319016	0.000255

75	Zammit <i>et al.</i> , (2010) - Low grades - Other	1.200631333	1.092936704	1.318938	0.000229
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Appendix 11. Recruitment letters that were circulated to mental health services in Ynys Môn and Gwynedd (Welsh translations were available)

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RESEARCH OPPORTUNITY
Exploring belonging in service users with
experience of psychosis who are living in Gwynedd
or Anglesey

IRAS Ref: 239866 REC Ref: 18/WA/0026

***** COVID-19 RELATED CHANGES TO THIS PROJECT ARE EXPLAINED AT THE
END OF THIS INFORMATION SHEET *****

Dear _____

Researchers at Bangor University are conducting research to explore sense of belonging in service users of Betsi Cadwaladr University Health Board who have experience of psychosis, and are permanent residents of Gwynedd or Anglesey, North Wales. We would really appreciate your help in referring anyone to us who you think meets the below study inclusion criteria and might be interested in taking part in our project. We are particularly interested in hearing the perspectives of service users living in the areas highlighted in **green** on the map below.



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What will be involved?

During the study, participants will complete a short questionnaire and have a discussion with a researcher about their sense of belonging and their experiences living in their local area. Meetings will take place at Bangor University but if the participant is unable to travel the University or would prefer not to, we can arrange for a researcher to visit them at their home or ward. **Participants will be paid £15 worth of shopping vouchers** for their time and will be compensated for reasonable travel expenses.

We would really appreciate your help with recruitment for our project.

Please consider contacting us if you have a client who meets the following eligibility criteria:

Inclusion

- Aged 18 or over
- Has experience of psychosis*
- Current service users of Betsi Cadwaladr University Health Board (Community or inpatient services)
- A permanent resident of Gwynedd or Anglesey**

Exclusion

- Assessed by care team as not having capacity to participate in the study
- Identified by care team as high risk to self or others
- Aged under 18
- Has no experience of psychosis
- Not a current service user of Betsi Cadwaladr University Health Board (Community or inpatient services)
- Temporary resident of Gwynedd or Anglesey***

* The participant has accessed mental health services as a result of their experience of psychosis.

**Year-round resident of a Gwynedd or Anglesey address.

***Temporary, short-term resident e.g. only residing in Gwynedd or Anglesey address during term-time or address is used as a second/holiday home.

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If you have any questions or if you know of somebody who meets these criteria and consents to be contacted by the research team, please contact **Sophie Baker** (s.baker@bangor.ac.uk/01248388255) to check their eligibility and pass on their contact details. We will then contact them to discuss the study in more detail.

THANK YOU!

Changes to this study due to COVID-19

Due to COVID-19, this study will now be conducted on Zoom or Microsoft Teams video calling platforms. This means that the process described above will all be carried out online *i.e.*, discussing the study information, informed consent, completing the questionnaire and interview, and payment.

As with the process for face-to-face interviews, the audio from the interview will be recorded and transcribed and once we no longer require the audio recording, the file will be permanently deleted. All data that we collect be encrypted and securely stored electronically in line with current University advice on research data management.

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Appendix 12. Participant information sheet (Welsh translation also available)

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PARTICIPANT INFORMATION SHEET – SERVICE USERS

***** COVID-19 RELATED CHANGES TO THIS PROJECT ARE EXPLAINED AT THE END OF THIS INFORMATION SHEET *****

IRAS Ref: 239866 REC Ref: 18/WA/0026

Study title: **'Sense of belonging' in services users living in North Wales who have unusual experiences**

We are inviting you to take part in a research study. Before you decide whether to take part, it is important that you understand what the research is about and what your participation will involve. Please read through this information sheet carefully or if you would prefer, a member of our research team will read through this information with you and you can stop them at any point to ask any questions you might have. You are welcome to talk to others about the study if you would find this helpful. Please ask if there is anything that is not clear or if you would like any further information.

What is the purpose of the research?

