Perceived discrimination and food insecurity as intersectional predictors of adolescent mental health: The synergistic effects of adversity and the mediating role of resilience

Findings from the Born in Bradford cohort

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The candidate confirms that the work submitted is their own and that appropriate credit has been given where reference has been made to the work of others.

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Abstract

Background: Health inequalities reflect the cumulative and intersecting effects of social disadvantage and adversity. The biopsychosocial model offers an integrative means of explaining these disparities beyond the biological, incorporating psychosocial processes through which mental health shapes health inequalities. Community adversity can impact both mental and physical health, yet its role in health inequality research is underexplored. Intersectionality provides a framework for capturing how multiple structural and social adversities can combine to synergistically impact outcomes, whilst the Stress Process Model explains how adversities and resilience might interact to jointly shape outcomes.

Methods: Data were drawn from the Born in Bradford Age of Wonder, prospective birth cohort study, n = 10,684 adolescents. Internalising distress was measured using the Revised Children's Anxiety & Depression Scale, food insecurity using a community designed questionnaire, perceived discrimination using the Adolescent Discrimination Distress Index and resilience using the Brief Resilience Scale. Multivariable linear regression and interaction effects investigated relationships between food insecurity, perceived discrimination and resilience with relation to internalising distress. Mediation analysis explored whether resilience partially mediated the relationship between discrimination and food insecurity with internalising distress.

Results: Perceived discrimination and food insecurity were positively associated with internalising distress, while resilience showed a negative association. Resilience partially mediated the association between perceived discrimination and food insecurity on distress, and significant two-way interactions indicated that certain intersections of adversity and identity intersected to produce synergistically poorer internalising distress.

Conclusion: Community-based adversity is a key modifiable determinant of adolescent mental health. Its association operates through both exposure to adversity and reduced resilience with intersectional effects demonstrating unequal impact across social groups. Adolescence represents a critical window of opportunity for preventative, socially informed, and systemic interventions to reduce health inequalities across the lifespan.

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List of Abbreviations

Abbreviation	Meaning
ACEs	Adverse Childhood Experiences
ADDI	Adolescent Discrimination Distress Index
APA	American Psychological Association
BiB	Born in Bradford
BRS	Brief Resilience Scale
CBT	Cognitive Behavioural Therapy
DNA	Deoxyribonucleic Acid
FI	Food Insecurity
FIT	Food Insecurity Total Score
FSM	Free School Meals
HPA	Hypothalamic–Pituitary–Adrenal Axis
IMD	Index of Multiple Deprivation
NHS	National Health Service
PCREF	Patient and Carer Race Equality Framework
PTSD	Post-Traumatic Stress Disorder
RCADS	Revised Children's Anxiety and Depression Scale
RCADS GA	Generalised Anxiety Subscale (RCADS)
RCADS MD	Major Depression Subscale (RCADS)
SES	Socioeconomic Status
UK	United Kingdom
US	United States
USDA	United States Department of Agriculture

Literature Review

Health inequalities

Health inequalities are avoidable, systematic and unfair differences in health outcomes between groups or across populations that can lead to health disparities (Public Health England, 2022; World Health Organization, 2025), which are measured differences in health outcomes that occur between groups (Turner, 2013). Health inequalities are experienced by groups of people who systematically experience greater obstacles to health due to, for example, their race, gender or where they live. These groups often bear a greater burden of disease and poorer health outcomes as a result (Marmot et al., 2020; Public Health England, 2022). Globally morbidity and mortality rates are consistently divided by socioeconomic position and race/ethnicity (Clouston & Link, 2021; World Health Organization, 2025).

Despite being the 6th largest economy in the world, the UK is unequal by international standards. Despite its wealth, the UK performs poorly compared to other high-income countries, ranking only 21st for overall child wellbeing and 27th for child mental health (Gromada et al., 2020; UNICEF, 2025). This stagnation in health outcomes is also reflected more broadly as the UK's historical gains in life expectancy stalled in 2012 (Minton et al., 2020). In the wake of the financial crisis and COVID-19, inequalities and their impact on children's health could not be more pertinent (Miall et al., 2023). Former President Obama referred to inequality as the 'defining challenge of our time' (Obama, 2014) and its precedence was reflected in the NHS Long Term Plan (NHS England, 2019b) and the Health and Care Bill 2021–22, even before the impact of COVID-19 compounded these disparities even further (Finch & Tinson, 2022).

Health inequalities arise from the conditions in which people are "born, grow, live, work and age", and well as their access to power, money and resources. These factors are referred to as the social determinants of health, or the "causes of the causes" (Pickett et al., 2021; World Health Organization, 2025). These include income inequality and its impact on food security, educational provision, resources and adversity in one's community like neighbourhood safety and experiences of discrimination. These conditions affect our mental health by influencing how we think, act and feel and if resources are in jeopardy or

not distributed fairly, our stress can increase impacting both physical and mental health (Phelan et al., 2010; Wilkinson & Pickett, 2017).

The social determinants of health in the UK influence outcomes in child health. They represent the most significantly modifiable target for prevention and intervention with mental and physical health (Hasbrouck, 2021; Public Health England, 2022). Social determinants are shaped by policies that influence the distribution of power, resource and money. They are experienced disproportionally by the margins of society, making them central to social justice (Kirkbride et al., 2024; Public Health England, 2022). Marked differences are seen between different identity groups and across geographical areas (Pickett et al., 2021). For example, in Bradford, England, those of lower socioeconomic status (SES) are more likely to experience food insecurity (Jandaghian-Bidgoli et al., 2024; Power et al., 2018) and the distress caused by this is linked to increased common mental health difficulties like anxiety and depression (Frongillo et al., 2024; Power et al., 2020).

Health inequalities are driven by a complex architecture of intersecting factors operating at the individual, community and larger societal levels to influence mental health outcomes (Gromada et al., 2020; Pickett et al., 2021). At the individual and relational level, childhood adversity can affect mental health by increasing the likelihood of health harming coping strategies by 12 times (Ahmad et al., 2022; Webster, 2022). Childhood adversity can also increase risk of physical and mental illness across the lifespan (Bellis et al., 2019). At the community level, experiences of racial discrimination in the UK shows both, a direct negative impact on mental health, and an indirect impact by effecting minoritised ethnic groups socioeconomic position (Stopforth et al., 2022). Finally, at a national societal level, government policies that do not redistribute equity for those most vulnerable, generate and perpetuate an intergenerational legacy of disadvantage and poor mental health (Kirkbride et al., 2024; Marmot et al., 2020).

Theoretical underpinnings – Psychosocial pathways

The causal pathways linking social inequality, mental health and health inequality are complex, context dependant and sometimes mutually compounding. These processes are often bi-directional, leading to sociodevelopmental cascades that can compound outcomes (Kirkbride et al., 2024; Pickett et al., 2021; Public Health England, 2022). For example, perinatal mental distress can be impacted by, and impact, socioeconomic position, whilst also increasing the risk of childhood adversity for their offspring (Kirkbride et al., 2024; Webster, 2022).

The evidence base continues to evolve but high-quality research converges on fundamental causes theory (Phelan et al., 2010; Riley, 2020), social stratification (Pickett & Wilkinson, 2015, 2017) and the stress process model (Aneshensel, 2015; Turner, 2013). Together these models explain how structural and social inequalities impact mental health across ecological levels, in turn contributing to health inequalities (Turner, 2010). These three central theories are outlined below.

Fundamental causes theory. This explains the persistent patterning of health inequalities at the structural level by positing that social conditions like socioeconomic status (SES), racism and stigma are the fundamental causes of health inequalities (Link & Phelan, 1995). These factors contribute to increased morbidity and mortality, which remain stable over time despite significant advances in disease intervention and management. It does so by unfairly structuring who has access to flexible resources. For example, people of higher SES are at an advantage as they have access to flexible resources to protect and mitigate risks to their health, such as money, power, knowledge and social capital (Link & Phelan, 1995; Phelan et al., 2010).

The theory describes the 'fundamental' higher level relationship between risks, protections and disease, irrespective of specific intermediatory mechanisms (Clouston & Link 2021). For example, unequal distribution of power and resource allows some groups to have easier access to food aid. Food aid is framed as universal, yet in the UK the accessibility and suitability of food offers differ by gender, culture and ethnicity (Power & Baxter, 2026). Qualitative research from Bradford, found that Pakistani women living in poverty were markedly less likely to access food banks in part due to food provision not being culturally appropriate e.g. lack of Halal options (Power et al., 2018). This can unfairly perpetuate the impact of lower SES and food insecurity for certain ethnic groups and illustrates how the fundamental causes of SES and racial exclusion remain in operation despite the availability of food aid.

There are many intermediatory mechanisms through which SES, racism and power, operate to affect outcomes. SES and racism in this context are what's 'fundamental' to the system of inequality. They stay constant even when the intermediatory mechanisms change. This was demonstrated by the introduction of free healthcare via the UK's NHS, where historically, a mechanism of inequality was a lack of affordable healthcare. Despite this, health inequalities have persisted indicating that the underlying mechanisms remain unchanged (Kapadia et al., 2022; Lewer et al., 2020).

The intermediatory mechanisms switched from financial to racial discrimination within healthcare settings (Kapadia et al., 2022; Lewer et al., 2020). Racial discrimination within NHS services erodes trust and discourages health related help-seeking, consequently impairing access to services which ultimately impacts health (Lacobucci, 2022). Fundamental causes were also reproduced during the COVID-19 pandemic, when a novel disease emerged, yet the same health inequality patterns persisted (Clouston et al., 2021). Across these contexts, the specific diseases and intermediatory mechanisms changed, yet the fundamental causes remained - socioeconomic disadvantage and racism (Clouston & Link, 2021). Fundamental causes theory therefore points to overarching systems of power and privilege to address health inequalities.

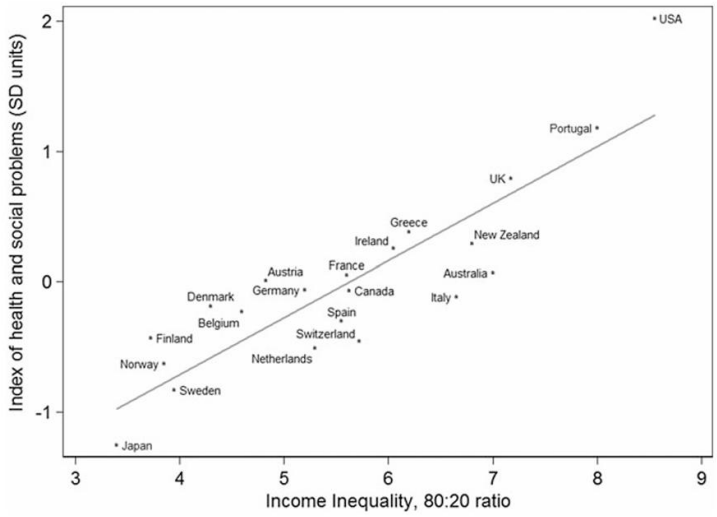
Despite its considerable influence in reframing health inequalities, fundamental causes theory remains underutilised in policy and practice. One key limitation lies in its emphasis on the fluid and evolving nature of mechanisms linking SES and health outcomes. This presents a considerable challenge in terms of operationalising its constructs and therefore testing its hypotheses empirically. If the mechanisms continually change over time, causality becomes difficult to specify and the theory difficult to falsify, thus limiting its ability to produce precise and testable hypotheses. As such, health inequality research cannot rely solely on a theory that is inherently difficult to test, and its assumptions must be triangulated through complementary frameworks. Furthermore, this limitation is compounded by critiques that the theory is underdeveloped in accounting for the full range of mechanisms through which power, both relational and structural, reproduces inequalities via for example cultural or political power (McCartney et al., 2021).

Social stratification. The stratification of people's position in society is a mechanism by which health inequalities are created and perpetuated. It describes the systematic way a society distributes resources unequally according to a social hierarchy based on key factors like class, economic position, gender, race, social status and power (Link & Phelan, 1995; Wilkinson & Pickett, 2006). This system creates disparities, by increasing risks to health and restricting access to resources that maintain and repair health, based on where you are in the social hierarchy (Public Health England, 2017, 2022; Wami et al., 2020). For example, if someone's SES is limited due to racial discrimination from those in power at work, or the poverty they are born into, they are more likely to experience food insecurity, which will negatively affect their mental and physical health (Power et al., 2023; Stopforth et al., 2022).

There are disparities in health in all countries along the axis of socio-economic position, with lower socioeconomic position increasing the risk of poor health (World Health Organization, 2025). Unexpectedly this is not in relation to absolute income but instead relative income (Pickett & Wilkinson, 2015). Societies with larger differences in relative income between their richest and poorest show a gradient in health and social outcomes, where those at the bottom of the gradient i.e. the poorest, do considerably less well than those at the top (Wilkinson & Pickett, 2006).

Figure 1

Health and social difficulties are more pronounced in more unequal countries



Note: Graph taken from The Spirit Level (Wilkinson & Pickett, 2009)

Figure 1 demonstrates the relationship between the index of health and social problems and income inequality, the most unequal countries with the most inequality had worse health and social outcomes. The index is a composite measure that includes life expectancy, math and literacy scores, infant mortality, homicides, imprisonment rates, teenage births, trust, obesity, mental illness, and social mobility (Pickett & Wilkinson, 2015; Public Health England, 2017; Wilkinson & Pickett, 2009). This is what is referred to as the social gradient. Its utility for policy and intervention is that it demonstrates how everyone below the top of the social ladder is affected, and it's not just the poor who do less well. It evidences that tackling inequality benefits the whole of society regardless of whether your values are economic or moral (Pickett et al., 2021; Wilkinson & Pickett, 2017).

If social stratification is the hierarchy, then social status is where one is along that ladder, and position is heavily influenced by levels of agency, respect and power (Pickett &

Wilkinson, 2015). Therefore, if one lives in an unequal society, they will need to be higher up the social gradient (higher social status) to survive or thrive. This can create chronic concerns about one's social status and a perception that one's self-worth is measured by their social position. If a person's position is limited by a lack of agency, respect or power, they can experience status anxiety which is stressful to both the body and mind (Melita et al., 2021; Pickett & Wilkinson, 2015). International comparisons show status anxiety increases with inequality and correlates with worse mental health outcomes like anxiety and depression (Layte, 2011; Layte et al., 2019; Patel et al., 2018; Wilkinson & Pickett, 2017).

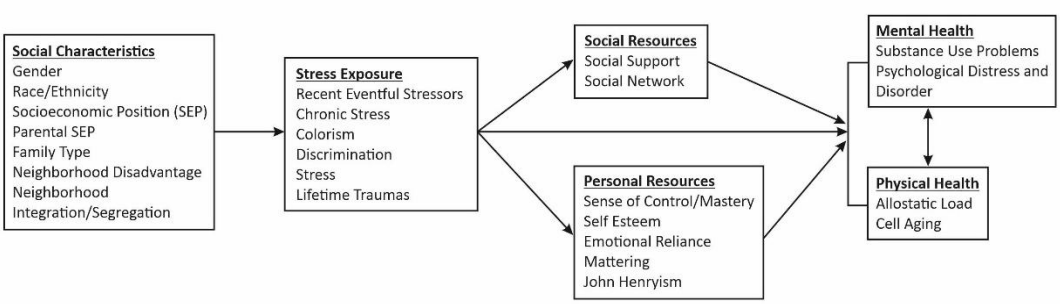
The social gradient evidence base has been criticised for inferring causality based on largely observational, cross-national correlational data, and a lack of experimental evidence to substantiate its claims. These critiques however overlook the foundations of epidemiological causal inference, which does not rely on single associations but rather systematic evaluation of evidence against established causal criteria (Pickett and Wilkinson, 2015). These include, for example, assessing consistency of results across studies, temporality of relationships, and the theoretical plausibility of underlying mechanisms. Collectively, epidemiological criteria produce strongly supported causal interpretations. To dismiss this body of evidence solely on its observational design, would call into question much of the epidemiological evidence base and causal inference in population health research. Selectively rejecting these findings, risks applying an inconsistent standard of appraising findings which is not scientific in nature (Igelström et al., 2022; Pickett and Wilkinson, 2015).

The Stress Process Model. The mechanisms through which psychosocial stressors such as status anxiety, food insecurity or discrimination can adversely impact mental health can be understood through the Stress Process Model (Anderson, 2013; Melita et al., 2021). It describes how broader social structures differentially expose individuals to stressors over time. It conceptualises mental health outcomes as resulting from a dynamic interplay between stressors and resources. When high levels of toxic stress coincide with diminished resources, the result is poorer health outcomes. However, if adversity is experienced alongside protective resources, negative outcomes can be buffered. These differential exposures of adversity and resources, which are often determined by structural factors, are a primary mechanism through which inequalities are produced (Thoits, 2010; Turner, 2013). For example, in Bradford people can experience financial and food insecurity whilst living in deprivation. Figure 2 illustrates the extensive interdisciplinary evidence from biology,

sociology and psychology demonstrating how the stress process is a multisystem process affecting multiple facets of health (Mengelkoch et al., 2024; O'Connor et al., 2021; Turner, 2010).

Figure 2

The Stress Process Model (Turner, 2013)



Stress is defined as when a stressor exceeds the resources, or adaptive capacity, of an individual. A stressor is a social, economic or environmental condition that places demand or creates perceived or real threat for an individual. The stress response is the body's response to stress, be that psychological, behavioural or physiological (Cohen et al., 1995; Schetter et al., 2013).

The Transactional Stress and Coping Model, a seminal theory underpinning cognitive behavioural therapy (CBT), posits that a stressor does not inherently produce distress, rather its impact is mediated by an individual's cognitive appraisal of a stressor. Therefore, the stress response is activated if the stressor is appraised as a threat or challenge that exceeds their perceived resources or capacity to cope (Biggs et al., 2017). Stress is a multidirectional and dynamic interaction between an individual, their environment and resources, both objective and perceived. How stress is appraised can create feedback loops, impacting and being impacted by how we think, act and feel (Lazarus & Folkman, 1987; Schetter et al., 2013).

In the short-term the physiological stress response can be adaptive, temporarily boosting the immune system and readying the body to respond to threat; be that physical, psychological or social. Stress can be tolerable, or even resilience boosting, if buffered by protective factors that allow positive adaptation to the stressor (Bellis et al., 2019). If stress is acutely unpleasant and/or overwhelming of people's resources it can lead to distress (Halbreich, 2021). The stress response can become toxic to health (toxic stress) if its

duration, frequency and/or intensity is sufficient to result in long term disruptions to mental and/or physical health (Shonkoff et al., 2012).

Long term disruptions occur when an individual repeatedly experiences stress. This results in a repeated cascade of biological responses that activate the bodies 'fight or flight' system. Physiologically this is enacted via several complex pathways, the most notable and consequential for mental and physical health being the hypothalamic-pituitary-adrenal (HPA) axis. HPA axis activation mobilises the energy required to ready the body to respond to a stressor, by releasing cortisol the body's stress hormone (Bertollo et al., 2020; James et al., 2023).