You are being invited to take part in a study that will involve having a discussion with a researcher about your sense of belonging and your experiences living in your local area. We will be interviewing people who have had unusual experiences, have sought help from mental health services, and are permanent residents of Gwynedd or Anglesey, North Wales. We are interested in hearing about your thoughts and opinions about your sense of belonging as there has been little research on this topic with people who have unusual experiences and are living in North Wales. We are interested in exploring participants' sense of belonging to where they live and what factors might influence this.

Who is conducting the research?

This study is being organised by Bangor University and is being carried out by a postgraduate student as part of her Economic and Social Research Council (ESRC) funded masters and PhD in Psychology. The study is being supervised by Researchers and a Clinical Psychologist from Bangor University and Betsi Cadwaladr University Health Board (BCUHB).

Why have I been invited to take part?

- 1) You have been identified by a healthcare professional as being eligible to take part in this study.

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- 2) You are a current service user of Betsi Cadwaladr University Health Board (BCUHB).
- 3) You have had unusual experiences and have sought help from mental health services.
- 4) You are a permanent resident of Gwynedd or Anglesey, North Wales.

What will I be asked to do if I take part?

You will be asked to complete a short questionnaire and an interview. The questionnaire will ask about background demographic information such as your ethnic group, the language(s) you speak, where you live, and how long you have been having unusual experiences. The interview will ask you more open questions about your sense of belonging and your experiences living in your local area. For example, we might ask you what 'belonging' means to you and ask you some questions related to your thoughts and your feelings about where you live and how you interact with others in your local area.

Will the interview be recorded?

Yes, we will ask for the interview section of the study to be audio recorded. Once the interview is complete, we will write up the audio recording and remove any personally identifiable information, so nothing you say in the interview can be linked back to you. We will permanently dispose of the audio recording once it has been transcribed and anonymised.

Where will the interview take place?

We can arrange for interviews to take place at a time and location convenient to you. The researcher will arrange to meet you in a suitable place at Bangor University, but if you cannot travel for an interview or you would prefer not to, we can arrange to visit you at your home or ward.

Will I be paid for my participation?

You will be paid £15 worth of shopping vouchers for your participation in the study. We will also cover any reasonable travel expenses, but we will require your travel receipts to reimburse you.

Will my participation in this study be kept confidential?

Yes, if you decide you would like to take part, all the information you share with the research team will be kept strictly confidential. However, if you do share with us something that indicates any risk of harm to yourself or others, we do have a responsibility to share this with the main healthcare professional involved in your care.

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What happens to the data that I provide?

All the information you give to the researcher will be held in accordance with the Data Protection Act (1998). This means that your data will be stored in locked filing cabinets at Bangor University, and any confidential information about you such as your name and address will be held separately to your anonymised questionnaire and interview data. The data will be analysed and written up in a report as part of a Psychology PhD thesis at Bangor University. The report will also be submitted for publication in a peer-reviewed academic journal. After this study, your data may be used for further research related to this project. Your data will be completely anonymised so there will be no way of tracing the information you give back to you. If you object to your data being shared with other collaborators you can opt out on the consent form.

Who has reviewed the study?

This study has been reviewed and granted ethics approval by Bangor University's School of Psychology ethics department and Betsi Cadwaladr University Health Board (BCUHB) NHS Research and Development department.

Do I have to take part?

No, your decision about taking part is entirely your choice. If you decide you would like take part, then change your mind at a later date this is also fine. You can withdraw at any point in the study without giving a reason and without experiencing any disadvantages as a result of your withdrawal.

Are there any risks if I take part?

Whilst the questionnaire and interview are unlikely to cause you any significant distress or harm, it is possible that you might find it upsetting or stressful to talk about your sense of belonging and your experiences living in your local area. There is also a risk of you sharing personal or private information during the interviews. However, it is important that you are aware that you do not have to answer any questions you do not feel comfortable answering, and you can leave the interview or stop the audio recording at any point if you feel stressed or upset. One of the researchers will contact you a couple of days after the interview to ask how you are and how you found the interview.

What do I do if I feel distressed?

If you feel distressed, you can contact Dr Mike Jackson who is a Clinical Psychologist and one of the supervisors for this study (mike.jackson@bangor.ac.uk). We can also help you contact the main person involved in your care.