Allostasis is the process through which the body attempts to maintain physiological stability in response to HPA activation and cortisol release. It achieves this through compensatory responses, including reallocating energy away from digestion, growth and repair and toward hypervigilance and increased heart rate and blood pressure (Finlay et al., 2026; Juster & Misiak, 2023; Rodriguez et al., 2020). When allostatic systems are chronically activated, cortisol is repeatedly released and the body's constant reallocation of resources becomes increasingly costly. This multi-system, cumulative burden on brain and body is referred to as allostatic load (Finlay, et al., 2026).

Systematic reviews spanning decades of research demonstrate associations between increased allostatic load and worse mental health (Guidi et al., 2021) in both clinical (Finlay, et al., 2026) and non-clinical populations (McCrory et al., 2023). Allostatic load is also associated with physical conditions including obesity, diabetes and cardiovascular disease, and with increased morbidity and mortality (Carbone, 2021; Finlay et al., 2023). Importantly, allostatic load is not evenly distributed, with higher levels observed for those of lower SES and racialised groups, mirroring established patterns seen in health inequality research and supporting the role psychosocial stressors play in shaping health outcomes (Geronimus et al., 2006; Rodriguez et al., 2020).

The cumulative psychological burden and resultant allostatic load of chronic stress can lead to premature mortality. This is referred to as 'weathering' and is associated with premature cell death, which has been explained by DNA proteins called telomeres prematurely shortening (Geronimus et al., 2006). This has led to the concept of biological age, where greater exposure to chronic stress may result in a biological age that exceeds their chronical age (Polsky et al., 2022). Through this pathway, chronic stress can become

toxic contributing towards coronary heart disease and shortened life expectancy (Geronimus et al., 2006; Guidi et al., 2021; Turner, 2010; Vaccarino et al., 2025).

Neural pathways implicated in the stress response centre on disruptions to emotion regulation arising from altered limbic and executive functioning in the brain. Chronic stress hyperactivates the amygdala, the brain region responsible for processing emotion and threat detection, whilst simultaneously inhibiting the four main modulators of amygdala activity (Bhutta et al., 2023). These modulators include the pre-frontal cortex, responsible for executive functioning (Arnsten, 2009); the hippocampus, which plays a central role in memory & learning (James et al., 2023; Vyas et al., 2002); oxytocin, a hormone linked with emotional regulation and social bonding (Bahji et al., 2021; Wirth, 2015); and the vagus nerve, which is central to nervous system regulation (Porges, 2022).

Together, these neural processes sensitise people to perceived social threat and impairs the ability to regulate and recover, contributing to altered neural pathways and inflammation associated with depression and anxiety (Bertollo et al., 2020; Patel et al., 2018; Sapolsky, 2015). Additionally, people with depression consistently report feelings of shame and inferiority, feelings associated with lower social status and the internalisation of one's outcomes (Johnson et al., 2012). Behavioural responses often include rumination, worry and health harming coping strategies that have unintended consequences e.g. social withdrawal, smoking, drug and alcohol use. These influences on thoughts, emotion and behaviour can both lead to and proliferate mental health outcomes (Suglia et al., 2025).

Stress proliferation refers to the process through which a stressor can increase exposure or vulnerability to further stressors, creating clusters of stress and proliferating impact (Pearlin, 2010; Pearlin et al., 2005). Physiologically, this accumulating burden can be explained by allostatic load, whereby chronic stress alters biological functioning, through gene expression and epigenetic mechanisms. This increases vulnerability to both mental and physical difficulties (Caspi et al., 2003; Sapolsky, 2015). These epigenetic changes may also be inherited leading to intergenerational susceptibility to the toxic effects of stress. This places some people at a disadvantage right from the outset, reflecting how environmental conditions can become biologically embedded (Leve et al., 2024; Yehuda & Lehrner, 2018).

Behaviourally, stress proliferation can occur when low SES contributes to financial strain. This may lead to food insecurity and heightened feelings of shame and status anxiety, shaped by dominant societal discourse around deprivation and low social status.

These experiences can then trigger social withdrawal and lead to depression (Melita et al., 2025; Power & Small, 2022; Purdam et al., 2016). Stress may also proliferate through the absence, loss or depletion of coping resources. When resources are inadequate or lost individuals may experience negative effects that heighten vulnerability to subsequent stressors (Hobfoll et al., 2001). Stress proliferation therefore offers a possible mechanism through which intersecting axes of social disadvantage and oppression can create synergistically worse outcomes (Pearlin, 2010; Pearlin et al., 2005). The stress process is dynamic and stressor impact on outcomes can be moderated when stressors interact with social and personal resources like social support, mastery or self-esteem. Therefore, outcomes are determined by the interaction between stressors and resources (Thoits, 2010; Turner, 2013).

The Transactional Model of Stress and Coping has usefully highlighted cognitive appraisal as a mediator of the stress response (Hofmann et al., 2012; Lazarus & Folkman, 1987) and this has informed cognitive reappraisal interventions like CBT (Hofmann et al., 2012). The appropriateness and utility of over individualising distress in contexts of real deprivation is questionable. In such circumstances, frameworks that foreground and address structural inequality may offer more explanatory power, and be less stigmatising, than overly situating the locus of control within individuals (Aneshensel, 2009).

For example, in the context of food insecurity where food shortages are materially real and hunger exerts direct physiological stress on the body and mind, stressors are not solely continent on interpretation or perceived capacity to cope (Inglis et al., 2023; Maina et al., 2025; Purdam et al., 2016). Similarly, distress in the context of discrimination or racial violence reflects exposure to externally imposed threats rather than maladaptive appraisal. Recent experimental evidence further challenges the transactional model of stress and coping. In a meta-analysis of 73 experimental studies, Emmer et al. (2024) found that discrimination negatively affected mental health in the absence of conscious awareness and was at times worse if the discrimination was ambiguous. As such, some stress responses can pose direct risk to allostatic load regardless of cognitive appraisal. This evidence should be taken into consideration when designing interventions (McEwen, 1998; McEwen & Stellar, 1993).

Summary of Key Theoretical Frameworks

The evidence is extensive and compelling, mental health is inextricably linked to one's life circumstances (Kirkbride et al., 2024). In the words of Professor Sir Michael

Marmot “Health inequalities and the social determinants of health are not a footnote to the determinants of health. They are the main issue” (The Marmot Review, 2010).

The psychosocial mechanisms that interact to create inequalities are complex and ever changing, however, SES, racism and stigma are fundamental to health inequalities (Clouston & Link, 2021). Social stratification creates disparities through unequal access to resources and opportunities, thereby protecting health and concentrating social status and power among those higher up the social hierarchy. In wealthy unequal countries social status rather than absolute income is what’s associated with poorer outcomes (Marmot, 2017; Pickett & Wilkinson, 2015). These exist along a social gradient where people of lower social status experience higher levels of stress. This sustained psychosocial stress increases allostatic load, damaging mental health, increasing physical disease and ultimately shortening life expectancy. The gradient in health is evident across the lifespan but is most impactful if experienced chronically during childhood and adolescence (Public Health England, 2017; Wilkinson & Pickett, 2017; Williams & Mohammed, 2013). A diagrammatic summary of the psychosocial process and their relation to outcomes are displayed in Figure 3.

Figure 3

Psychosocial pathways to health inequalities: linking social determinants with psychobiological processes, health behaviours and distribution of health outcomes

Note: Taken from the Public Health England, Sept 2017 (Public Health England, 2017)

To combat these unfair and modifiable disparities in health, policy and intervention must focus on addressing the fundamental causes and mechanisms by which health inequalities operate. Additionally, resource must be equitably distributed so that all society can benefit from less stress and better health (Marmot et al., 2020).

The influence of childhood adversity

Health inequalities occur across the life course but the impact of social determinants on health often starts in childhood, making this a pertinent developmental period for research and early intervention (Herzberg & Smyser, 2024). To study potential sources of psychosocial stress for children experiencing health inequalities, researchers

have primarily looked to Adverse Childhood Experiences (ACEs). As such, ACEs research has grown exponentially over the past 25 years (Struck et al., 2021).

Large longitudinal and meta-analyses demonstrate that cumulative exposure to ACEs is associated with psychosocial stress, allostatic load, poorer mental and physical health, and reduced life expectancy (Bellis et al., 2019; Bhutta et al., 2023; Nelson et al., 2020; Petruccelli et al., 2019; Shonkoff et al., 2012). Accordingly, early identification and intervention with ACEs and their social determinants, have become important targets for public health research and policy (Department of Health and Social Care, 2020). Areas with the highest health inequalities in England, particularly deprived regions in the North also have a higher prevalence of ACEs, thus reflecting the role early-life adversity plays in shaping unequal outcomes (Lewer et al., 2020; Marmot et al., 2020).

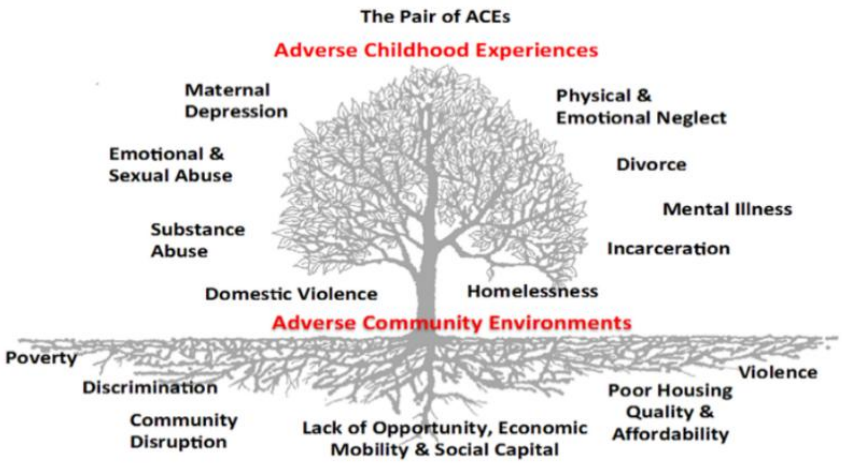
The original ACEs studies were conducted on an American, predominantly White population and captured, individual, largely household-based, adversity (Felitti et al., 1998). This resulted in an ACEs list and subsequent research that has limited generalisability and at times poor specificity (Cronholm et al., 2015; McEwen & Gregerson, 2019; Russell et al., 2024). This is particularly relevant for ethnic minorities living in deprivation, who disproportionately experience childhood adversity and health inequalities (Ahmad et al., 2022), but whose types of ACEs are not always captured by traditional ACEs research (Cronholm et al., 2015).

The Pair of ACEs Model

The Pair of ACEs Model (Figure 4) invites researchers to take a broader look at sources of adversity. Whilst non-exhaustive, it more accurately reflects the breath of experiences among ethnic minorities and those living in deprived communities (Ellis & Dietz, 2017; Ellis et al., 2022). This is important, as the community-based adversity that underlies health inequalities have been evidenced to impact mental health and should be considered as part of effective and equitable public health policy (Kirkbride et al., 2024; Marmot et al., 2020).

Figure 4

The Pair of ACEs model (Ellis et al., 2022)



Note. The leaves of the tree signify the symptoms of ACEs that services are more familiar with. The roots signifying the child's tree of life, steeped in structural racism, community adversity and inequality, robbing it of the vital nutrients required for healthy development and flourishing.

Community level adversity

The following is a concise literature review of the community-based adversities used in this research and their relationship to the stress process and mental health.

Discrimination

The Universal Declaration of Human Rights, states that everyone should be treated with dignity, equality and protected from oppression (United Nations, 1948), yet today discrimination in the UK has been described as "shockingly widespread" and is disproportionately experienced by marginalised groups like migrants and minoritised ethnic people (Finney et al., 2023). In 2018 nationally representative research by the Equality and Human Rights Commission found that 70% of their Muslim participants reported religious discrimination and 58% of Asian heritage participants reported racial discrimination (Abrams et al., 2018).

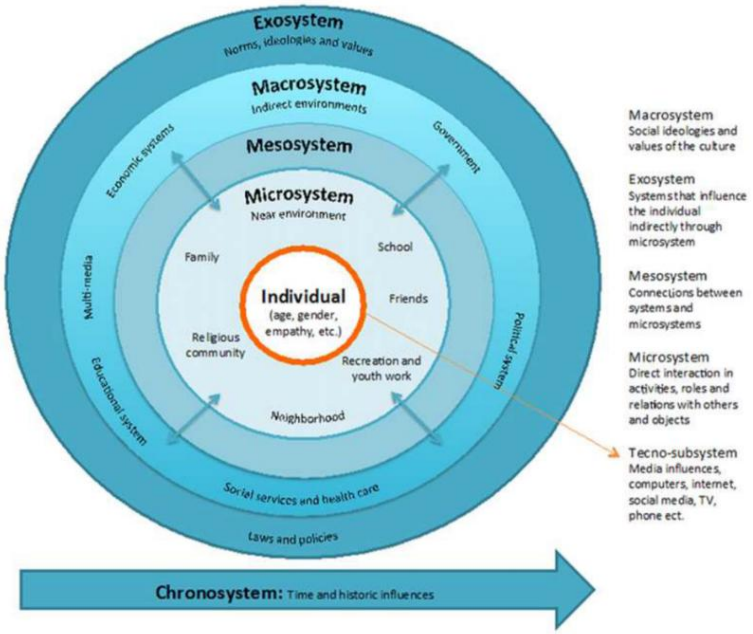
Nationally anti-Muslim incidents have risen 365% since October 2023 and over 70% of Muslims with mental health difficulties reported experiences of Islamophobia (Muslim

Mind Collaborative, 2025). Surprisingly, these discriminations and their impact on mental health in the UK is vastly understudied (Fahim Uddin et al., 2022). This indicates that discrimination is likely a critical component of health inequalities for the large South Asian and Muslim community in Bradford, one of Britain's most deprived districts (Marmot et al., 2020; Kapadia et al., 2022). The impact of inequalities caused by discrimination are found to have innumerable adverse consequences, including but not limited to physical and mental health, and premature mortality (Graham, 2024) and as such are a threat to one's basic human rights (Schmitt et al., 2014).

Discrimination under UK law is defined by the Equality Act 2010 as "treating someone with a protected characteristic less favourably than others" or putting arrangements in place that put a person with a protected characteristic at an unfair disadvantage (Equality Act, c. 15). Protected characteristics in the UK are age, gender assignment, marital status, being pregnant or on maternity leave, disability, race including colour, nationality, ethnic or national origin, religion or belief, sex or sexual orientation.

Figure 5

Bronfenbrenner's ecological systems model, demonstrating the different levels where discrimination can operate



Note. Taken from (Currie & Morgan, 2020)

Discrimination occurs across different ecological levels of society at the interpersonal, institutional/structural and cultural levels (Figure 5; Currie & Morgan, 2020).

Interpersonal discrimination occurs at the micro level between people e.g. racially motivated violence or microaggressions (Graham, 2024). At the meso and exo ecological levels, institutional and structural discrimination disadvantages people via practices and policies that systematically exclude or impose barriers that restrict fair access to resources (Emmer et al., 2024).

For example, experimental field studies in the UK found that ethnic minority applicants in the UK labour market were less likely to be shortlisted for jobs compared to equally qualified White British candidates. This illustrates how discrimination acts as a fundamental cause of inequality by constraining socioeconomic opportunity and status (Zwysen et al., 2021). This validates why South Asian people in the UK prefer self-employment, because they feel discrimination in the workplace mediates their income potential (Haq, 2015). Discrimination at the structural level is argued to be the most harmful and pernicious (Williams et al., 2019). It can operate independent of conscious intent making it invisible to both those affected by it and those enacting the policy or practice that predates their involvement (Krieger, 2014). Consistent with this, meta-analytic evidence reported that more ambiguous forms of discrimination had a stronger impact on stress and affect than more explicit single event experiences of discrimination (Emmer et al., 2024). This subtlety makes such forms of discrimination particularly difficult to notice, name and address.

At the macro level cultural discrimination operates through ideological power, whereby dominant societal discourses socialise others to view the non-dominant group as inferior or dangerous in some way (Lears, 1985; Link et al., 2001). These discourses produce and sustain problematic cultural norms, stereotypes and prejudice. These can then get re-enacted and further shape society, government and institutions. This process therefore explains the reciprocal causality of inequalities (Emmer et al., 2024; Williams et al., 2019). For example, how discourse in the UK portrays South Asian people as potential terrorist threats (Hussain & Bagguley, 2012), and Black men as inherently dangerous (Williams & Clarke, 2016) reinforcing racialised stereotypes that both shape and are reproduced through government policy. Notably, the UK's Prevent counter-terrorism strategy which has been shown to racialise Muslims as a "suspect community" from which the White British majority must be defended, therefore proliferating and legitimising further discrimination of Muslims in the UK (Ali, 2020; Bruchhaus & Abbas, 2025).

The psychological impact of discrimination on mental health is far reaching. Evidence from studies across the US, UK, Europe and beyond consistently find discrimination is associated with poorer mental health outcomes. This can include but is not limited to distress, anxiety, depression, trauma and unshared experiences, often referred to as psychosis (Cénat, 2023; Kim et al., 2025), and that the severity of discrimination is worse for ethnically minoritised groups (Emmer et al., 2024; Fisher et al., 2000).

Research points to many different mechanisms of action, both neurological, biological, individual, social and systemic in action to explain the many ways discrimination impacts mental health (Emmer et al., 2024). Although further research is still required numerous theories converge on processes that directly or indirectly lead to chronic stress activation as a contributor to poor outcomes (Krieger, 2014; Priest et al., 2013; Williams et al., 2019).

As previously discussed, chronic stress is widely evidenced to negatively impact mental and physical health. The outcomes for people experiencing discrimination closely mirror those associated with toxic stress, including HPA dysregulation, increased allostatic load, altered neural functioning, epigenetic changes and the proinflammatory cytokines that link stress to internalising distress such as depression and anxiety (Emmer et al., 2024; Fields et al., 2025; Gou et al., 2025; Kathawalla & Syed, 2021; Miller et al., 2021; Muscatell et al., 2022; Williams, 2018). Collectively, this evidence demonstrates that discrimination operates as a chronic psychosocial stressor, providing a key mechanism through which community-based adversity can impact health and lead to health disparities. This reenforces its role as a fundamental cause of health inequality, as its effects persist through multiple pathways and across different ecological levels of society.

In line with the stress process model, it is worth noting that the mental health outcomes of experiencing structural and interpersonal discrimination are not experienced equally across groups and contexts. The effects of discrimination on mental health can be buffered by the community resilience associated with the ethnic composition of one's local community. The ethnic density hypothesis argues that minoritised ethnic groups can experience better mental health when living within communities with higher concentrations of their own ethnic group (Bécares et al., 2018; Das-Munshi et al., 2010).