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You can also contact the following support lines:

Community advice and listening line (C.A.L.L) mental health helpline for

Wales: 0800 132 737 (24-hour helpline)

Samaritans: 116 123 (24-hour helpline); Welsh language service: 0808 164 0123 (Daily, 7pm-11pm)

Mind: 0300 123 3393 (Mon-Fri, 9am-6pm, except for bank holidays)

SANEline: 0300 304 7000 (Daily, 4.30pm-10.30pm)

What if something goes wrong?

If something goes wrong or if you have any concerns about the study, please contact Sophie Baker (s.baker@bangor.ac.uk/01248388255) in the first instance. If you wish to make a formal complaint please contact Bangor University School of Psychology manager, Dr Huw Roberts (huw.roberts@bangor.ac.uk).

What do I do now?

If you are interested in taking part, you can contact Sophie Baker (s.baker@bangor.ac.uk/01248388255) to arrange a meeting or we will contact you a few days after you have received this information sheet to ask if you are interested in participating. If you do decide you are interested in taking part, the researcher will arrange an initial meeting with you to explain the study in more detail and provide you with the opportunity to ask any questions. If you are happy to take part, you will be asked to sign a consent form. Following this, we will arrange a convenient time for you to complete the questionnaire and interview.

Changes to this study due to COVID-19

Due to COVID-19, this study will now be conducted on Zoom or Microsoft Teams video calling platforms. This means that the process described above will all be carried out online i.e. discussing the study information, informed consent, completing the questionnaire and interview, and payment.

As with the process for face-to-face interviews, the audio from the interview will be recorded and transcribed and once we no longer require the audio recording, the file will be permanently deleted. All data that we collect from you will be encrypted and securely stored electronically in line with current University advice on research data management.

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Appendix 13. Form for acquiring informed consent

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Study title: 'Sense of belonging' in services users living in North Wales who have unusual experiences

IRAS Ref: 239866 REC Ref: 18/WA/0026

Participant ID number

Please initial each box and sign at the end of this consent form to confirm you understand and agree with each item.

- | | Please initial |
|---|--|
| 1) I confirm that I have read and understood the participant information sheet (V1.3 14/01/2021), have had the opportunity to ask the researcher questions, and have had these answered to my satisfaction. | <input type="checkbox"/> |
| 2) I understand that my participation in this study is voluntary and I am free to withdraw at any point without giving a reason and without experiencing any disadvantages as a result. | <input type="checkbox"/> |
| 3) I give my permission for my interview to be audio recorded for the purpose of data analysis and reporting. Once audio recordings have been transcribed and anonymised, the recording will be destroyed. | <input type="checkbox"/> |
| 4) I agree for the use of anonymised quotes to be used in reports and/or publications. I understand that no personal information will be used and nothing reported will be able to be linked back to me. | <input type="checkbox"/> |
| 5) I agree that anonymised data collected (questionnaire and interview) may be used by the research team for future research related to this project. | <input type="checkbox"/> |
| 6) I agree to be contacted about future research related to this study (optional). | <div>Please circle YES / NO</div> <input type="checkbox"/> |
| 7) I have been informed of the support available to me should I get distressed whilst I am a participant in this study. | <input type="checkbox"/> |
| 8) I agree that the data I provide for this study (questionnaire and interview) may be shared as anonymous data with other | <div>Please circle YES / NO</div> <input type="checkbox"/> |

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trusted collaborators. No information that could identify me will be made available to other researchers (optional).

- 9) I consent to the main healthcare professional involved in my care to be informed about my participation in this study. ☐
- 10) I understand that if I share any information with the research team that indicates any risk of harm to myself or other people, they will need to share this with the relevant service. The researcher will discuss this with me first though. ☐
- 11) I agree to take part in the study named above. ☐

Name of participant	Date	Signature
.....

Name of researcher	Date	Signature
.....

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Appendix 14. Sociodemographic questionnaire

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Sociodemographic questionnaire

Participant ID.....
Date of interview.....
Researcher

1. How old are you?

..... years

2. What is your gender?

.....

3. What is your ethnic group? (see overleaf for list)

.....

4. What is your place of birth?

.....