In the UK, higher own-group density has been associated with lower rates of common mental health disorders, lower suicidal ideation and improved wellbeing across several different ethnic minority groups, including Pakistani, Bangladeshi and Indian

communities (Bécares et al., 2018; Das-Munshi et al., 2010). Proposed mechanisms include greater social support, stronger social identity, increased social cohesion and reduced exposure to discrimination and minority stress (Bécares et al., 2009, 2018; Das-Munshi et al., 2010). Consequently, whilst broader structural inequalities remain present, higher own-group ethnic density may reduce exposure to some forms of minority stress. Viewed through the lens of the Stress Process Model, ethnic density may function as a psychosocial resource that buffers discrimination related stress whilst simultaneously increasing access to protective social resources, reducing vulnerability to poorer mental health outcomes (Thoits, 2010; Turner, 2013).

Food Insecurity

Access to adequate food and nutrition is a basic human need and fundamental human right (Jandaghian-Bidgoli et al., 2024). Food insecurity (FI) however is quickly becoming a major public health and human rights challenge given its rapid increase and far-reaching impact on physical and mental health, diet and nutrition. Globally, it is significant enough to be affecting over a billion people (Barrett, 2010; Loopstra, 2024). FI is a contextually broad concept that emerges and proliferates uniquely depending on the social and environmental context e.g. war, famine, or a cost-of-living crisis in a western context. Each aspect of which are caused by and produce different outcomes (Ejiohuo et al., 2024).

Accordingly, this summary focuses on the context relevant to high-income, Western countries, where food insecurity is driven primarily by financial insecurity rather than food scarcity (Hartgen-Walker & Lally, 2023). This aligns with fundamental causes theory, as access to food in the UK is not constrained by food scarcity but rather socioeconomic disadvantage in the form of financial strain and deprivation (Department for Environment, Food & Rural Affair, 2024; Power & Baxter, 2026).

FI is defined as the inadequate or uncertain access to nutritious and safe foods for normal growth, health and development (Food and Agriculture Organization of the United Nations, 2023), and can also encompass the inability to attain food in socially acceptable ways (Power et al., 2018). Its severity can range from, mild (uncertainty obtaining food); moderate (compromised nutrition and altered eating patterns); to severe (having no food for over a day; Hartgen-Walker & Lally, 2023).

Despite the UK being the 6th largest economy in the world (Gromada et al., 2020), it is estimated that food insecurity for children in the UK is worse than in the US and Canada

(Loopstra, 2024) and yet is much less studied (Power et al., 2023). Between 2022-23, 17% of children, an average of 2.4 million, in the UK were living with food insecurity, a rise of over a million children since 2019 (Loopstra, 2024). The Food Foundation reported that in 2023 the number of children experiencing moderate to severe FI doubled to 4 million children (Food foundation, n.d.). Given FI's risk to mental health, this requires swift intervention to both protect the mental health and human rights of children experiencing it.

The harmful impact of FI on development and nutrition is better documented, however much less is known about its influence on mental health (Loopstra, 2024). The first study on food insecurity in the UK was conducted as late as 2016 (Power et al., 2020), and academic progress has been hindered by historic gaps in data recording. Notably, the nationally representative family resource survey included food insecurity for the first time in 2019 (Power et al., 2023). These research gaps are a matter of urgency as FI continues to rise sharply (Loopstra, 2024) and this is echoed by systematic reviews which emphasise the need for more comprehensive research and intervention (Clark et al., 2025; Frongillo et al., 2024; Pourmotabbed et al., 2020).

The current literature regarding FI and mental health outcomes has primarily focused on adults and depression (Pourmotabbed et al., 2020; Sparling et al., 2022). FI's relationship with mental health like many other processes is complex and can be multidirectional and mutually compounding (Maynard et al., 2018). The psychological mechanisms of action to date are understudied and much remains to be known regarding the specific processes driving their impact. What is agreed is that FI is a powerful stressor and these stress processes are behavioural and biological in nature (Frongillo et al., 2024; Pourmotabbed et al., 2020).

Behaviourally, chronic uncertainty, psychological threat and worry regarding acquiring sufficient food is thought to trigger the stress response which is associated with anxiety and depression (Laraia, 2013; Leung et al., 2022). If the magnitude of this is sufficient to overwhelm ones psychological and material resources, FI can also cause trauma (Frongillo et al., 2024). It can also lead to feelings of shame, helplessness, alienation and low self-efficacy (Laraia, 2013; Pourmotabbed et al., 2020). Poor mental health is also associated with food insecurity, through decreased productivity, resulting in for example, threats to income, motivation and problem solving (Ejiohuo et al., 2024; Moy et al., 2026). Coupled together these multidirectional processes can become cyclical and may proliferate stress leading to possible synergistically poor outcomes (Maynard et al., 2018).

FI in high income countries is highly correlated with community adversity like deprivation and poverty, which are often experienced in communities lacking social and environmental supports, i.e. community resilience (Carrillo-Alvarez et al., 2021; Ellis et al., 2022; Loopstra & Tarasuk, 2013). For example, a mother experiencing food insecurity intersecting with financial insecurity and limited community resources may experience chronic stress, which increases the risk of engaging in unhelpful coping strategies and poorer mental health (Laraia, 2013; Power et al., 2017).

Children and adolescents can be impacted by FI both directly and indirectly, through worry, stress and altered relationships with stressed caregivers (Frongillo et al., 2024). Until recently, it was assumed that children were shielded from the adversity of FI by their parents (Fram et al., 2011). More recent qualitative research is disproving this, confirming children are aware of and often internalise responsibility for food insecurity, which can lead to anxiety and anticipatory stress (Fram et al., 2011). This stress can strain familial relationships and alter parenting practices such as harsher discipline and disrupted attachments (Gershoff et al., 2007; Ke & Ford-Jones, 2015). Moreover, FI can also act as an emotional contagion, where even in households where parents sacrifice their own food to protect children from hunger, children are still aware and adversely affected by parental stress and worry (Knight et al., 2018; Shinwell & Defeyter, 2021). Experiences of FI are also associated with feelings of shame and helplessness, leading to behavioural changes such as social withdrawal which can proliferate stress by creating negative feedback loops worsening outcomes when further social resources are lost (Bell et al., 2023; Fram et al., 2011).

Quantitative studies of FI for children and adolescents have shown associations with depression, anxiety, PTSD, inattention, aggression, hyperactivity (Shankar et al., 2017), bullying and substance use (Frank et al., 2024). Food insecure adolescents were at elevated risk of bullying victimisation compared to food secure peers, especially Females (Frongillo et al., 2024; Liang et al., 2021). Large scale, multi-country, secondary analyses found that children and adolescents experiencing food insecurity showed an increased risk of suicidal ideation, suicidal planning and suicide attempts, when compared to their food secure peers. Thus, indicating the severity of distress that food insecurity can impose (Steare et al., 2024; Tetteh et al., 2024).

Much like traditional ACE's, longitudinal research from the US found that FI in childhood predicted worse psychological distress later in life, even at lower levels of FI and

after adjusting for other factors such as SES, parental health and FI in adulthood (Fertig, 2019). This is an important finding as it posits FI as a chronic stressor analogous to traditional ACEs (Asmussen et al., 2019) and suggests that early intervention is key to reducing lifelong health inequalities. Supporting this, children experiencing food insecurity had higher cortisol levels than food secure children, suggesting the stress process as a causal explanation for poor outcomes (Ke & Ford-Jones, 2015; Simonovich et al., 2020). To date the evidence implicates stress as a causal mechanism, as studies have demonstrated this link across longitudinal, biomarker based, dose response and epidemiological studies across diverse populations and contexts (Frongillo et al., 2024; Pourmotabbed et al., 2020; Zahidi et al., 2024).

Reviews and reports have stated that ethnic minorities disproportionately experience food insecurity in Western countries (Blake & Cromwell, 2022; Power et al., 2018). Interestingly, a Born in Bradford study found that despite living in comparatively lower deprivation, White British women (19%) reported higher levels of FI than South Asian women (10%). This difference was attributed to South Asian women being more likely to access food through extended family and cultural community support networks (Power et al., 2017). This speaks to the powerful buffering effects of strong community networks even in the presence of adversity (Ellis et al., 2022).

Notably, South Asian women in Bradford were much less likely to access food bank support than White British women, largely due to experiencing shame regarding their FI and food banks lacking culturally appropriate food. For some, this reluctance to disclose FI or engage with services meant their FI remained entirely hidden (Power, Small, et al., 2017). These findings highlight the importance of assessing FI via multiple domains, rather than relying on service utilisation alone, as patterns of reporting and accessing services varied by culture and ethnicity. This also suggests that social and community support may both buffer and obscure the immediate effects of FI. The overall impact of these intersecting process on mental health, however, is withstanding.

Notable gaps in the current literature include studies relating to children and adolescents (Pourmotabbed et al., 2020). This requires addressing as these are key developmental stages during which vulnerability to mental health difficulties can be pronounced (Reuter et al., 2024). There has also been a relative paucity of research regarding FI's relationship to anxiety which requires more quality research (Zahidi et al., 2024). Existing research has primarily focused on common mental health challenges such as

depression, but more remains to done regarding associations with trauma, disordered eating, externalising behaviours and suicide risk. In addition, key mechanistic pathways need elucidating, mirroring the level of evidence found across ACEs studies. If FI is a potent stressor, it too could pose long term risks to epigenetic and neurobiological processes in children's development (Asmussen et al., 2019; Struck et al., 2021).

Resilience

Health inequalities cannot be understood or tackled by examining stressors in isolation. As the stress process model describes, outcomes are a product of interactions between stressors and resources that together interact to shape outcomes, as shown in Figure 2 (Thoits, 2010). Accordingly, resilience is of particular interest to the research community as despite robust evidence that adversity is bad for mental health (Vaidya et al., 2024), not all people who experience the same adversity have the same outcomes (Farchi & Peled-Avram, 2025). This has sparked a surge in research but despite 30 years of inquiry, the field is yet to fully elucidate the complex interplay between early adversity and children's capacity to adapt (Wolke et al., 2025).

The construct has been defined and operationalised several ways across the disciplines. It has been conceptualised as a process, a trait, an outcome and as a set of resources, that either protects, maintains or promotes outcomes (Wolke et al., 2025). This lack of conceptual clarity has led to heterogeneity within the field, limiting the comparability of studies and risking conceptual conflation and misinterpretation (Wolke et al., 2025).

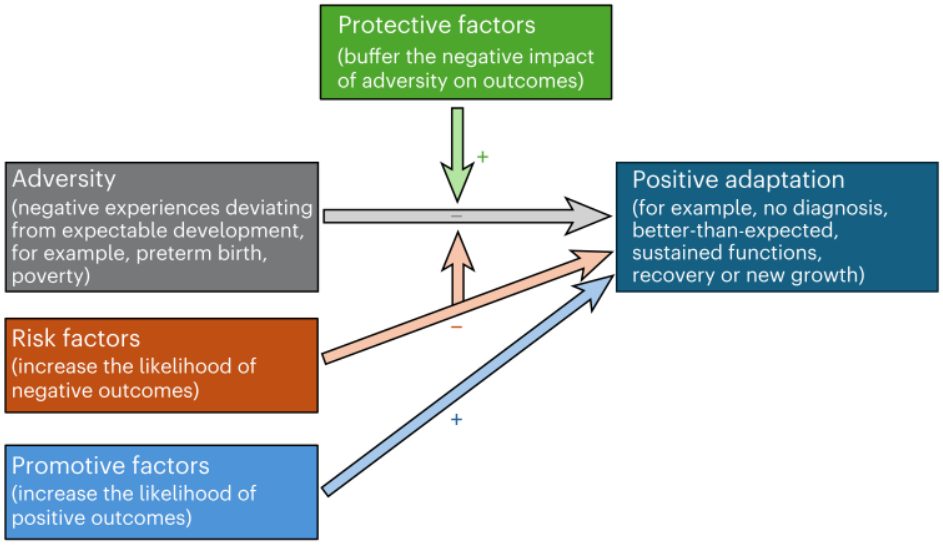
Where the literature converges, is the agreement that resilience involves risk or exposure to adversity, is influenced by multilevel promotive and protective factors, and results in an adaptive response that regains, sustains or improves outcomes (Denckla et al., 2020; Métais et all., 2022; Ungar & Theron, 2020). In psychology, resilience is primarily conceptualised in relation to mental health outcomes and is seen as a dynamic process created by behaviour that is influenced by protective biopsychosocial factors that can fluctuate across time and context (Métais et al., 2022).

Protective factors are those that benefit one's mental health or functioning and are not to be conflated with an absence of risk. They are comprised of a multisystemic interplay between assets and resources (Ungar & Theron, 2020). Assets are individual characteristics such as temperament, hardiness, cognitive flexibility or coping skills that may or may not be

a stable trait, and resources, external influences (e.g. social capital, environmental conditions) and community assets like faith-based groups (Stainton et al., 2019; Wolke et al., 2025). Promotive factors are distinct from protective factors in that they promote better outcomes directly, irrespective of risk or adversity. High quality childhood education, for example, is a promotive factor and is associated with better cognitive and emotional outcomes across all children, whether there's adversity present or not (Wolke et al., 2025).

Figure 6

Diagram illustrating the different factors affecting positive adaptation



Note. Taken from (Wolke et al., 2025)

Consistent with process-oriented theories is evidence that resilience fluctuates, therefore it cannot be a fixed trait only (Stainton et al., 2019). Resilience can vary within individuals depending on situational demands and availability of resources. It has been observed to vary across context, time, ethnicity and socioeconomic context (Abate et al., 2024). Systematic reviews indicate that socioeconomic disadvantage can moderate the relationship between resilience and mental health, such that resilience may be less consistently protective under conditions of chronic financial insecurity (Heinz et al., 2025; Schäfer et al., 2024). Protective factors are therefore not universally effective (Stainton et al., 2019), and the broader the range of factors one can draw upon, the more resilient they may be across time and context (Rutter, 2012).

The relationship between resilience and adversity can also be bi-directional. It is both vulnerable to (Heinz et al., 2025) and boosted by adversity (Abate et al., 2024). It is an interplay between fluctuating risks and resilience factors that if overwhelmed can be

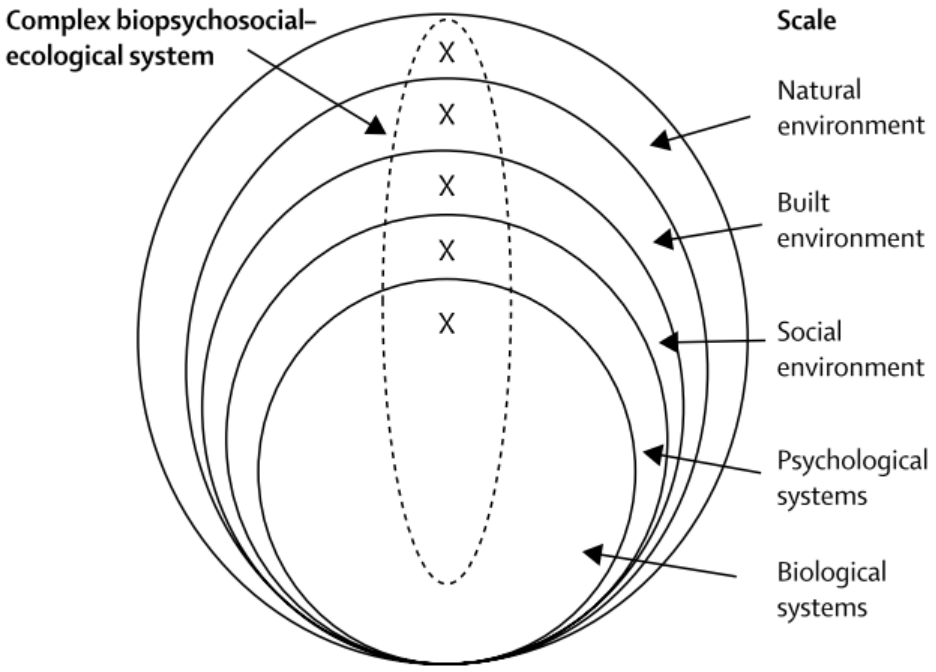
detrimental to mental health (Stainton et al., 2019). Crucially, it is not just cultivated through the absence of adversity but can also be in response to it. Exposure to adversity at manageable levels may even promote adaptation that strengthens resilient capacity (Abate et al., 2024).

The types of protective factors that influence mental health outcomes via resilience are highly varied and occur at multiple ecological levels (Figure 6). From individual (optimism), relational (positive attachment figures) to environmental factors like food insecurity and discrimination (Begdache et al., 2025; Liu et al., 2023). The most studied areas are psychological and social factors (Ungar & Theron, 2020) with significant gaps highlighted in how socioeconomic contexts uniquely mediate resiliency pathways (Heinz et al., 2025). Research has also focused on the role of neurobiological, neurocognitive and genetic factors (Stainton et al., 2019).

The original focus of resilience research was on individual factors; however, studies have shown that individual level interventions e.g. cognitive appraisals and emotion regulation, whilst beneficial, are unsustainable without wider socioecological supports like housing and social networks (Fritz et al., 2018; Pi Ferrer et al., 2025; Ungar & Theron, 2020). Much like the Pair of ACEs model, this emphasises that individual resilience is interdependent with community resilience and therefore community level interventions are required to ensure efficacy and longevity of outcomes (Ellis et al., 2022; Ellis & Dietz, 2017).

Figure 7

A multisystemic model of resilience factors



Note. Taken from (Ungar & Theron, 2020). The X's represent the systemic levels through which protective and promotive factors interact to produce outcomes.

Owing to the wide range of protective factors involved, resilience can operate through many mechanisms. To date, the mechanistic literature suggests that protective factors operate by: 1. Reducing the impact of adversity (Graber et al., 2015); 2. Direct positive effects on mental health (Heinz et al., 2025); 3. Interrupting compounding cascades that amplify risk to mental health (Fritz et al., 2018); and 4. Vulnerability mechanisms, factors that amplify the effects of adversity (Rutter, 2012).

An advantage of resilience being a dynamic process rather than an entirely innate trait, is that it can be influenced by one's environment and accessible to anyone with the right support and resources. In tandem with social justice measures that seek to better mental health by addressing adversity, research can offer modifiable factors at multi systemic levels to aid preventative public health strategies (Luthar et al., 2000; World Health Organisation, 2022). Understanding what factors enhance resilience or reduce vulnerability to adversity, and the mechanisms through which different groups access them, could provide invaluable knowledge for designing large scale public health interventions to reduce global mental health risks (Ungar & Theron, 2020). Additionally, multilevel

interventions that seek to combat inequalities could benefit from interventions that simultaneously target both increasing resources and mitigating adversity to maximise positive outcomes (Panter-Brick & Leckman, 2013).

Resilience has been operationalised in diverse ways within the field and accordingly this is reflected in the diversity of resilience measures. Many measures of resilience focus on upstream factors such as individual assets or resources, which are assumed to positively impact adaptive functioning (Smith et al., 2008). However, the presence of these factors does not mean they are being accessed or translated into resilient outcomes, particularly as resilience is enacted in different ways across context, culture, time and environment (Denckla et al., 2020). Consequently, there has been increasing interest in outcome-based resilience measures, which assess the downstream behavioural outcomes of resilience rather than upstream factors that may or may not result in resilience (Smith et al., 2008). This perspective offers a more direct indication of whether resilience is occurring or not.