5. What is your postcode?

.....

1

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6. How long have you lived at your current address?

.....

7. What language(s) do you speak? (If you only speak English, please go to question 13. If you speak Welsh or if you are learning, please answer questions 8-12)

English

Welsh

8. Can you understand, speak read or write Welsh (tick all that apply)

Understand spoken Welsh

Speak Welsh

Read Welsh

Write Welsh

None of the above

9. How well can you speak English?

Very well

Well

Not well

Not at all

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10. Are you more proficient in one of your languages?

Yes, please specify which language

No

11. At what age did you start learning your second language?

..... years old

12. Using a percentage, how much of your time on average is spent using your preferred language?

.....%

13. What is your highest level of qualification?

Post Graduate Education (MSc/MA/PhD or equivalent)

Higher Education (BA/BSc or equivalent)

A-levels or equivalent (e.g. Baccalaureate)

Further Education (Vocational qualifications i.e. GNVQ/NVQ/HND)

GCSE or equivalent (e.g. O-levels)

Other qualifications

No qualifications

14. What is your current employment status

Full-time work

Part-time work

3

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Long-term sick or disability
Unemployed
Student
Retired
Other.....

15. What is your marital status

Married/Civil partnership
Cohabiting
Single
Separated/divorced
Widowed

16. Whom do you live with?

Partner
Other family
Friends
Other
No one

17. Have you been given a mental health diagnosis?

Yes, please specify.....
No

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18. At what age did you receive this diagnosis?

.....years old

19. Which services provide support for your mental health?

.....

20. How long have you been receiving support from mental health services?

.....

Ethnic groups (for question 3)

White

English/Welsh/Scottish/Northern Irish/British

Irish

Gypsy, Traveller or Irish Traveller

Any other White background

Mixed/Multiple ethnic groups

White and Black Caribbean

White and Black African

White and Asian

Any other Mixed/Multiple ethnic background

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COLLEGE OF HUMAN SCIENCES

YSGOL SEICOLEG
SCHOOL OF PSYCHOLOGY



Asian/Asian British

Indian

Pakistani

Bangladeshi

Chinese

Any other Asian background

Black/African/Caribbean/Black British

African

Caribbean

Any other Black/African/Caribbean background

Other ethnic group

Arab

Any other ethnic group

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Appendix 15. Semi-structured interview schedule

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DETAILED QUALITATIVE INTERVIEW GUIDE

IRAS Ref: 239866 REC Ref: 18/WA/0026

Study title: 'Sense of belonging' in services users with psychosis living in North Wales

Participant ID.....

Date of interview.....

Researcher

Aims and objectives

- To explore service users' conceptualisation of 'belonging'.
- To explore service users' sense of belonging and experiences living in their local area.
- To explore whether the participant perceives their language match/mismatch to have any influence on their sense of belonging or their experiences living in their local area.

Format

- A semi-structured interview format will be followed.
- The interviewer will use open questions, with prompts if necessary. The interviewer will start by asking questions about sense of belonging broadly, and if language is not mentioned spontaneously by the participant, additional questions will be asked to prompt the participant to discuss language and belonging.
- Interviews will be audio recorded, transcribed and anonymised by SB.
- Anonymised interview data will be analysed using thematic analysis.

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Information and consent

Before taking part in the interview the researcher will have gone through the information about the study with the participant and the participant will have signed a consent form.

Introduction

I would like to thank you for taking the time to be interviewed today. I am interested in hearing about your thoughts and opinions about your sense of belonging and your experiences living in your local area.

Everything that we talk about today is private, so you can be as honest as possible. The only reason I would share anything we discuss beyond the research team is if I have reason to believe that you or anybody else is at any risk of harm.

I would also like to remind you that you do not have to answer any questions that you do not feel comfortable answering, and you can ask me to stop the interview at any point if you would like to take a break or discontinue the interview.

Do you have any questions about the interview before we begin?

Conceptualising 'sense of belonging'

I would first like to ask you about how you would define 'sense of belonging'. There are no right or wrong answers; I am just interested in hearing about what belonging means to you personally.