Literature Summary

This body of literature speaks to the importance of understanding health inequalities as an outcome of interacting adversities and resources that impact mental health and do so by operating at multiple ecological levels (Pearlin, 2010; Turner, 2010). Adversity experienced during key developmental phases can shape health across the lifespan and contribute to the persistence of health inequalities (Felitti et al., 1998; Graf et al., 2021; Orth & van Wyk, 2022). The Pair of ACEs model extends beyond traditional ACEs and recognises that adversity is not only experienced at the individual level, but within community and structural contexts also. Community-level adversities, such as discrimination and food insecurity, remain understudied despite being disproportionately experienced by socioeconomically disadvantaged and racially minoritised populations (Ellis et al., 2022).

Jointly, resilience represents influential psychosocial resources that may buffer the impact of such adversities or when diminished can contribute to increased vulnerability to poorer mental health (Stainton et al., 2019). Framed within the stress process model, this literature posits that health outcomes are shaped through a dynamic interplay between the harmful effects of stress associated with adversity and the buffering effects of resilience (Turner, 2013). Additionally, that adversity not only affects mental health directly but also physical health through multiple mechanisms associated with the cumulative ‘weathering’ effects of chronic stress (Geronimus et al., 2006). What health inequality research lacks are

empirical approaches capable of both capturing and quantifying how these experiences might intersect and accumulate to influence health outcomes. Intersectionality informed quantitative methods are emerging in response to this limitation (Hankivsky et al., 2014, Holman et al., 2021).

Intersectionality – synergy at the intersections

Singular explanations can fall short in explaining health outcomes for those who experience multiple adversities simultaneously. Intersectionality a term coined by Crenshaw in the 1990's, speaks to the consequence of simultaneously occupying multiple axes of social identity, disadvantage and privilege, e.g. gender, race, ethnicity, SES and religion (Crenshaw, 1989, 1993). It is a movement away from singular and individual level explanations of outcomes and speaks to emergent phenomena in systems that cannot always be explained by looking at individual parts (Mudd et al., 2024). It highlights that these intersecting identities are interdependent, mutually constitutive, culturally and socially situated. Intersectionality is concerned with systems of power that intersect within and between individual and meso/macro levels to coproduce outcomes for those who occupy multiple marginalised identities (Bright et al., 2016) like ethnic minorities in Bradford (Wright et al., 2022). The consequences, it argues, are context dependant and when experienced simultaneously give rise to unique phenomena with distinct outcomes (Bauer et al., 2021; Cho et al., 2013; Cole, 2009).

For example, what it means to be an Asian Muslim is not the same across time, culture or geography. In a majority-Muslim context such as Pakistan, being Islamic is culturally the norm, whereas in Britain, it's a minority identity, whose meaning has changed over time. Since 9/11 and escalating anti-immigrant discourse's, Asian Muslim identity has become increasingly racialised through narratives of threat and suspicion, resulting in sharp increases in ethnic discrimination, xenophobia and Islamophobia, (Abbas, 2004; Ansaloni, 2004; Islamic Human Rights Commission, 2020).

Even within the context of the UK, what it means to be Asian, and its consequences, are nuanced and vary across contexts. For example, an Asian Muslim adolescent living in the ethnically dense area of central Bradford may experience their ethnicity and religion differently from someone living in an area where they are a smaller numerical minority and as a result be exposed to more overt experiences of discrimination and marginalisation (Bécares et al., 2009; Das-Munshi et al., 2010).

In areas of high own-group ethnic density individuals can be buffered from some forms of interpersonal racism and Islamophobia (Bécares et al., 2009; Das-Munshi et al., 2010). These experiences may shift across time as one's social sphere expands, and they increasingly engage with wider societal systems. For example, in adulthood when navigating occupational and economic structures, individuals once living in a primarily South Asian neighbourhood, may become more visibly marginalised minorities and experience more discrimination (Das-Munshi et al., 2012; Zwysen et al., 2021).

This demonstrates how these experiences rely on each other for meaning and are shaped by political, geographical and cultural contexts rather than individual attributes. To study them in isolation would elide what is essential for understanding (Cole, 2009). For example, today in Britain, xenophobia may be experienced very differently by a White Irish Catholic compared to a racialised Asian Muslim who might not be able to hide their ethnicity or religion. This could explain why the effects of discrimination on mental health are more pronounced for minoritised ethnicities (Emmer et al., 2024; Fisher et al., 2000).

Intersectionality asks researchers to look at the consequences of occupying multiple axes of adversity together and is emerging as a valuable framework for public health research. Bowleg (2012) summarised the ways this framework is applicable:

1. Unifying framework: it provides a linguistic and theoretical framework for analysing and gathering research regarding how multiple intersecting identities shape health, offering valuable insights for policy, practice and intervention.

2. Captures complexity: it has the capacity to examine complex intersecting inequalities in a more comprehensive and nuanced way and, most usefully, it does this through the lens of marginalisation rather than viewing people as deviating from White middle-class norms.

3. Spotlight on social justice: it emphasises the ways in which power structures, at multiple levels, intersect and operate to create and perpetuate health inequalities.

4. Targeted health policy: by capturing the true outcomes of intersecting identity it can inform community wide intervention and policy priorities that address inequality where it is most impactful - the fundamental causes level (Bowleg, 2012; Harari & Lee, 2021).

Intersectionality was designed with qualitative methods in mind and despite epistemological contentions and difficulties deducing complex and fluid constructs into measures, its use in quantitative research has risen considerably since 2010 (Harari & Lee,

2021). A recent consultation with policy and practice stakeholders, in the UK, found them 'cautiously optimistic' regarding the utility of intersectionality in understanding and addressing health inequalities. They felt intersectionality was applicable to their work, but as a concept, complex and inaccessible. They emphasised the need for good quality big datasets with participatory input, and a move beyond description to explanation (Holman et al., 2021).

Synergy is described qualitatively by the concept Multiple Jeopardy, whereby the combined impact of intersecting disadvantages is greater than the sum of their individual parts (King, 2007). Mathematically it is a value that quantifies the additional risk that occurs when risk factors intersect and interact (Briggs et al., 2021) and can be captured using interaction terms in regression analysis (Knol & Vanderweele, 2012)

These effects are particularly relevant for ethnically minoritised and deprived communities who may experience intersecting experiences of adversity and inequality. For example, low SES, discrimination and food insecurity may affect outcomes in ways that are non-additive (West et al, 2014, Pickett et al, 2021). Research investigating the presence of synergistic effects is sparse, but if confirmed, could add to a growing evidence base of quantitative intersectional analysis aimed at informing public health policy (Hankivsky et al., 2014; Holman et al., 2021).

Adolescence

Adolescence is defined as the period between puberty and adult independence. It is a key phase in development as it involves rapid neurological, psychosocial and biological changes and vulnerabilities, that pose considerable risk to mental health. It is widely recognised as a period of heightened stress sensitivity, due to increased biological reactivity and prolonged recovery to homeostasis. Experiences of chronic stress during this sensitive developmental stage can result in stress sensitivity becoming biologically embedded, leading to long lasting risk for depression, anxiety and stress related disease in adulthood (Negriff et al., 2025; Romeo, 2013; Sisk & Romeo, 2019).

Globally, depression and anxiety are the leading causes of premature mortality and morbidity among adolescents (Colizzi et al., 2020) and in the UK mental health problems have been continually rising for adolescents over the last decade, with a sharp increase seen after the COVID-19 pandemic (Hazir et al., 2023). Experiences of distress during this critical period can disrupt development with long-term consequences on mental health,

emotion regulation and chronic health conditions (Graf et al., 2021; Orth & van Wyk, 2022). Ecological models have consistently demonstrated, cross culturally, that social group membership is of particular importance to mental health outcomes. Adolescents who are migrants, of lower SES and girls report lower mental wellbeing (Kern et al., 2020). Additionally, adolescents who experience discrimination report higher rates of severe mental illness that persist across the lifespan (Kim et al., 2025). Thankfully early intervention can improve outcomes (de Carvalho & Veiga, 2022).

The gradient in health emerges in early childhood and steepens during adolescence (Layte et al., 2019). Accordingly, many long-term mental health challenges emerge before ones 24th year, indicating that adolescence is the second window of opportunity for prevention and early intervention (Blakemore, 2019; Grey et al., 2024). Despite this, research is limited on how socially patterned exposure to chronic psychosocial stressors might change the trajectory of health inequalities, particularly if experienced during the sensitive stage of adolescence (Jones et al., 2019; Reuter et al., 2024). Furthermore, this is a period when awareness of broader social processes like discrimination becomes more salient and potentially more impactful (Benner et al., 2018). Understanding this trajectory for when health inequalities emerge, is crucial for timely preventative intervention.

Bradford – Diverse and Deprived

Bradford district experiences significant health and social inequalities (Wright et al., 2022). It is one of the most ethnically and culturally diverse cities in the UK. It has a young and growing population, the 7th youngest in England with 27.9% under 20 years (City of Bradford Metropolitan District Council, 2025) and is home to one of the largest Muslim communities in England (Office for National Statistics, 2023). Unlike other areas in the UK, the South Asian and Muslim community in Bradford are highly clustered creating areas of high own-group ethnic density (ESRC Centre on Dynamics of Ethnicity, 2015). Consequently, Bradford functions as a critical location for exploring how community adversity and resilience factors might interact to shape health inequalities via its impact on mental health. Its large young and ethnically clustered population also provides an invaluable opportunity to examine this amongst adolescents.

Bradford has the 3rd poorest mental health outcomes in the country and is ranked the 5th most income deprived local authority in England. 13% of the district's households are in fuel poverty, 29% of children are living below the poverty line with 28% of

households finding it difficult or very difficult to cope on their incomes (City of Bradford Metropolitan District Council, 2023a; Office for Health Improvement and Disparities, n.d.). 20% of families experience food insecurity, some of the highest rates in England (Bryant, 2022; Power et al., 2017).

It has severe longevity inequalities that are not yet fully understood. Life expectancy is 9 years lower for men and 8 years lower for women between the most and least deprived areas of Bradford. These inequalities are even more pronounced for healthy life expectancy, where a 20-year difference exists between the least and most deprived areas that are less than 10 miles apart (City of Bradford Metropolitan District Council, 2023d; Reducing Inequalities Alliance, 2023). Furthermore, people from ethnic minority groups are the most deprived and have worse health outcomes on average, when compared to the White ethnic majority in Bradford (City of Bradford Metropolitan District Council, 2023b; City of Bradford Metropolitan District Council, 2023d). This indicates that these longevity gaps occur along the intersections of both deprivation and ethnicity.

The prevalence of traditional ACEs in Bradford are significant (Stevens, 2019), and consequently the Better Start Bradford program strategy highlighted early intervention, ACEs and trauma prevention as health protection priorities (Bradford District Council, 2021). Beyond traditional ACEs, the people of Bradford also experience multiple forms of community-based adversity, including discrimination (Abrams et al., 2018) and food insecurity (Power et al., 2017). These experiences are not captured by the original ACE frameworks yet are fundamental to health inequalities and those marginalised groups who disproportionately experience them (Clouston & Link, 2021; Ellis & Dietz, 2017).

Evidence from the Born in Bradford ‘Growing up’ study found that a quarter of its participants reported concerns regarding their families’ finances (Pickett et al., 2022), with SES and food insecurity co-existing hand in hand in Bradford (Power et al., 2017). Additionally, discrimination in many forms affect people in Bradford, with racial discrimination, xenophobia, and religious discrimination being particularly salient (Abrams et al., 2018), however, these are understudied and could contribute toward health inequalities.

The Born in Bradford Study

To understand and address these significant inequalities the Born in Bradford (BiB) research programme was established in 2007. It is a series of internationally recognised

birth cohort studies and is one of the largest of its kind in the world. The overarching aims of the research are policy and intervention focused, and they achieve this by investigating influences on health and development, highlighting inequalities and establishing optimal areas of intervention for maximum impact. The first phase of cohort studies recruited pregnant mothers and followed their children's outcomes, e.g. BiB birth cohort, BiB growing up (ages 7-11), BiB4All, BiB Age of Wonder (ages 12 -21), looking at why health was so poor, and subsequent studies (BiBBS) are testing interventions (https://borninbradford.nhs.uk/).

The Age of Wonder (AoW) is a BiB whole city research programme of multi-ethnic, socioeconomically diverse adolescents, spanning 7 years as they progress into adulthood, yearly, from ages 12 - 21. The AoW samples comprise follow up data from the now adolescent BiB participants and their peers in the same year group (Shire et al., 2024).

The focus of the research generated from the BiB data thus far have looked at the influence of green spaces, air pollution, obesity, perinatal mental health, health provision and consanguinity on health outcomes (McEachan, 2019). Much of the published BiB literature is focused on physical health and biomedical approaches to understanding these health inequalities. What is comparatively under studied is how broader structural and psychosocial factors, specifically within the community context might be causing stress that impacts both mental and consequently physical health (Ellis & Dietz, 2017; Wilkinson & Marmot, 2003). A more ecological systems-oriented perspective that simultaneously considers how community adversity like discrimination, social deprivation and food insecurity intersect to impact mental health might offer unique insights into potential drivers of health inequality in Bradford and more broadly.

Gaps in the literature

The following pertinent gaps in the literature were identified from this literature review.

1. Despite robust evidence linking mental health to healthy life expectancy, the field rarely draws on mental health pathways to explain later disability, focusing more on physical disease alone (Zhang et al., 2024)
2. The influence of broader structural and psychosocial factors on health is comparatively under reported in BiB literature (https://borninbradford.nhs.uk/our-impacts/publications/)

3. There is a paucity of research into the trajectory of health inequalities during the adolescent phase of development (Jones et al., 2019; Reuter et al., 2024)
4. Religious discrimination, xenophobia and their impact on mental health in the UK is understudied (Fahim Uddin et al., 2022)
5. Food insecurity and its impact on mental health is understudied in the UK (Power et al., 2023)
    a. This is especially marked with child and adolescent samples (Pourmotabbed et al., 2020)
    b. FI and anxiety require more quality research (Zahidi et al., 2024)
6. There is a paucity of empirical research examining intersectional effects for populations that experience multiple adversities simultaneously (Hankivsky et al., 2014)
    a. In the UK there is a call for good quality, big datasets with participatory input, and a move beyond description to explanation (Holman et al., 2021)
7. Discrimination and food insecurity's relationship to mental health rarely uses measures normed with clinical populations, especially in the context of large-scale cohort studies

Study Rationale

Building upon the literature review and synthesis, this study will address the forementioned gaps in the literature, by investigating how psychosocial experiences in the community impact mental health, a key pathway to health inequalities (Ellis et al., 2022). It responds to the need for large-scale empirical approaches, that capture how multiple adversities might intersect and accumulate to influence outcomes (Hankivsky et al., 2014, Holman et al., 2021).

This will be achieved by conducting quantitative analyses with data from the Born in Bradford: Age of Wonder cohort, a large, ethnically diverse and socioeconomically disadvantaged sample of adolescents (Shire et al., 2024). Rooted in community-identified need within Bradford, where substantial health inequalities persist, this research extends the largely individual-level and biologically oriented BiB literature to date (Cartwright et al., 2023). It does so by adopting a biopsychosocial approach to examine the joint roles of community adversity and resilience in shaping internalising distress, with implications for longer-term health trajectories and longevity (Ellis et al., 2022; Turner, 2013; Zhang et al., 2024).

Guided by the Pair of ACEs model (Ellis et al., 2022), the analysis focuses on food insecurity and perceived discrimination as pertinent forms of community adversity. These stressors are examined in relation to symptoms of depression and anxiety, which together are referred to as internalising distress. In line with the Stress Process Model (Pearlin, 2010; Turner, 2010), the role of resilience is also examined, in relation to internalising distress and as a potential mediator.

Finally, and more uniquely, this study employs an intersectionally informed quantitative design to examine whether co-occurring experiences of adversity and/or marginalised identities give rise to synergistic (i.e. non-additive) outcomes (Hankivsky et al., 2014). The utility of this focus is further justified by Bradford community consultation projects. Community members have specifically named mental health and the "effects of social conditions on this", and food insecurity, as priorities for research (Cartwright et al., 2023). These priorities are also echoed in the wider literature; a 2021 systematic review examining research priorities for minoritised ethnic groups converged on similar themes, specifically a need to explore the intersectional nature of discrimination and food insecurity, and how these interact to influence mental health (Iqbal et al., 2021)

Hypotheses

In the context of adolescents in Bradford, UK, this research will examine the following hypotheses:

1. Perceived discrimination and food insecurity are associated with internalising distress
2. Resilience is negatively associated with internalising distress
3. Resilience partially mediates the relationship between (a) perceived discrimination and internalising distress, and (b) food insecurity and internalising distress.
4. Intersectional experiences of adversity (e.g. perceived discrimination, food insecurity) and marginalised identities (e.g. gender, ethnicity) are associated with increased adolescent internalising distress, such that combined exposures produce synergistic effects exceeding the sum of individual effects

Methods

Design

This study was informed by a critical realist epistemological position. Critical realism asserts that material realities exist while recognising that their effects are experienced, interpreted and expressed through social, political, and cultural contexts that are difficult to fully or objectively quantify (Zachariadis et al., 2013).

A secondary quantitative analysis was conducted using cross sectional data taken from the Born in Bradford Age of Wonder study (AoW), a large-scale, city-wide longitudinal cohort study. The AoW design was an expansion of the original BiB birth cohort study and included the non-BiB peers from the same participating schools (Shire et al., 2024). The broader AoW study is a multi-phase, mixed methods programme. This study utilised data from the Work Package 2, which encompasses the quantitative component of AoW Phase 1. This was a prospective, natural observational cohort design with, repeated measures, school-based, data collection. Co-production was at the core of the AoW with the research team, young people, experts by experience and stakeholders all working in equal partnership to determine its design (Shire et al., 2024).

Sampling

The AoW study used a whole city cohort, opportunistic sampling method. 36 of the largest mainstream secondary schools in Bradford District were recruited to host and facilitate participation. Schools were recruited by approaching chief executive officers of academy trusts, headteachers, educational groups and the local authority. Over 50 BiB events took place showcasing the work of the program. Participating schools were offered £1000 per year as compensation, individual participants were not compensated.

The exact inclusion and exclusion criteria for the BiB AoW study are as follows: Inclusion criteria: pupil of a consenting school, young person and/or their family have not opted out of the study, pupil of school years 8, 9 or 10, research team able to contact parent /carer of young person to provide them with information about the study.

Exclusion criteria: parent/carer opts out, young person does not provide assent, teacher decides it is not appropriate for young person to take part, for example due to safeguarding concerns (Pickavance et al., 2025; Shire et al., 2024)

The data provided for this study was collected across the 2022/23 and 2023/24 academic years with survey dates spanning 07/11/2022 – 07/11/2024. The questionnaire data was collected in school using REDCap (RRID:SCR_003445) an electronic data capture system hosted at Bradford Teaching Hospitals NHS Foundation Trust. Questionnaires were completed once per academic year in either four 20–30-minute sessions or two back-to-back 50-minute sessions (Shire et al., 2024). Some participants had repeated measures within the same year due to for example moving school and a small number (n = 40) had missed earlier measures due to for example absence at school. Full details including a participant flow diagram of the AoW recruitment can be found in Pickavance et al., 2025 and Shire et al., 2024.

Ethical approval for the AoW was granted by Bradford Leeds NHS Research Ethics Committee [Ref: 21/YH/0261, date: 22.12.21]. Parents received an information pack and an opt-out form before participation and young people provided verbal assent on the day of data collection. Opt-out consent was obtained based on “public interest”, but participants could withdraw from the study at any time. Additional ethical approval for this research was granted by the University of Leeds research ethics committee, reference: SoMREC 2794, Appendix A.

Measures

Dependant variables

Internalising distress, which encompasses anxiety and depression, was chosen as the dependant variable as it encompasses the two prevalent and markedly increasing mental health difficulties among adolescents (Keyes & Platt, 2023).

Revised Children's Anxiety and Depression Scale (RCADS)

Symptoms of anxiety and depression (internalising distress) were analysed using the RCADS-25, an abbreviated version of the RCADS-47. It is a validated, 25-item, self-report measure that consists of 2 sub-scales (total anxiety and total depression), that measures symptoms of depression and anxiety in children and adolescents between 8 – 18 years. Together the sub-scales account for all the questions in the measure and are reported as the RCADS total score. Participants were asked, for example ‘I have trouble sleeping’, and responses were rated on a Likert scale (0 = never, 1 = sometimes, 2 = often, 3 = always). An RCADS Total Score can range from 0 – 75, RCADS Generalised Anxiety (RCADS GA) score 0 –

45 and RCADS Major Depression (RCADS MD) score 0 – 30, with higher scores indicating more distress (Ebesutani et al., 2012; Klaufus et al., 2020). The RCADs is not a diagnostic tool, but standardised T-scores that account for gender and age norms, can correspond with clinical ranges of distress. A T-score below 65 is considered normal, 65-69 borderline, and above 70, in the clinical range (Chorpita et al., 2005).

The psychometric properties of the RCADS are considered robust. It has been validated with different ethnicities in various cultural contexts in over 11 different societies that include the UK, Palestine, the Caribbean and Nigeria, and shows good cross-cultural validity (Klaufus et al., 2020; Stevanovic et al., 2016). The RCADS-47 has been validated in the UK and other countries and shows high internal consistency with Cronbach's alpha values varying between 0.80 & 0.95, (Child Outcomes Research Consortium, n.d.) In a UK sample the Cronbach's alpha was 0.91 (Baron et al., 2021). The Cronbach's alpha for this study was 0.94 which is considered very good (Nunnally & Bernstein, 1994).

Independent variables

The independent variables for this study were chosen based on the Pair of ACEs Model which emphasises the impact of community-based stressors (e.g. poverty and discrimination) on mental health outcomes (Ellis & Dietz, 2017). The available BiB variables that best captured poverty related experiences were food insecurity, free school meals and the index of multiple deprivation (IMD) and discrimination was captured using the Adolescent Discrimination Distress Index. Resilience, via the Brief Resilience Scale, and religion (self-report) were included in the model to evaluate whether these were protective.

Adolescent Discrimination Distress Index

Experiences of discrimination were analysed using a modified version of the Adolescent Discrimination Distress Index (ADDI). The original scale is a validated, 15-item, self-report measure of perceived ethnic/racial discrimination consisting of 3 sub-scales that access discrimination within institutional, education and peer situations (Fisher et al., 2000). Participants were asked, 'have you experienced any of the following: e.g. you were discouraged from joining a club or a group', response options were yes or no. Following pilot BiB studies, the scale was modified based on feedback from participants and schools. Accordingly, four alterations were made, the educational subscale was omitted, the wording of some questions were slightly modified to reflect UK versus US English, distress scores were not asked and each question prompted participants to a wider source of

discrimination, 'if you had this experience, was it because of your: (tick all that apply), 1. Ethnicity, 2. Sex/gender identity, 3. Disability, 4. Religion, 5. Class, 6. Neurodiversity (e.g., conditions such as Autism, Asperger's), 7. Dyslexia, 8. Sexuality, 9. Other. Two scores were calculated from the questionnaire, 1. The modified ADDI total score, which ranged from 0 – 11, reflecting total burden of discrimination, and a total count of types of discrimination. Higher scores indicated more discrimination. The psychometric properties of this modified version of the scale have not been determined. Refer to Appendix B comparing the original ADDI questions to those used in this BiB study.

Food insecurity questions

Food insecurity was assessed using a bespoke, non-validated questionnaire developed by the BiB Age of Wonder research team with public and patient involvement and co-applicant input (Ryan et al., 2024). The design was informed by but substantially adapted from the validated 18-item and 6-item versions of the USDA household food security modules, which evaluate quantitative and qualitative aspects of food access over a 12-month or 30-day period (Coleman-Jensen & Nord, 2024), refer to Appendix C for a comparison. Adaptations to the wording and simplification of the response process, to yes/no, were made to minimise participant burden and to support higher completion rates.

This study utilised the food insecurity questionnaire as a continuous variable under the assumption that higher scores indicated higher food insecurity and any score greater than 0 indicated food insecurity. The Cronbach's alpha for this study was $\alpha = 0.62$. Contemporary research emphasises context and scale length when interpreting alpha values (Nieminen, 2022; Nunnally & Bernstein, 1994) and allows thresholds from $\alpha = 0.60$ for exploratory research (Hair et al., 2019). Given the ecological validity of its community informed design, which prioritised cultural and contextual relevance, and the brevity of the 5-item scale where alphas scores typically yield artificially lower scores (Nunnally & Bernstein, 1994), this result is considered acceptable.

Brief resilience scale

In the context of this research, when resilience is referenced, it is conceptualised solely as the self-reported ability to bounce back or recover from stress and adversity. This was analysed using the brief resilience scale, a validated, 6-item self-report measure. Participants were asked, "Please indicate the extent of the following statements by using the following scale: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree" in relation to 3 positively worded and 3 negatively worded questions e.g. "I tend to

bounce back quickly after hard times". The score is attained by reverse scoring questions 2, 4 and 6 and finding the mean of the six items, a higher score indicates more resilience, an increased ability to bounce back from stress and adversity (Smith et al., 2008).

In general, the psychometric properties are considered robust. It has been validated with a moderately diverse, German (Chmitorz et al., 2018), Vietnamese (Minh Nguyen et al., 2023), Chinese (Fung, 2020) and American (Smith et al., 2008) populations. It has not been validated with adolescent or UK populations which may limit its cross-cultural validity. The original validation studies reported Cronbach's alpha values ranging between 0.80 – 0.91 (Smith et al., 2008) and 0.66 in a Vietnamese sample (Minh Nguyen et al., 2023). The Cronbach's alpha for this study was $\alpha = 0.66$, which is adequate for a short scale used in exploratory research (Hair et al., 2019; Nunnally & Bernstein, 1994).

Demographic variables

Sex and ethnicity were recorded using items included within the questionnaire packs administered during data collection. The participants were asked, "What is your ethnicity?" with the following response options: White; Mixed or Multiple Ethnic Groups; Asian or Asian British; Black, Black British, Caribbean or African; Arab; or Other Ethnic Groups. For the purposes of analysis and reporting, these categories are referred to using shorthand labels (e.g., "White", "Asian", "Black"), whilst recognising the heterogeneity within these groups. For sex, participants were asked; "What is your sex? (The biological sex on your birth certificate. A question on gender identity will follow in the survey.)". The response options were, Female; Male; Do not wish to answer; or Wish to enter own response. IMD was aggregated from deciles to quintiles by combining deciles 1 & 2, 3 & 4, 5 & 6, 7 & 8, 9 & 10 to form quintiles 1 – 5 where 1 was the most deprived and 5 the least (Ministry of Housing, Communities & Local Government, 2025). For the purposes of ease,

Free school meal status was derived from school administrative records across all the years of data collection. For children and adolescents in the UK, free school meals (FSM) are a means-tested public health intervention aimed at reducing food insecurity. During the data collection phase of this study, 2022 – 2024, adolescents in England were eligible if their parents/carers were in receipt of state benefits such as Universal Credit or Child Tax Credit (Department for Education, 2024). For this analysis, these data were collapsed into the single binary variable "FSM ever", where it was coded 1 if a participant was FSM-eligible in any year up to the analysis and 0 otherwise. Cases with no FSM records (NA) recorded

every year after a previous year with a “No” response were treated as not eligible and coded as 0.

Procedure

Missing Data

The procedure for missing items in the RCADS-25 was followed as per the developer’s guidance which recommends prorating scores within the Depression subscale if less than two items are missing, and the Anxiety subscale if less than three items are missing. In such cases prorating is performed by dividing the sum of completed items by the number of items completed, multiplying the resulting value by the total number of items in that subscale, and then rounding the final score. In all other cases missing individual items were coded as zero where other items contained within the same instrument/subscale had been responded to, or NA where all items are missing, prior to calculation.

All analyses were conducted using complete cases. Sample characteristics and missing data profile by demographic group are presented in Appendix D. Comparisons between the full dataset and analytic subsamples indicated largely consistent distributions across both demographic and outcome variables. Summary tables can be found in Appendix D & E. The complete case sample showed a slightly younger age profile and a higher proportion of Year 8 pupils. Ethnic distribution remained broadly stable, although the proportion of Asian participants increased from 46% to 57%. Patterns of missingness remained consistent across subsamples and did not appear to relate to the outcome variable. Whilst these differences should be taken into consideration when interpreting findings, the overall similarity across samples suggests that it is unlikely to bias the observed associations.

Analytical strategy

Analyses were conducted in R, version 4.5.2 (R Core Team, 2024) using RStudio version 2026.1.0.392 (RStudio Team, 2024). Given the size of the smallest sub-sample exceeded N = 4,500, a priori power analysis was not applicable. Samples of this size can reliably detect even small effects with high power (Cohen, 1988). Consequently, the inferential tests satisfy APA recommendations regarding adequate statistical power (American Psychological Association, 2020). All predictors were entered into each regression model simultaneously as each predictor was well established in the literature to

potentially affect mental health. Potential confounders were identified using established epidemiological reviews (Farrell et al., 2024; Zhang et al., 2025) for child and adolescent mental health outcomes, to account for this, resilience, IMD, ethnicity and sex were included the models.

Hypotheses 1 & 2

Perceived discrimination and food insecurity are associated with internalising distress among adolescents and resilience is negatively associated with internalising distress among adolescents.

Descriptive analyses were conducted to describe the sample demographics, perceived discrimination scores, food insecurity scores, receipt of free school meals, and internalising distress, anxiety and depression scores. An independent-samples *t*-test with Welch's correction was conducted to compare potential sex differences in ADDI scores between Males and Females. Sex was the independent variable and ADDI score the dependant variable. All tests were two-tailed with statistical significance evaluated at $\alpha = .05$.

A linear regression analysis was conducted to determine the association between an individual's total RCADS score and the following independent variables: perceived discrimination (ADDI total), food insecurity (FIT), area level deprivation (IMD) and religion, ethnicity and sex. This was repeated using an individual's anxiety RCADS subscale scores and depression RCADS subscale scores respectively.

A logistic regression model was also conducted using categorical RCADS outcomes. For these analyses, to ensure the outcome variables had two categories, normal and borderline were combined. Hence the corresponding output represents the likelihood of an individual having a clinical RCADS score versus a normal/borderline range with respect to the predictors. The logistic regression was conducted to determine the association between clinical levels of internalising distress symptoms (RCADS total clinical), and the following fixed effects: perceived discrimination (ADDI total), food insecurity (FIT), resilience (BRS), area level deprivation (IMD), ethnicity, religion and sex. This was repeated using an individual's level of generalised anxiety RCADS subscale score (RCADS GA clinical) and depression RCADS subscale score (RCADS MD clinical) respectively.

The RCADS clinical category variables were provided in the original dataset, these were calculated in accordance with the developers' published criteria, found at https://rcads.ucla.edu/.

Hypothesis 3

Resilience partially mediates the relationship between (a) perceived discrimination and internalising distress, and (b) food insecurity and internalising distress

A regression-based mediation analysis was conducted as recommended by Baron & Kenny (1986). This approach suggests three sets of regression analyses to establish the relationship between 1. the predictors and RCADS without resilience, to establish whether a total effect exists, 2. the relationship between the predictors and resilience as the dependant variable, to establish whether resilience varied as a function of the predictors, and 3. the relationship between the predictors and RCADS with BRS included as a predictor, to establish whether the inclusion of resilience reduced the direct effect of the predictors, therefore suggesting mediation (Baron & Kenny, 1986). Following this, to determine statistical significance, a nonparametric bootstrapping test with 5000 resamples (Preacher & Hayes, 2004) was conducted using the mediation package in R (Tingley et al., 2014)

Hypothesis 4

Intersectional experiences of adversity (e.g. perceived discrimination, food insecurity) and marginalised identities (e.g. gender, ethnicity) are associated with increased internalising distress, such that combined exposures produce synergistic effects exceeding the sum of individual effects

To explore the potential synergistic effects of the predictor variables on mental health scores, theoretically plausible interactions terms were sequentially included in the linear model to assess their significance. Statistically significant interaction terms were then entered simultaneously into a combined model. This procedure was carried out for each RCAD variable - RCADS total, RCADS GA and RCADS MD. A full breakdown of the procedure and initial results can be found in Appendix F.

Regression models were fitted using the lm() and the glm() function's in base R, and tidy output was produced with the broom and dplyr packages.

Data Diagnostics

Data diagnostics were conducted in line with APA recommendations (American Psychological Association, 2020). Model assumptions were evaluated using the residuals diagnostic functions in the olssr package in R. Diagnostics included inspection of residual plots, tests for normality and heteroscedasticity, assessment of leverage and influence (e.g., Cook's distance, leverage plots), and evaluation of model specification.

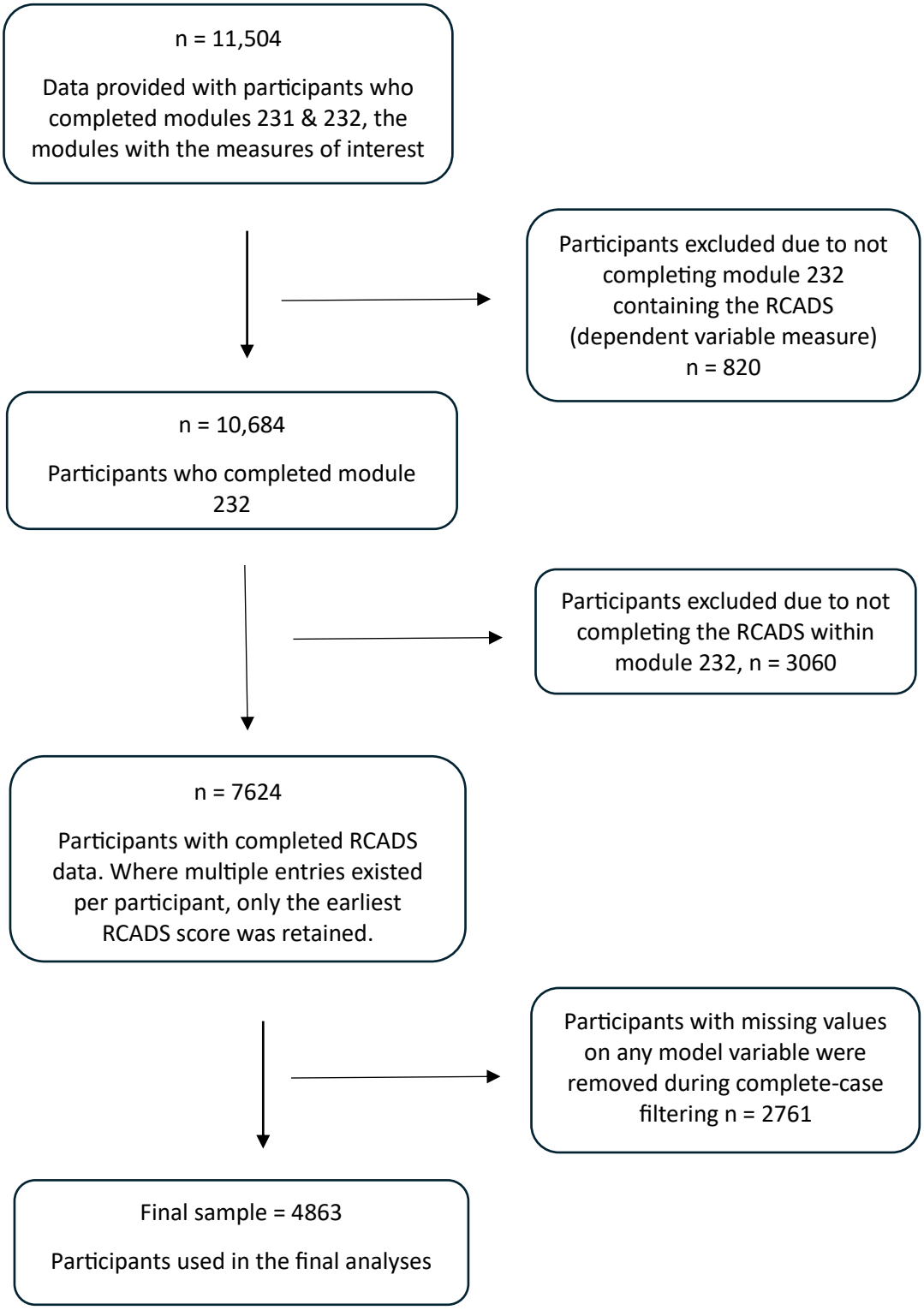
Results

Participants

A participant flow diagram is presented in Figure 8, outlining the number of participants at each stage of the selection process and describing the inclusion and exclusion criteria from the initial dataset through to the final analytic model.

Figure 8

Participant flow diagram with inclusion criteria on the left and exclusion criteria on the right



Demographic information relating to age, academic year, ethnicity, religion, area level deprivation (IMD) and gender was collected. A full breakdown is presented in Appendix D

Data Diagnostics

Residuals, using standard diagnostic plots, from the fitted regression models were examined. Data diagnostic outputs can be found in Appendix G. The distribution of estimates can be reasonably assumed to approximate normality under the central limit theorem (Singer, 2025). No outliers were removed, as excluding cases in a large dataset risked introducing bias (Aguinis et al., 2013). Distributions of the continuous variables were inspected for kurtosis and extreme skew; no transformations were required.

The assumption of multicollinearity where two or more predictors are highly correlated was assessed and found to be acceptable, (tolerance < .10 or VIF > 10). Tolerance tests were conducted to examine the extent to which each predictor was uniquely associated with the outcome, all values were acceptable, indicating that multicollinearity was not a concern and a good model fit (Menard, 2001). All diagnostics results are provided in Appendix G.

Analysis Results

Descriptive statistics

Descriptive statistics for the predictive measures across subsamples are provided in Appendix E. The sample was heavily skewed towards those living in deprived areas, with 65% of participants living in the most deprived IMD quintile and a further 18% in the second most deprived quintile. Exposure to deprivation varied substantially by ethnic group; Arab adolescents were the most likely to live in the most deprived quintile (80%), followed by Black adolescents (77%), followed by Asian adolescents (75%), compared to 43% of White adolescents, who were the least likely to live in the most deprived quintile and the most likely to live in the least deprived quintile.