- How would you define having a 'sense of belonging'? /what does 'belonging' mean to you?
- What makes you feel like you belong?
- What makes you feel like you do not belong?
- Do you think having a sense of belonging is important?
 - Why/why not?

Sense of belonging to the local area

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I am now going to move on to ask you some questions related to your thoughts and opinions about where you live and how you relate to others in your local area in [PLACE]. We can think of belonging as [what participant answered previously] and also a feeling of "fitting in" and feeling accepted and supported by our community, for example.

- How long have you lived in [PLACE]?
- What has it been like living in [PLACE]? Can you tell me about your experiences living here?
 - Has it been mostly positive or negative?
 - Can you explain why?
- Have you lived anywhere else? If yes - Did you prefer living there or in [PLACE]?
 - Why/why not?
- Do you like living in [PLACE]?
 - Why/why not?
 - Have you always felt like this about [PLACE]?
- What are your thoughts and opinions about where you live?
- What are your thoughts and opinions about the people who live in your local area?
- Do you feel like you belong/fit in where you live?
 - For what reasons?
 - Have you always felt like this about [PLACE]?
- Have there been occasions when you have felt a sense of belonging to where you live?
 - Can you explain why?
- Have there been occasions when you have felt like you do not belong/fit in where you live?
 - Can you explain why?
- Do you feel connected with other people in your community?
 - Do you feel like you have things in common with others around you? (For example, do you think people have similar values and beliefs to you?)
 - Do you feel confident communicating with others around you?

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- Do you feel comfortable communicating with others around you?
 - Why/why not?
- Do you feel accepted by other people in your community?
 - Do you feel valued by others around you?
 - Do you feel comfortable around others in your community?
 - Why/why not?
- Do you make any efforts to interact with people in your community?
 - Do you engage in any community activities/events?
 - Do you socialise with people in your local area?
 - Do you feel like there is a sense of community cohesion/connectedness?
 - Do you feel like you trust people in your local community?
 - Do you feel safe living here?
 - Do you feel like people would help you out if you asked them?
 - Would you help others in your local community?
 - Why/why not?

Sense of belonging and language (If not already discussed)

For the next questions, I am interested in hearing about your views on language and belonging. You live in an area of North Wales where there is a high percentage of Welsh speakers' comparative to other areas of Wales. I am interested in hearing about your experiences of this.

Questions if participant is a second language Welsh speaker/Welsh learner (ask where applicable)

- [If learning] How long have you been learning Welsh? What are your reasons for learning?
- Why is it that you prefer to speak English?
- How proficient are you in Welsh?
- Do you feel confident speaking Welsh?
- Do you use your Welsh to communicate with other people in your community?
 - Why/why not?
 - If yes -How often? With whom? In what kinds of contexts?
- Do you consider the language a person speaks to have a role in their sense of belonging to their local area?
 - Why/why not?

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- Do you think that the Welsh language is an important part of Welsh cultural identity?
 - Can you explain why?
- Do you feel like your preference to speak English/Welsh affects your sense of belonging to where you live?
 - Why/why not?
- Do you feel like a person's preference to speak English/Welsh would affect their sense of belonging to this area?
- Do you feel like speaking English/Welsh ever influences the way that you interact with other people who live in your community?
 - If yes – in what kind of ways?
(Has it ever made it more difficult to communicate with others? Has it ever made you feel uncomfortable? Has it ever presented any other challenges/barriers?)
 - Can you give any examples?
- Would you consider your preference to speak English/Welsh to be a significant part of your cultural identity?
- Do you think it is important that people make an effort to preserve the Welsh language?
 - Why/why not?

Close

Before we end the interview, is there anything else that you would like to add?

Thanks again for taking the time to talk with me. How did you find the interview?

As I mentioned earlier, I will transcribe this interview and remove any information that could identify you, so the transcripts will be completely anonymised. We will then analyse the information to explore the 'sense of belonging' of people who are experiencing psychosis.

Would you be interested in receiving a summary of our research findings at the end of the study? Are you happy for us to contact you about this project in future?

If you have any questions about this study, please feel free to contact me.