Patterns of food insecurity also varied by ethnic group. The sample mean for the food insecurity questionnaire (FIT) was M = 0.28. Arab adolescents reported the highest mean FIT scores (M = 0.62), while Other adolescents the lowest (M = 0.28), compared with White adolescents (M = 0.31) who had a higher mean than Asians (M = 0.24) despite on average living in less deprived quintiles. Consistent with this pattern, FSM receipt was

highest amongst Arab adolescents (65%), compared to 25% for Asian and White adolescents.

Perceived discrimination likewise varied across groups. Black adolescents reported the highest ADDI mean scores (M = 1.04), whereas Asian adolescents reported levels below the sample average (analytical sample, M = 0.68; Asian, M = 0.62), compared to White adolescents who reported levels above the Asian average (M = 0.64). Gender differences were also observed with Females (M = 0.9) reporting a higher average compared to males (M = 0.7). Refer to Appendix H for a breakdown of descriptive statistics.

Table 1

Descriptive statistics for study variables in the final analytic sample

Variable	Final sample		
	n	M	SD
ADDI total	4863	0.68	1.47
BRS total	4863	18.34	4.83
FIT	4863	0.28	0.72
FSM	1296	-	-
RCADS total	4863	17.84	13.63

Note. RCADS = Revised Children's Anxiety and Depression Scale; Final sample = complete case subsample of the RCADS sample, including participants with complete data for all included variables in the final regression model. ADDI total = Adolescence Discrimination Distress Index total score; BRS total = Brief Resilience Scale total; FIT = food insecurity questions total; FSM = ever accessed free school meals; RCADS total = results for the 25-item RCADS scale; FSM is a binary variable (0 = no, 1 = yes); therefore, means and standard deviations are not reported

t-test results. A Welch two-sample t-test was conducted to examine whether there was a difference in ADDI scores between males and females. There was a statistically significant difference between the two sexes, $t(4755.50) = 2.84$, $p < .005$. Females (M = 0.71) had a significantly higher ADDI score compared with males (M = 0.59). The mean difference of 0.12, had a 95% confidence interval of 0.04 – 0.20.

Hypotheses

Hypotheses 1 & 2

Perceived discrimination and food insecurity are associated with internalising distress among adolescents and resilience is negatively associated with internalising distress among adolescents.

Linear Regression Results. The overall F-test for all three regression models were statistically significant and R^2 values fell within the medium-large range for behavioural science research indicating that the predictor variables reliably explained a substantial proportion (33 – 39%) of the variance in symptom scores (Cohen, 1988). RCADS total model $F(17, 4845) = 181.12$, $p < .001$, **$R^2 = 0.39$, Adjusted $R^2 = 0.39$**; RCADS GA model $F(17, 4850) = 170.59$, $p < .001$, **$R^2 = 0.37$, Adjusted $R^2 = 0.37$**; RCADS MD model $F(17, 4850) = 141.30$, $p < .001$, **$R^2 = 0.33$, Adjusted $R^2 = 0.33$**.

The linear regression coefficients for all 17 predictors across the three models (RCADS Total, RCADS GA, and RCADS MD) are presented in Table 2. The model analysing total internalising distress (RCADS total) found that, after controlling for all other variables, higher ADDI (β = 0.23, $p < .001$) and food insecurity totals (β = 0.19, $p < .001$), receipt of free school meals and female sex (β =0.39, $p < .001$) significantly predicted higher internalising distress scores, and higher reported resilience (BRS total; β = -0.37, $p < .001$). Those identified as following a religion and selecting “Asian or Asian British” significantly predicted lower internalising distress scores. Standardized coefficients showed that Female sex, resilience, ADDI total and food insecurity were the strongest predictors of internalising distress scores. Cohen’s benchmarks for interpreting standardised effects suggest the associations for Female sex and resilience fall within the moderate range, and ADDI and FIT reflects a small to moderate effect (Cohen, 1988).

The model analysing an individual's generalised anxiety score (RCADS GA) found that after controlling for all other variables, higher ADDI and food insecurity totals, Female sex and selecting “Other ethnic groups” significantly predicted higher anxiety scores, and that resilience and selecting “Asian or Asian British” significantly predicted lower anxiety scores. Standardized coefficients showed that Female sex (β =0.39. $p < .001$), higher BRS total (β = -0.36, $p < .001$), perceived discrimination (higher ADDI total; β = 0.23, $p < .001$) and food insecurity FIT; were the strongest predictors of anxiety scores.

The model analysing an individual's depression score (RCADS MD) found that, after controlling for all other variables, higher ADDI and food insecurity totals, receipt of free school meals, female sex, selecting “Other ethnic groups”, and IMD 1 (most deprived) and IMD 2 quintiles significantly predicted higher depression scores, and that resilience and religion significantly predicted lower anxiety scores. Standardized coefficients showed that Female sex (β =0.35, $p < .001$), higher BRS total (β = -0.35, $p < .001$) and higher ADDI total (β = 0.22, $p < .001$) were the strongest predictors of depression scores.

Participants who responded with “Do not wish to answer” and “Wish to enter own response” for their sex had statistically significant associations with the RCADS, across all three models, RCADS total, RCADS GA and RCADS MD. These results should be interpreted with significant caution due to their large confidence intervals and small sample size. Additionally, no inferences could be taken from these results as the additional explanatory information provided in the free text box was omitted for anonymity reasons. Accordingly, these results will be reported in tables but not investigated further in this research.

Table 2

Multivariable linear regression models predicting internalising distress (RCADS total), anxiety (RCADS GA), and depression (RCADS MD)

Predictor	RCADS total				RCADS GA				RCADS MD			
	B	95% CI		*p*	*B*	95% CI		*p*	*B*	95% CI		*p*
		LL	*UL*			*LL*	*UL*			*LL*	*UL*	
Ethnicity												
White (ref)	-	-	-	-	-	-	-	-	-	-	-	-
Arab	0.42	-2.14	2.97	0.750	0.22	-1.31	1.75	0.778	0.37	-0.82	1.56	0.540
Asian	-1.74	-2.78	-0.70	0.001	-1.35	-1.98	-0.71	<.001	-0.38	-0.86	0.11	0.127
Black	0.62	-1.19	2.42	0.502	0.52	-0.58	1.62	0.357	0.12	-0.72	0.96	0.782
Mixed	-0.25	-1.85	1.36	0.764	-0.37	-1.35	0.61	0.457	0.10	-0.65	0.85	0.799
Other	2.43	0.43	4.43	0.017	1.31	0.08	2.53	0.037	1.20	0.26	2.14	0.012
Sex												
Male (ref)	-	-	-	-	-	-	-	-	-	-	-	-
Female	5.30	4.67	5.93	<.001	3.17	2.78	3.55	<.001	2.14	1.84	2.43	<.001
Do not wish to answer	3.23	0.67	5.80	0.014	2.37	0.80	3.93	0.003	0.88	-0.32	2.08	0.150
Wish to enter own response	8.95	4.34	13.55	<.001	5.33	2.46	8.21	<.001	4.16	2.01	6.32	<.001
IMD in quintiles												
IMD 5 - least deprived (ref)	-	-	-	-	-	-	-	-	-	-	-	-
IMD 1 - most deprived	0.73	-0.72	2.18	0.324	-0.16	-1.05	0.72	0.720	0.90	0.22	1.57	0.010
IMD 2	1.15	-0.39	2.68	0.143	0.21	-0.73	1.14	0.666	0.96	0.24	1.68	0.009
IMD 3	0.52	-1.22	2.27	0.558	0.00	-1.06	1.06	0.997	0.55	-0.26	1.37	0.183
IMD 4	0.51	-1.40	2.42	0.599	0.06	-1.10	1.23	0.917	0.46	-0.43	1.35	0.312
Religion = No (ref)	-	-	-	-	-			-	-	-	-	-
Religion = Yes	-1.17	-2.20	-0.13	0.027	-0.42	-1.05	0.22	0.198	-0.79	-1.27	-0.30	0.001
ADDI total	2.21	1.99	2.42	<.001	1.30	1.17	1.43	<.001	0.91	0.81	1.01	<.001
FIT	3.56	3.13	3.99	<.001	2.16	1.90	2.43	<.001	1.40	1.20	1.60	<.001
FSM = no (ref)	-	-	-	-	-	-	-	-	-	-	-	-
FSM = yes	0.89	0.18	1.60	0.014	0.21	-0.22	0.65	0.334	0.66	0.32	0.99	<.001
BRS total	-1.05	-1.12	-0.98	<.001	-0.61	-0.65	-0.57	<.001	-0.44	-0.47	-0.41	<.001

Note. RCADS = Revised Children's Anxiety and Depression Scale; RCADS total = results for the full 25-item scale; RCADS GA = anxiety subscale; RCADS MD = depression subscale. CI = confidence interval; LL = lower limit; UL = upper limit; (ref) = reference category for categorical predictors. ADDI total = Adolescent Discrimination Distress Index total score; FIT = food insecurity total score; FSM = ever accessed free school meals (0 = no, 1 = yes); BRS total = Brief Resilience Scale total score. IMD 1–5 = Index of Multiple Deprivation quintiles derived from aggregated deciles (1 = most deprived; 5 = least deprived, reference category). Ethnicity categories are coded as follows: White = reference category; Asian = Asian or Asian British; Black = Black, Black British, Caribbean, or African; Mixed = Mixed or multiple ethnic groups; Other = other ethnic groups. In this analysis, ADDI and FIT were the primary variables of interest. Resilience, ethnicity, sex, religion, FSM status and IMD were included as adjustment variables to account for potential confounding.

Logistic regression results. The logistic regression coefficients for all 17 predictors across the three models (RCADS Total clinical, RCADS GA clinical, and RCADS MD clinical) are presented in Table 3. All three regression models showed acceptable fit, RCADS total clinical model; McFadden $R^2 = 0.25$, with AIC = 2354.85, BIC = 2471.66, and log-likelihood = -1159.43; $p < .001$; RCADS GA clinical model, McFadden $R^2 = 0.24$, with AIC = 1966.20, BIC = 2083.02, and log-likelihood = -965.10; $p < .001$; RCADS MD clinical model, McFadden $R^2 = 0.21$, with AIC = 2600.58, BIC = 2717.40, and log-likelihood = -1282.29; $p < .001$.

The model analysing total internalising distress (RCADS total clinical) found that, after controlling for all other variables, higher ADDI and food insecurity totals, receipt of free school meals, the first two quintiles of IMD (1&2) and Female sex showed significant association with clinical levels of internalising distress, and that resilience and selecting "Asian or Asian British" were significantly associated with lower odds of clinical levels of internalising distress.

The model analysing an individual's clinical levels of anxiety (RCADS GA clinical) found that, after controlling for all other variables, higher ADDI and food insecurity totals, and Female sex showed significant association with clinical levels of anxiety, and that resilience and selecting "Asian or Asian British" were significantly associated with lower odds of clinical levels of anxiety.

The model analysing an individual's clinical levels of depression found that, after controlling for all other variables, higher ADDI and food insecurity totals, receipt of free school meals, the first two quintiles of IMD (1&2) and Female sex showed significant

association with clinical levels of depression, and that resilience was significantly associated with lower odds of clinical levels of depression. Notably, in comparison to the linear regression models, religion was not significant in any of the models and in the RCADS total and GA models the first two quintiles significantly predicted higher odds of clinical levels of clinical levels of internalising distress.

Table 3

Logistic regression results predicting clinical levels of internalising distress (RCADS total), anxiety (RCADS GA), and depression (RCADS MD)

Predictor	RCADS total clinical				RCADS GA clinical				RCADS MD clinical			
	OR	95% CI		p	OR	95% CI		p	OR	95% CI		p
		LL	*UL*			*LL*	*UL*			*LL*	*UL*	
Ethnicity												
White (ref)	-	-	-	-	-	-	-	-	-	-	-	-
Arab	0.87	0.38	1.89	0.734	0.54	0.19	1.33	0.206	1.15	0.53	2.38	0.714
Asian	0.62	0.44	0.88	0.007	0.58	0.40	0.86	0.006	0.82	0.58	1.15	0.244
Black	1.05	0.58	1.84	0.872	1.32	0.71	2.37	0.368	1.26	0.72	2.15	0.414
Mixed	1.03	0.60	1.71	0.910	0.84	0.45	1.49	0.563	1.25	0.75	2.01	0.380
Other	1.32	0.68	2.44	0.392	1.76	0.88	3.33	0.093	1.15	0.58	2.15	0.675
Sex												
Male (ref)	-	-	-	-	-	-	-	-	-	-	-	-
Female	1.74	1.37	2.22	< .001	1.61	1.23	2.11	< .001	2.43	1.92	3.09	< .001
Do not wish to answer	2.25	1.01	4.65	0.036	2.33	0.97	5.05	0.043	2.38	1.05	4.90	0.026
Wish to enter own response	7.46	2.14	23.26	< .001	7.15	1.78	23.69	0.002	5.56	1.52	17.27	0.005
IMD in quintiles												
IMD 5 (ref)	-	-	-	-	-	-	-	-	-	-	-	-
IMD 1	2.16	1.22	4.06	0.012	1.54	0.85	2.96	0.176	2.30	1.30	4.37	0.007
IMD 2	2.12	1.16	4.07	0.018	1.55	0.83	3.06	0.189	2.59	1.43	5.01	0.003
IMD 3	1.36	0.68	2.81	0.392	1.35	0.66	2.84	0.415	1.48	0.74	3.07	0.280
IMD 4	0.99	0.44	2.24	0.984	1.03	0.45	2.37	0.938	0.86	0.37	1.99	0.722
Religion = No (ref)	-	-	-		-	-	-		-	-	-	-
Religion = Yes	0.90	0.64	1.27	0.562	0.85	0.59	1.23	0.396	0.82	0.58	1.14	0.246
ADDI total	1.36	1.29	1.44	< .001	1.33	1.25	1.40	< .001	1.34	1.27	1.41	< .001
FIT	1.67	1.50	1.86	< .001	1.67	1.49	1.87	< .001	1.54	1.39	1.71	< .001
FSM = no (ref)	-	-	-	-	-	-	-	-	-	-	-	-
FSM = yes	1.29	1.01	1.63	0.041	1.31	1.00	1.71	0.051	1.37	1.09	1.72	0.006
BRS total	0.81	0.79	0.83	< .001	0.82	0.80	0.84	< .001	0.85	0.83	0.87	< .001

Note. RCADS total clinical = results for the full 25-item scale; RCADS GA clinical = anxiety subscale; RCADS MD clinical = depression subscale. OR = odds ratio; CI = confidence interval; LL = lower limit; UL = upper limit; (ref) = reference category for categorical predictors. ADDI total = Adolescent Discrimination Distress Index total score; FIT = food insecurity total score; FSM = ever accessed free school meals (0 = no, 1 = yes); BRS total = Brief Resilience Scale total score. IMD 1–5 = Index of Multiple Deprivation quintiles derived from aggregated deciles (1 = most deprived; 5 = least deprived, reference category). Ethnicity categories are coded as follows: White = reference category; Asian = Asian or Asian British; Black = Black, Black British, Caribbean, or African; Mixed = Mixed or multiple ethnic groups; Other = other ethnic groups. In this analysis, ADDI and FIT were the primary variables of interest. Resilience, ethnicity, sex, religion, FSM status and IMD were included as adjustment variables to account for potential confounding.

Hypothesis 3

Resilience partially mediates the relationship between (a) perceived discrimination and internalising distress, and (b) food insecurity and internalising distress.

The 3-step regression-based mediation analysis (Baron & Kenny, 1986) indicated that BRS mediated the effect of a number of predictors on RCADS. Results can be found in Appendix I. The associations between ADDI and RCADS (B = 2.73 to B = 2.21) and between FIT and RCADS (B = 4.34 to B = 3.56) reduced following the inclusion of BRS into the model. This suggests that resilience partially mediated the relationship between perceived discrimination and food insecurity with internalised distress.

The bootstrapping method revealed strong total associations between both food insecurity and discrimination with internalising distress (Total Effect food insecurity = 4.34, Total Effect Discrimination = 2.73), confirming their negative association with internalising distress. The Average Causal Mediation Effect scores in Table 4 suggest that resilience significantly and partially mediated the associations between perceived discrimination and food insecurity with internalising distress, accounting for approximately 19% of the total effect of perceived discrimination and approximately 18% of the total effect of food insecurity on internalising distress.

Table 4

Bootstrapped Mediation Analysis (nonparametric, 5000 resamples) examining the indirect effects of perceived discrimination (ADDI) and food insecurity (FIT) on internalising distress (RCADS)

Effect	Perceived Discrimination				Food Insecurity			
	B	95% CI		*p*	*B*	95% CI		*p*
		LL	*UL*			*LL*	*UL*	
ACME (indirect)	0.52	0.42	0.63	< .001	0.78	0.58	0.99	< .001
ADE (direct)	2.21	1.96	2.47	< .001	3.56	3.07	4.08	< .001
Total effect	2.73	2.46	3.01	< .001	4.34	3.81	4.87	< .001
Proportion mediated	0.19	0.16	0.23	< .001	0.18	0.14	0.23	< .001

Note. RCADS = Revised Children's Anxiety and Depression Scale; ACME = average causal mediation effect (indirect effect); ADE = average direct effect; Proportion mediated = proportion of the total effect explained by the indirect (mediated) pathway; B = unstandardised coefficient; CI = confidence interval; LL = lower limit; UL = upper limit. 95% confidence intervals were estimated using a nonparametric percentile bootstrap with 5,000 resamples. All models were adjusted for religion, FSM status (0 = no, 1 = yes), ethnicity, sex, and IMD quintile (1 = most deprived; 5 = least deprived). *N* = 4,863. Perceived discrimination measured using the ADDI and Food insecurity measured using the food insecurity total (FIT). Although termed Average Causal Mediation Effects within the statistical framework, the present cross-sectional design does not permit causal conclusions and findings should be interpreted as evidence of indirect association rather than causal mediation

Hypothesis 4

Intersectional experiences of adversity (e.g. perceived discrimination, food insecurity) and marginalised identities (e.g. gender, ethnicity) are associated with increased internalising distress, such that combined exposures produce synergistic effects exceeding the sum of individual effects.

The two-way interaction terms examined to identify potential synergistic effects and the significant two-way interactions included in the combined model are presented in Appendix F. In the combined model, several interactions remained statistically significant after controlling for all main effects and other interaction terms with RCADS total, RCADS GA and RCADS MD. The interactions between ADDIxFIT and ADDIxFSM were not statistically significant. Notably however, the strongest and most consistent interactions involved Female sex as a moderator. Interactions between ADDIxFemale and FITxFemale resulted in

significant positive interaction effects, and ADDIxFemale was the only two-way interaction to be significant across RCADS total and its subscales RCADS GA and RCADS MD.

Additionally, interactions between FITxIMD2 and FITxIMD3, the 2nd and 3rd most deprived quintiles, also showed significant positive interaction effects. In contrast, some interactions showed negative associations, ADDIxBlack and FITxIMD3 both showed significant negative associations with depression symptoms. Results for the significant interactions are presented in Table 5, the full fixed effects from the same combined regression model are provided in Appendix J.

Table 5

Significant two-way interaction effects from the combined regression model predicting RCADS and its subscales

Predictor	RCADS total				RCADS GA				RCADS MD			
	B	95% CI		*p*	*B*	95% CI		*p*	*B*	95% CI		*p*
		LL	*UL*			*LL*	*UL*			*LL*	*UL*	
	Significant Interaction effects											
ADDI total:Female	0.81	0.38	1.24	< .001	0.37	0.11	0.64	0.005	0.42	0.22	0.62	< .001
ADDI total:Asian					0.7	0.03	1.37	0.039				
ADDI total:Black									-0.51	-0.93	-0.09	0.017
FIT :Female	1.46	0.59	2.34	0.001					0.7	0.29	1.11	0.001
FIT :IMD 2					2.61	0.47	4.75	0.017				
FIT :IMD 3	4.21	0.72	7.71	0.018					14.84	7.78	21.9	< .001
FSM:Asian									2.54	0.19	4.89	0.034
FSM:Mixed					2.88	0.53	5.23	0.016				
Arab:Female					-1.28	-2.19	-0.37	0.006				

Note. RCADS = Revised Children's Anxiety and Depression Scale; RCADS total = results for the full 25-item scale; RCADS GA = anxiety subscale; RCADS MD = depression subscale. B = unstandardised regression coefficient; CI = confidence interval; LL = lower limit; UL = upper limit; (ref) = reference category for categorical predictors. ADDI total = Adolescent Discrimination Distress Index total score; FIT = food insecurity total score; FSM = ever accessed free school meals (0 = no, 1 = yes); BRS total = Brief Resilience Scale total score. IMD 1–5 = Index of Multiple Deprivation quintiles derived from aggregated deciles (1 = most deprived; 5 = least deprived, reference category). Ethnicity categories are coded as follows: White = reference category; Asian = Asian or Asian British; Black = Black, Black British, Caribbean, or African; Mixed = Mixed or multiple ethnic groups; Other = other ethnic groups. Interaction terms refer to cross-product terms between predictors included in the combined regression model, only statistically significant interaction terms from the combined model are presented.

Discussion

Principal findings

This study examined the relationships between food insecurity, perceived discrimination, resilience and internalising distress. Overall, the findings supported all four hypotheses, with the notable exception that experiencing food insecurity and perceived discrimination together did not predict synergistically worse internalising distress.

This study found:

- Positive associations between food insecurity, deprivation, perceived discrimination and internalising distress
- A negative association between resilience and internalising distress
- Resilience partially mediates the relationship between perceived discrimination and food insecurity with internalising distress
- Significant two-way interactions, suggesting certain intersections of adversity and identity are associated with increased risk to mental health
- Adolescents with higher food insecurity had a 67% increased likelihood of clinical levels of anxiety and a 54% increased likelihood of clinical levels of depression
- Adolescents with higher perceived discriminations had a 33% increased likelihood of clinical levels of anxiety and a 34% increased likelihood of clinical levels of depression
- Adolescents with higher resilience had an 82% decreased likelihood of experiencing clinical levels of anxiety and an 85% decreased likelihood of experiencing clinical levels of depression

Hypothesis 1

Perceived discrimination and food insecurity are associated with internalising distress among adolescents.

Food insecurity & deprivation. 18% of the analytical sample equalling 874 adolescents reported experiencing some form of food insecurity, thus highlighting its prevalence amongst adolescents in Bradford. These results are concerning given the links

between financial insecurity and food insecurity (Power et al., 2017; Public Health England, 2020) reports which state the percentage of children living in low-income families in Bradford is significantly rising. This alongside the continuing cost of living crisis and its impact in Bradford suggests these numbers will continue to rise (Kerr et al., 2025).

In this sample, food insecurity was significantly associated with elevated internalising distress, worsening symptoms of both anxiety and depression. Adolescents reporting higher levels of food insecurity were 67% more likely to have clinical levels of anxiety and 54% more likely to have clinical levels of depression. This adds to the literature by demonstrating an association with anxiety, both in a large dataset and with adolescents, all areas specifically identified in reviews as gaps in the literature (Abeldt, 2024; Sparling et al., 2022; Zahidi et al., 2024). Based on standardised betas coefficients food insecurity was the 3rd most negatively impactful variable in the model, highlighting its comparatively strong influence on outcomes.

Interestingly, receipt of free school meals was not associated with elevated anxiety, however the relationship with depression remained, including being 37% more likely to experience clinical levels of depression. This suggests that receiving free school meals might have helped with food anxiety, but perhaps the impact of deprivation stigma and shame may remain impactful on mood. Stigma can be particularly salient for ethnic minorities nationally and has been reported amongst the Pakistani community in Bradford (Brennan-Tovey et al., 2023; Power et al., 2017). Poverty related shame often starts in late childhood and proliferates with age and cognitive development and therefore is particularly evident in secondary schools (Hartgen-Walker & Lally, 2023).

These findings are consistent with fundamental causes theory, suggesting that whilst FSM interventions might alleviate school-based hunger, they are insufficient to eliminate broader mental health consequences, therefore allowing fundamental social causes to shape health outcomes. Depression, in this case, appears to remain shaped by social hierarchical processes linked to deprivation like stigma and shame (Earnshaw & Karpyn, 2020; Phelan et al., 2010).

Higher levels of deprivation were also associated with internalising distress; the two most deprived quintiles were associated with an increased risk of depression but not anxiety. Adolescents living in deprivation had 130% (IMD quintiles 1&2) and 159% (IMD quintiles 3&4) increased odds of experiencing clinical levels of depression in comparison to the lowest levels of deprivation. Those living in the most deprived area quintile had the

highest levels of FSM uptake and those in the least deprived areas the lowest levels of FSM (Appendix H).

These findings align with global evidence that show socioeconomic deprivation predicts poorer mental health outcomes (Kirkbride et al., 2024) and parallel research that show more deprived areas report shorter life and healthy life expectancy compared to the least deprived (The Health Foundation, 2023; Marmot et al., 2020, p.16). Given the established links between mental health and longevity (Bellis et al., 2019; Zhang et al., 2024), these findings suggest that poorer mental health could be contributing towards reduced life and healthy life expectancy in Bradford. This is especially pertinent given these associations are already evident at the key developmental stage of adolescence, which is associated with increased risk of long term physical and mental illness (Blakemore, 2019). These findings are supported by recent qualitative research in Bradford, where families living in deprivation and food poverty described the significant mental strain and emotional toll of continually having to fight their difficult circumstances and its impact on their wellbeing (Kerr et al., 2025).

Perceived Discrimination (PD). Approximately 1 in 4 adolescents (26%) reported perceiving some form of discrimination indicating its salience amongst Bradford adolescents. PD was significantly associated with internalising distress and worsening symptoms of both anxiety and depression. Adolescents reporting higher levels of PD were 33% more likely to have clinical levels of anxiety and 34% more likely to have clinical levels of depression. Based on standardised betas coefficients, PD was the 2nd most negatively impactful variable in the model, highlighting its comparatively strong association with outcomes.

Food insecurity, deprivation and perceived discrimination were confirmed as predictors of mental health among adolescents in Bradford, thus reenforcing the utility of the Pair of ACEs (Ellis & Dietz, 2017) and stress process models (Turner, 2013) in informing health inequality research. These models emphasise that mental health outcomes are shaped by experiences at multiple ecological levels, community (macro) and individual/family (meso), and how exposure to community-based adversity contributes toward cumulative allostatic load, thereby elevating risk of toxic stress and poorer outcomes (Ellis et al., 2017; Ellis et al., 2022).

Importantly, food insecurity, deprivation and perceived discrimination were not only associated with poorer adolescent mental health; they were also linked to an

increased likelihood of experiencing clinical levels of internalising distress. This contributes to the literature by highlighting both elevated and more urgently clinical levels of distress. This distinguishes this work from previous research that examined anxiety and depression using screening measures not normed against clinical populations (Pourmotabbed et al., 2020; Sparling et al., 2022; Zahidi et al., 2024).

In the context of a deepening cost of living crisis (Kerr et al., 2025), escalating food bank usage (Hartgen-Walker & Lally, 2023), rising levels of Islamophobia (Tell MAMA, 2025) and racial discrimination in the UK (Equality and Human Rights Commission, 2024), the need to prioritise food insecurity and discrimination as public health targets appears particularly important for young adolescents living in one of Britains most ethnically diverse and deprived districts (City of Bradford Metropolitan District Council, 2023a).

Hypotheses 2 & 3

Resilience is negatively associated with internalising distress, and resilience partially mediates the relationship between (a) perceived discrimination and internalising distress, and (b) food insecurity and internalising distress

Adolescents in Bradford who self-reported a greater ability to recover from or bounce back from stress (resilience) showed significantly lower levels of anxiety and depression symptoms, indicating that it is a protective factor for mental health. Those with higher resilience were also 82% less likely to experience clinical levels of anxiety and 85% less likely to experience clinical levels of depression.

Interestingly, religion in this sample predicted lower internalising distress but not higher levels of resilience. This diverges from literature that links spirituality and religion to resilience (Hargreaves, 2016; Heinz et al., 2025) and suggests that whilst religion is a promotive factor for mental health in this cohort, it does not appear to operate by increasing one's capacity to rebound from adversity (Wolke et al., 2025).

The mediation results suggest that internalising distress is likely increased when the ability to bounce back is reduced. Specifically, resilience appeared to a partially mediate the relationship between perceived discrimination and food insecurity with internalising distress. This is consistent with the existing literature that distress can be worsened by eroding resilience and that resilience is not an entirely inherent trait, instead partially shaped by intersecting environmental factors like experiences of discrimination and food insecurity.

This interpretation aligns with the stress process and stress proliferation models (Pearlin, 2010; Turner, 2010) which proposes multiple mechanistic pathways through which chronic stress leads to mental health difficulties. Stress can impact outcomes both directly via chronically increased allostatic load, and indirectly by undermining adaptive capacity, reducing resilience, and consequently proliferating the detrimental effects of stress on mental health (Juster & Misiak, 2023; O'Shields et al., 2022). Conversely, and providing cross validation of this theory, higher resilience, as measured by the BRS, was associated with lower allostatic load and better mental health (Rösner et al., 2024).

These results reinforce the argument that addressing food insecurity and discrimination should be a priority for Bradford and Public Health in general. Such interventions could impact health via multiple mechanisms. Beyond reducing the impact of community determinants of mental health, it also protects resilience while simultaneously reducing the effects of multiple interacting pathways of adversity. When poor mental health, weakened resilience, and vulnerability to further adversity intersect, this could result in a multi-mechanistic process driving synergistically worse outcomes.

Hypothesis 4

Intersectional experiences of adversity (e.g. perceived discrimination, food insecurity) and marginalised identities (e.g. gender, ethnicity) are associated with increased internalising distress, such that combined exposures produce synergistic effects exceeding the sum of individual effects.

No significant interaction occurred between FIT and ADDI scores suggesting that for adolescents in Bradford, the combined presence of food insecurity and perceived discrimination alone may not further exacerbate the risk of internalising distress. Both food insecurity and perceived discrimination were independently associated with an elevated risk of internalising distress for Females. This could be due to Females on average experiencing slightly more adversity compared to males, for example, discrimination based on race and sex (Lausi, 2026). Alternatively, in the absence of marked differences in ADDI scores, this Female specific synergy could reflect gendered socialisation, where girls are socialised to be more relationally focused and consequently more vigilant and sensitive to social threat compared to boys (Keyes & Platt, 2023)

In the case of food insecurity this finding is consistent with reviews that report Females experiencing higher internalising distress compared to Males (Dush, 2020;

Frongillo et al., 2024). Gender norms can increase the emotional labour of adversity and gendered expectations of caregiving roles (Kilpela et al., 2025; Maynard et al., 2018) which can be internalised and intensified from early adolescence, a point in development where societal and/or familial expectations can increase (Hill & Lynch, 1983; Priess et al., 2009). This corresponds with adult FI data that suggests the disproportionate burden of socialised caregiving accounts for some of the gender disparity in FI distress (Kilpela et al., 2025; Leung et al., 2022).

Higher levels of perceived discrimination demonstrated a synergistic interaction with ethnicity in predicting worse anxiety for Asian adolescents when compared to White adolescents, despite White participants reporting a higher average for discrimination. This suggests that Asian adolescents could be particularly at risk if they perceive discrimination and therefore discrimination might not exert a uniform risk to mental health across groups. These findings correspond with systematic reviews suggesting that the impact of discrimination on mental health is stronger for marginalised groups (Emmer et al., 2024). This could be due to Asians in Bradford occupying multiple intersecting identities known to experience discrimination i.e. race, migrant status, deprivation and religion (Wright et al., 2013).

This pattern is consistent with theoretical and empirical literature that conceptualises discrimination as a mechanism through which structural inequalities and racialised power hierarchies are enacted and maintained (Emmer et al., 2024; Williams & Mohammed, 2013). For Asian adolescents', discrimination may operate as a more powerful stressor because it occurs within contexts of unequal structural power (Huynh et al., 2023; Williams et al., 2019). For marginalised groups, discrimination is more than a social slight, and can signify heightened vulnerability to exclusion, surveillance, or physical harm, which may amplify its psychological impact (Krieger, 2014). This may in turn, lead to more frequent and heightened threat activation in anticipation of harm, leading to more chronic stress activation relative to those in more privileged social positions where the same behaviour does not carry equivalent threat or risk (Emmer et al., 2024; Fahim Uddin et al., 2022; Muslim Mind Collaborative, 2025).

The synergistic association of food insecurity with internalising distress was only evident at moderate levels of deprivation (IMD quintiles 2 & 3), and not in the most deprived quintile. This pattern mirrors other BiB findings, where White women living in comparatively less deprived areas of Bradford, reported higher levels of food insecurity

than Asian women living in the lowest quintile. This was attributed to South Asian women benefitting from family and cultural community support that did not appear to be mirrored within the White women's community resources (Power et al., 2017, 2018).

This aligns with the stress process model and intersectional theory which conceptualise risk to outcomes as the product of interactions between intersecting adversity and available resources. Together, it suggests that food insecurity could exert synergistic effects on mental health in moderately deprived contexts where community level resources or community cohesion might be less prevalent. The community resilience model speaks to this and advocates that services assess for, and support community led responses to adversity (Ellis & Dietz, 2017; Ferrer et al., 2025).

These findings also suggest that reliance on area level deprivation indices such as IMD, might obscure within area heterogeneity in food insecurity. IMD captures a broader composite measure of relative deprivation and socioeconomic disadvantage at the community level. It does not however, reliably measure individual or household level need. Consequently, like other studies suggest (Skarda et al., 2025), more specific measures including individual level socio-economic indicators like household income, SES, or even FSM may offer greater predictive power of mental health than IMD alone.

These findings might also be explained by status stress theory (Marmot, 2004, p. 45; Pickett & Wilkinson, 2015) and shame-based models of socioeconomic adversity that suggest psychosocial stressors can be stronger in relative deprivation contexts than absolute deprivation, i.e. where the social gradient in outcomes might be steeper (Kirkbride et al., 2024). Individuals in moderately deprived areas that have lost food security, might be exposed to more social comparison, judgement and/or perceived failure, resulting in greater status loss, shame and stress (Skarda et al., 2025) and this might also be experienced in the context of less community support.

Receiving FSM among Asian adolescents was synergistically associated with worse depression compared to White adolescents. This may reflect the impact of benefit stigma amongst the Asian community in Bradford. This is supported by qualitative BiB research that has described how for some Asian adults in Bradford, external aid like food banks was intentionally avoided despite the presence of food insecurity. This avoidance was driven by strong cultural values of self-reliance, expectations of family support and feelings of shame around needing external support (Brennan-Tovey et al., 2023; Power et al., 2017, 2018, 2020, 2023). Within this context, Asian adolescents receiving FSM might be at increased risk

of depression due the internalisation of both societal and cultural stigma around what it means to need FSM (Power et al., 2018, 2020).

This interpretation extends beyond Bradford. A qualitative review across 13 different countries found that adolescent experiences of poverty converged on themes of stigma and shame, with young people describing “immense feelings of distress” because of what it means to not have necessities like food (Maina et al., 2025). Adolescents described psychosocial pathways to mental distress operating at multi levels individual, intrapersonal, interpersonal, community and societal. Given the well-established association between shame and depression (Inglis et al., 2023; Nikoli et al., 2021), the multiple level pathways of distress could plausibly culminate in synergistic outcomes, such as those observed in these present findings.

Overall, these interaction findings suggest that food insecurity, deprivation and discrimination, are complex, context dependant processes that can intersect with social positions such as gender and ethnicity, to produce elevated risk to mental health outcomes. Despite growing recognition of such complexity to date, intersectional methods remain underutilised in public health research and policy (Holman et al., 2021). These findings indicate that mental health outcomes can be synergistically exacerbated across some intersecting identities and adversities. This illustrates the added value of intersectional frameworks in identifying heterogeneity within groups and intersections with elevated risk, that otherwise might have been obscured by overly simplistic, singular variable methods (Routen et al., 2023).

Intersectional methods can therefore identify groups requiring additional intervention and/or protection from inequality. In this sample that was Asian adolescents perceiving discrimination, female adolescents perceiving discrimination, female adolescents experiencing food insecurity, Asian adolescents in receipt of free school meals and adolescents living in IMD quintiles 2 & 3 who were in receipt of free school meals.

Hypotheses Summary

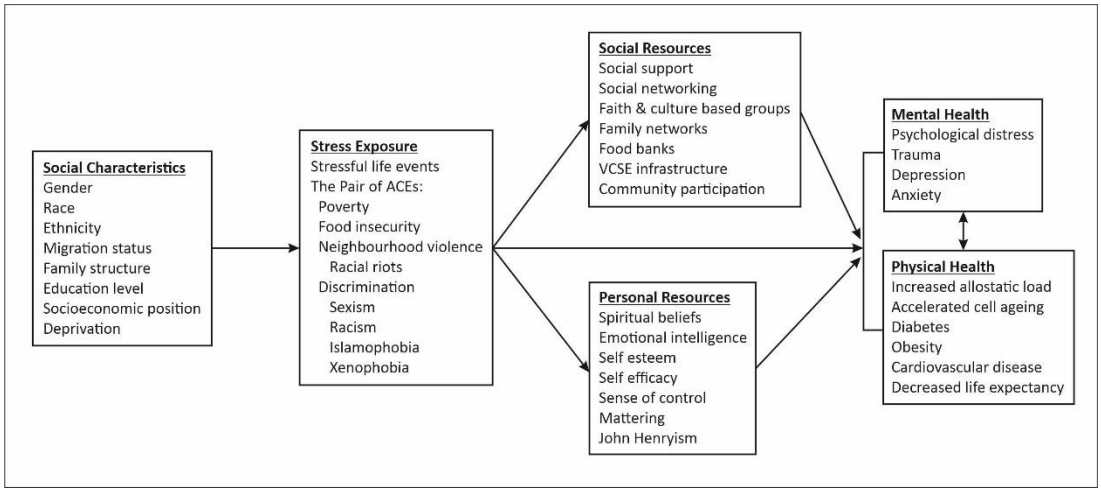
Stress process and intersectional theories of health inequality emphasise how structural disadvantage, social position and access to coping resources intersect to influence mental, and consequently physical health, through the process of chronic stress (Turner, 2013). Consistent with these frameworks, these findings show that structural and social adversities such as food insecurity, perceived discrimination and living in deprived communities were associated with poorer internalising distress and resilience. Extending

beyond their direct associations with internalising distress, experiencing food insecurity and perceived discrimination were linked to distress in part through lower levels of resilience. Furthermore, the impacts of adversity are not equal for everyone and can be synergistic for some intersections of adversity and identity.