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Appendix 16. Output for fully adjusted model testing the presence of a group density association for the conspiratorial belief that Covid-19 is related to mobile 5G.

```
> exp(confint(M9_Covid5G )) # For odds ratios and CIs
```

	2.5 %	97.5 %	Estimate
(Intercept)	3.714023e-05	5.661888e-03	4.585671e-04
`welsh language ability`Yes, fluently	4.587135e-01	3.378072e+00	1.244816e+00
`welsh language ability`Yes, but not fluently	1.460921e-01	1.223004e+00	4.226951e-01
scale(`welsh speaking density`)	5.494741e-01	2.573120e+00	1.189060e+00
as.numeric(Age)	9.002082e-01	9.496061e-01	9.245773e-01
GenderFemale	1.317772e+00	5.154538e+00	2.606244e+00
EducationNo formal qualifications	3.152065e+00	3.344070e+01	1.026680e+01
EducationOther qualifications	6.132295e-01	3.238360e+00	1.409205e+00
`Social Grade`B (Middle class)	6.740726e-01	1.743916e+01	3.428594e+00
`Social Grade`C1 (Lower Middle class)	1.377809e-01	3.411517e+00	6.855960e-01
`Social Grade`C2 (Skilled working class)	1.565968e-01	4.692549e+00	8.572271e-01
`Social Grade`D (working class)	1.791646e-01	5.328051e+00	9.770354e-01
`Social Grade`E (Non working)	3.509746e-01	1.007351e+01	1.880305e+00
EthnicityNon white British	2.653150e-01	2.889622e+00	8.755912e-01
`Income deprivation`	9.833448e-01	1.148292e+00	1.062623e+00
`Population density`	9.467543e-01	1.024052e+00	9.846451e-01
`Ethnic density`	9.740562e-01	1.196576e+00	1.079598e+00
`Outsider status`	8.486172e-01	3.915270e+00	1.822791e+00
`welsh language ability`Yes, fluently:scale(`welsh speaking density`)	3.813755e-01	1.872737e+00	8.451130e-01
`welsh language ability`Yes, but not fluently:scale(`welsh speaking density`)	7.958449e-02	1.658983e+00	3.633584e-01
Std.Dev.(Intercept) msoa11	1.045916e+01	3.187674e+02	3.959012e+01

```

> summary(M9_Covid5G)
Family: binomial ( logit )
Formula:      `Covid-19 linked to 5G` ~ `welsh language ability` * scale(`welsh speaking density`) +
      as.numeric(Age) + Gender + Education + `Social Grade` + Ethnicity +      `Income deprivation` + `Population density`
      `outsider status` + (1 | msoa11)
Data: CoalfieldsData_5G
Weights: weight

      AIC      BIC    logLik deviance df.resid
568.7      700.6    -263.3     526.7      3933

Random effects:

Conditional model:
  Groups Name      Variance Std.Dev.
msoa11 (Intercept) 13.53      3.679
Number of obs: 3954, groups: msoa11, 409

Conditional model:

```

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-7.68740	1.28237	-5.995	2.04e-09 ***
`welsh language ability`Yes, fluently	0.21899	0.50935	0.430	0.667245
`welsh language ability`Yes, but not fluently	-0.86110	0.54206	-1.589	0.112155
scale(`welsh speaking density`)	0.17316	0.39386	0.440	0.660188
as.numeric(Age)	-0.07842	0.01363	-5.754	8.71e-09 ***
GenderFemale	0.95791	0.34795	2.753	0.005905 **
EducationNo formal qualifications	2.32892	0.60249	3.865	0.000111 ***
EducationOther qualifications	0.34303	0.42452	0.808	0.419071
`Social Grade`B (Middle class)	1.23215	0.82990	1.485	0.137622
`Social Grade`C1 (Lower Middle class)	-0.37747	0.81870	-0.461	0.644759
`Social Grade`C2 (Skilled working class)	-0.15405	0.86738	-0.178	0.859032
`Social Grade`D (working class)	-0.02323	0.86543	-0.027	0.978583
`Social Grade`E (Non working)	0.63143	0.85638	0.737	0.460923
EthnicityNon white British	-0.13286	0.60919	-0.218	0.827361
`Income deprivation`	0.06074	0.03956	1.535	0.124685
`Population density`	-0.01547	0.02002	-0.773	0.439603
`Ethnic density`	0.07659	0.05249	1.459	0.144520
`outsider status`	0.60037	0.39007	1.539	0.123769
`welsh language ability`Yes, fluently:scale(`welsh speaking density`)	-0.16828	0.40597	-0.415	0.678489
`welsh language ability`Yes, but not fluently:scale(`welsh speaking density`)	-1.01237	0.77480	-1.307	0.191341

```

---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

Appendix 17. e-letter in response to Chapter 2 published review from Abed, Abbas, & St John-Smith, 2021)

eLetters

Evolutionary mismatch is relevant to the ethnic density effect in psychosis

24 February 2022

Riadh Abed, Retired Psychiatrist and medical member of the mental health tribunals, Ministry of Justice, UK

Mohammed Abbas, Consultant Psychiatrist, Glenfield Hospital, Leicester, UK

Paul St John-Smith, Retired psychiatrist

We read with interest Baker et al's (2021) excellent meta-analysis that has replicated and extended previous findings of an increased risk of psychosis in situations of reduced same-group ethnic density, although the effect appears to vary across minority groups. As in previous studies, the greatest association was observed in Black individuals living in white majority host neighbourhoods.

The authors have surveyed a range of explanatory models for this phenomenon but to our disappointment they neglected to consider evolutionary processes or models. The authors rightly acknowledge that the increased risk of psychosis is not observed in migrant groups' countries of origin, nor can it be explained by diagnostic biases or genetic risk factors and that the risk is context-dependent i.e. environmental in origin.

A relevant example of an evolutionary formulation based on the concept of mismatch is the Outgroup Intolerance Hypothesis (Abed and Abbas, 2011 & 2014). This model proposes that novel aspects of the modern human environment whereby humans live in close proximity of many strangers and/or cut off from access to kinship/ingroup networks is of pivotal importance in increasing the risk of psychosis in vulnerable individuals.

The Outgroup Intolerance Hypothesis is based on the evolutionary concept of mismatch that states that conditions that radically depart from the ancestral human environment are likely to give rise to maladaptive responses in vulnerable individuals leading to potential medical and psychiatric disorders (Gluckman et al, 2009). Mismatch has been a highly productive framework for explaining a range of medical and psychiatric conditions in the modern environment that were either absent or rare in the ancestral human environment such as obesity, type 2 diabetes, cardiovascular disease, childhood myopia (Gluckman et al, 2009) as well as drug and alcohol use (Nesse and Berridge, 1997), depression (Rantala et al, 2018) and eating disorders (Abed, 1998; Abed et al, 2012).

Given that the low same group ethnic density effect (which entails living in close proximity with many strangers and being cut-off from kin and ingroup members) is most likely to be a novel condition that was absent or rarely encountered over human evolutionary history, we suggest that mismatch is directly relevant to the understanding of this phenomenon. In addition, the Outgroup Intolerance Hypothesis provides a greater depth of understanding of other explanatory models cited by the authors such as the effects of racism and various types of discrimination. The evolutionary perspective provides a way of thinking more clearly about the roots of racism and discrimination towards outgroup members generally and why these attitudes cause recipients to experience distress, psychic pain, lack of safety, feelings of paranoia etc.

The evolutionary explanation for why such circumstances are distressing is that over the course of human evolutionary history, being surrounded by strangers with little access to kin and /or ingroup support signalled severe threats to fitness including potential risks to survival.

We suggest that taking greater account of evolutionary concepts can enhance and complement theoretical explanatory models in mental health and the ethnic density effect is a prime example of their usefulness. Evolutionary models are thus particularly pertinent in connecting relevant social stressors and biological responses in the aetiology of mental disorders. This is what we advocate for a wide range of psychiatric conditions in a forthcoming edited volume on evolution and mental health (Abed and St John-Smith, 2022).

Riadh Abed

Mohammed Abbas

Paul St John-Smith

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Conflict of interest:

None declared.