Figure 9 is an updated stress process model informed by a synthesis of findings from this research and the broader literature. It proposes pathways through which social determinants can contribute toward stress exposure and how these experiences can be buffered by resources to produce mental and physical health outcomes (Turner, 2013).

Figure 9

An adapted Stress Process Model, informed by experiences in Bradford (adapted from Turner, 2013)



Broader findings

Females at increased risk

Females were 52% of the sample and demonstrated poorer outcomes than Males across resilience and internalising distress measures, including higher levels of anxiety and depression and lower levels of resilience. When compared to Males, Females were 61% more likely to experience clinical levels of anxiety and 143% more likely to experience clinical levels of depression, indicating moderate increases in anxiety risk and large increases of depression risk. Females also reported slightly higher levels of ADDI than males on average; however, the magnitude of this difference was small.

In contrast, the interaction analysis indicated that Females who experienced discrimination, experienced synergistically poorer outcomes. This was evident for anxiety and even more pronounced for depression, suggesting that the impact of perceived discrimination is more strongly associated with poorer mental health outcomes for Females than Males. Together, these findings suggest a pattern of differential vulnerability between Males and Females across exposure, risk and susceptibility to internalising distress. Females are not only more likely to experience internalising distress, their synergistic outcomes suggest they are more sensitive to the effects of perceived discrimination.

In terms of explaining this, there is little direct evidence within this study. Specific discriminations were not disaggregated in this analysis, limiting the ability to propose underlying mechanisms. A possible explanation is that Females experience additionally or qualitatively different forms of gender-based discrimination, sexist oppression or exclusion that may be contributing towards their poorer outcomes (Benner, 2017; Benner et al., 2018). Supporting this, a recent UK study found that young adult Muslim women experienced more religious discrimination than Muslim Men, partly due to being more visibly Muslim (Fahim Uddin et al., 2022). Given that 44% of the Females in this sample identified as being Muslim, it is possible that intersecting identities may increase both exposure to, and the impact of these discriminatory experiences. However, the visibility of this samples religious beliefs remains unknown. Additionally, this study's design as discussed further below was cross sectional and therefore causality could not be assumed.

These findings highlight Female adolescents in Bradford as particularly vulnerable and an important target for future research to better understand these differences and inform intervention design.

Asian adolescents do better

Asian participants had the lowest average of internalising distress and above average resilience when compared to other ethnic groups. Intersectionality and minority stress theory would predict that groups occupying multiple axes of adversity, such as deprivation, ethnic minoritisation, racism and islamophobia (Wright et al., 2022), are at greater risk of poorer outcomes than the majority White ethnic group, who face relatively fewer systemic barriers (Bright et al., 2016; Frost & Meyer, 2023; Liu et al., 2023). Much of this research has been conducted with adults and more research is required to understand if or when these psychosocial driven health inequalities start to emerge in adolescence.

In contrast, recent UK reviews of child and adolescent mental health generally reveal comparable mental health outcomes between ethnic minorities and White British children, with the notable exception that Pakistani heritage children were more likely to experience internalising problems (Goodman et al., 2008; Guan & Duschinsky, 2024). In contrast Asian mothers in Bradford have worse depression, somatic, and severe health condition outcomes compared to the White population in Bradford (Santorelli et al., 2024; Traviss et al., 2012).

This is an important finding as it suggests that mental health and the apparent protective function of resilience - the ability to bounce back from stress, likely changes across the lifespan (Dickerson et al., 2024). This trend is reflected in the Bradford life expectancy gap (City of Bradford Metropolitan District Council, 2023d), therefore understanding when and how health inequalities emerge could provide invaluable public health intervention targets, particularly if psychological distress is contributing towards the development or exacerbation of physical conditions such as obesity, cardiovascular disease or diabetes across the lifespan (City of Bradford Metropolitan District Council, 2023b).

These positive outcomes could be explained by the minority strengths model that describes how collective strengths and community connectedness in marginalised communities can create resilience and improve mental health outcomes (Perrin et al., 2020), exploring this is a gap in existing BiB research. Adding to Asian resources might be religious identification which is widely associated with lower levels of depression (Braam & Koenig, 2019) and has also been observed in the both the adult and adolescent Muslim community (Marie et al., 2023; Rahman, 2025). This could have been an influential factor on outcomes in this study, as 93.5% of Asian adolescents in the analytical sample identified as Islamic. Strengthening this hypothesis were results that showed religion to be negatively associated with depression.

Alternatively, it is worth considering that while the ability to bounce back from stress is associated with better mental health during early adolescence, it may not persist across the lifespan. In this context, resilience may be driven by a form of high effort coping in response to stress that could ultimately be biologically and psychologically depleting, and ultimately detrimental to long-term health. Adaptation in this case could represent endurance more than possessing and benefiting from protective factors (Robinson & Thomas Tobin, 2021; Ungar, 2013)

Ethnic density in this context might be a protective factor contributing toward better outcomes. Whilst Asian adolescents are an ethnic minority in the UK, Asians may not be in their immediate community. In central Bradford the Asian community can be highly clustered (ESRC Centre on Dynamics of Ethnicity, 2015) and in school they occupy between 25 – 45% of pupils (Stewart, 2018), this could prove a protective factor from minority stress (Frost & Meyer, 2023).

Outcomes for Asian participants could also be better because on average they are not yet perceiving or experiencing discrimination. Asian adolescents reported the lowest average of perceived discrimination of any ethnic group (Asian M = 0.62, sample M = 0.68). This may be explained by the ethnic density hypothesis, which proposes that ethnic minorities living amongst higher own-group density experience better mental health, as such environments reduce exposure to discrimination and enhance social support (Bécares et al., 2018). This would be consistent with UK research that found ethnic density to buffer ethnic minority mental health (Bécares et al., 2009; Das-Munshi et al., 2010).

Furthermore, given their younger profile (sample M = 13) these students might not be noticing or being affected by discrimination yet. Longitudinal studies show steep developmental trajectories in the psychological appraisal of discrimination typically between 12 – 14 years old (Fields et al., 2025; Fisher et al., 2000c); the toll of which emerging later in adolescence (Benner, 2017). This sample might be at the beginning of this stage and therefore under reporting discrimination. These potential protective factors might change when they enter society at large where they are less protected by ethnic density, further minoritised and as a result experience more frequent and overt discrimination (Das-Munshi et al., 2010).

There may have been an argument to overlook the influence of discrimination on outcomes, if it were not for further findings that highlighted that discrimination was associated with worse mental health, increased chances of clinical levels of distress and even more crucially showed a synergistic association with anxiety for Asian adolescents. Furthermore, the risks discrimination poses to both resilience and mental health outcomes. These results and the existing evidence point toward a dynamic interplay between protective, promotive and detrimental factors to produce outcomes (Turner, 2013). The variance in outcomes for Asians across the timespan coupled with increasing discrimination, xenophobia and islamophobia, emphasises the need for continued mental health monitoring. In parallel research into how and when discrimination might influence

this, as this point in early adolescence could be a key developmental window for early intervention and prevention.

The life expectancy gap – when does it start?

Increasingly, the literature is finding links and causal pathways between mental distress and physical health outcomes that can shorten lifespan. This indicates that tackling social determinants of health could be an impactful means of improving both mental health, physical health, and longevity (Marmot et al., 2020; World Health Organisation, 2023)

Evidence from ACES research consistently demonstrates that childhood adversity predicts both mental and physical health outcomes across the lifespan (Bhutta et al., 2023). Large-scale epidemiological reviews further confirm these findings by also demonstrating associations between mental distress and increased risk of chronic disease (Abohashem et al., 2026; Chen et al., 2025; Vaccarino et al., 2025), accelerated biological aging (Polsky et al., 2022), and premature mortality, with individuals experiencing depression having substantially elevated risk of premature mortality compared to the general public (World Health Organization, 2016; Walker et al., 2015). Together, this body of evidence highlights that physical and mental health outcomes share common social determinants, and that mental health itself can also be a determinant of physical health (Marmot et al., 2020). Addressing mental health can therefore be an especially impactful and efficient means to improving overall health and healthy longevity.

This present study contributes to this body of knowledge linking mental and physical health, by demonstrating associations between food insecurity, perceived discrimination and deprivation with internalising distress. This suggests a plausible pathway between social determinants of health, internalising distress and the 10-year life expectancy gap and 20-year healthy life expectancy gap evident between the least and most deprived districts in Bradford. Ethnic minorities, both in this sample (Appendix H) and in Bradford at large, are disproportionately represented within the most deprived wards, evidencing that Bradford health inequalities intersect with both deprivation and ethnicity (City of Bradford Metropolitan District Council, 2026; Dickerson et al., 2024).

Alongside these social patterns, mortality rates from cardiovascular disease in Bradford is one of the highest within Yorkshire and Humber and is higher than the national average (City of Bradford Metropolitan District Council, 2026). Cardiovascular disease in Bradford also disproportionately affects those who are deprived and ethnically minoritised

(Hou, 2025). Existing research and these findings suggest that internalising distress could be a pathway through which social determinants of health biologically reduce life expectancy via chronic stress responses that can, for example, increase the risk of cardiovascular disease (Vaccarino et al., 2025).

Although adolescents in Bradford do not present with cardiovascular disease, adolescence is a key developmental stage in which the biological and behavioural pathways underlying later health begin to take shape (Sawyer et al., 2018). It is imperative therefore, given the health inequalities deprived and ethnic minorities experience (Marmot et al., 2020), that the origins and trajectory of this pathway be studied further. Social determinants of health are key upstream targets for both mental health and stress related physical health, therefore early intervention of upstream influences could be a particularly cost-effective investment.

Strengths & Limitations

Design

Strengths

This large-scale quantitative analysis provided significant statistical power and enabled more rigorous estimation of the scale and distribution of food insecurity and discrimination across this population (Cohen, 1988). This provided evidence capable of highlighting systemic inequalities, informing much needed public health policy and intervention, in an area with significant need (McEachan et al., 2024).

An intersectionality informed design was a key strength. This study was explicitly aimed at examining whether the mental health impact of discrimination and food insecurity differed across social groups. This approach revealed differential associations across groups highlighting the importance of specificity and the utility of intersectionality in health inequality research. Without such an intersectional approach, patterns critical to public health understanding and policy could have been missed. This design contributes to this paucity of research with large-scale, ethnically diverse samples experiencing both discrimination and deprivation (Schetter et al., 2013).

Previous quantitative intersectional studies have been critiqued for including variables that insufficiently reflect social power relations (Bauer et al., 2021). In contrast, all the variables in this design represent positions within social power structures and are

explicitly linked to the fundamental causes of health inequality, including SES and discrimination (Link & Phelan, 1995). Additionally, this study incorporates added ecological validity, as the selected predictor variables were directly identified by members of the Bradford community (Cartwright et al., 2023). This resulted in a study design that was informed, by the people, for the people.

Critiques and Limitations

Quantitative analysis, like all forms of research is subject to error and insufficiency and therefore cannot fully capture the breadth and depth of marginalised experiences. As such, these findings should be understood as indicative rather than exhaustive, testing theory and offering empirical evidence of the consequences of experiences that shape people's lives rather than objective or complete accounts of mental health experiences (Bowleg, 2012; Krieger, 2014). The aim of this research was to capture population-level patterns of health inequalities among adolescents in Bradford, whilst necessarily omitting, richer dimensions of meaning, context and lived experience that lie beyond the capacity of quantitative methods. Despite these limitations, this study successfully achieved its primary aim of identifying population-level patterns in health inequalities for a community in need.

The quantitative design demonstrated relationships between variables, but it was cross sectional and observational (Pickavance et al., 2025), meaning findings were predictive only and causal inferences could not be made. Accordingly, it is not possible to determine the temporal ordering of the variables or whether the observed associations reflect causal relationships. Nevertheless, given the substantial and now robust body of prior research linking psychosocial stress to adverse mental health outcomes, psychosocial stress remains a plausible explanatory pathway for the associations observed in this study and therefore these findings warrant further research (Bhutta et al., 2023; Nelson et al., 2020). All measures were taken during early adolescence; however, this does not necessarily mean they reflect the same developmental moment, as adolescent development is not uniform (de Carvalho & Veiga, 2022).

Caution must be exercised when interpreting the mediation analyses. The causal mediation approach applied in this case assumes experimental or longitudinal designs (Maxwell & Cole, 2007), which this cross-sectional observational dataset did not provide. As such, the mediation findings should be interpreted as exploratory rather than confirmatory. Additionally, while resilience was included in the model for predictive purposes it should be noted that resilience factors may not be stable over time (Stainton et al., 2019). This may

limit their predictive power; however, they do offer important benchmarks for health inequality monitoring (Wolke et al., 2025).

This dataset included a moderate but considered number of variables allowing for the adjustment of sociodemographic characteristics, plausible confounders, and co-occurring inequalities while avoiding unnecessary model complexity. This approach was aimed at balancing the effects of inflating error versus obscuring meaningful associations. Large scale datasets, that include excessive or poorly theorised variables, carry the risk of overfitting and overadjustment bias, reducing statistical precision or potentially distorting estimate values (Schisterman et al., 2009; van Zwieten et al., 2024; Vanderweele, 2009).

This is pertinent to health inequality research, as adjusting for variables that could lie on causal pathways may obscure the very mechanisms through which disadvantage impacts mental health. Overadjustment could not be completely avoided in this analysis, and estimates are likely to be conservative. For example, the inclusion of ethnicity and sex in the model may have attenuated some observed associations, as ethnicity and sex are closely linked to experiences of discrimination (Emmer et al., 2024). Additionally, FSM are often used as a proxy for SES (Ilie et al., 2017) and is itself closely linked to food insecurity (Power et al., 2022). Reassuringly, adjusting for these interrelated constructs is more likely to have reduced the magnitude of these effects, rather than exaggerated them. In the context of this research, their presence and effect were more pertinent than their precise magnitude.

The interaction effects in these analyses demonstrated some synergistic relationships, this analysis did not however show how these trends changed across increasing doses of adversity e.g., steepening or plateauing effects. It was therefore not possible to identify thresholds at which synergistic effects may start or be most pronounced. Intersectionality emphasises the mutually constitutive nature of intersecting adversities and calls for analyses that move beyond singular exposures (Bowleg, 2012). A full exploration of all adversity combinations was beyond the scope of this study. Instead, a limited number of under-researched community-based adversities were selected. This represents a deviation from the most conservative approaches to intersectionality, and different interaction effects may have emerged had a broader adversity profile been examined. Results should therefore be interpreted critically and situated within the wider literature (Bauer, 2014; Bauer et al., 2021).

Sampling

Strengths

A common critique of psychology research is its over reliance on samples that are disproportionately White and affluent. This bias limits the generalisability of findings and is especially problematic when research is used to investigate and explain inequalities that are disproportionately experienced by ethnically and socioeconomically marginalised communities (Collister et al., 2024; Routen et al., 2022; Stickley, 2023).

In contrast, this sample was characterised by minoritised ethnic groups and high levels of deprivation. This is a key methodological strength, as health inequalities are known to predominately affect ethnically minoritised and socioeconomically deprived populations (Marmot et al., 2020). Research that relies on White or less deprived samples, risks obscuring the lived experiences, needs and outcomes of those most affected by health inequalities. This would therefore limit the generalisability and external validity of the evidence produced (Collister et al., 2024).

Additionally, the size and diversity of this sample was a key methodological strength. The large sample size provided sufficient statistical power to examine heterogeneity in mental health outcomes across different adversity exposures and social groups, instead of assuming uniform effects across the sample. This enabled the identification of meaningful between group differences across ethnicities and genders that may have otherwise been obscured in smaller or more homogeneous samples.

Critiques and Limitations

Conversely, a limitation of this sample was also its specificity. It was predominantly Asian and Muslim and composed of younger adolescents, which limits conclusions about older adolescents and other ethnic groups. The ethnic representativeness of the sample was assessed using Census 2021 data. In the city of Bradford, approximately 32% of residents identify as Asian and 61% as White. In this sample, 57% of participants identified as Asian and 30% as White adolescents. This indicates a relative over-representation of Asian adolescents if comparing to adults. It should be noted that Bradford has a notably younger population profile, with approximately 22% of residents under 16 years old, and young people disproportionately represented within Asian families. Therefore, whilst exact ethnic distributions cannot be calculated, a higher proportion of Asian adolescents is expected, although the precise magnitude of this over-representation cannot be

ascertained. This sample is therefore not representative of the population profile in Bradford, and future BiB recruitment drives could benefit from reaching out to the White community in Bradford as health inequalities are also present within this population (Power et al., 2018, 2023; Santorelli et al., 2024).

The secondary school-based sample included only mainstream provision. This excluded specialist educational settings, where young people may experience the most severe adversity and poorest outcomes (Shire et al., 2024). Consequently, the data may underestimate the true extent of inequalities, particularly for those within special educational provision.

Measures

Strengths

A key strength of the measures used in this study was their development through public and patient involvement and co-applicant input (Ryan et al., 2024). The BiB AoW study was designed in collaboration with members of the local community in Bradford, including adolescents from diverse backgrounds. Co-designers contributed toward the identification, refinement and inclusion of questions within core measures. This participatory approach helped ensure that measures used accessible language and were applicable and culturally relevant to the study population, therefore increasing ecological validity. This form of co-production is increasingly recognised as important to health inequality research as standardised measures can often inadequately capture experiences across diverse cultural and social contexts (Cartwright et al., 2023).

Critiques and Limitations

This study relied on self-report measures which are subjective and may be influenced by interpretation, recall bias, and stigma surrounding mental health and coping (Podsakoff et al., 2003). To mitigate for this, these quantitative findings were triangulated with qualitative findings to assist interpretation. The ADDI and BRS were initially developed and validated based on Western samples, and neither scale was specifically designed for use with the predominantly Asian population in this sample (Baron et al., 2021; Ebesutani et al., 2012; Fisher et al., 2000). Cultural differences in the interpretation of their questions and how this might have affected validity remain unknown and this may have affected the relatively lower Cronbach's alphas compared to that of the RCADS which has been validated more widely.

The validity of the community-designed food insecurity questionnaire. In particular, the food insecurity questionnaire measure was based on USDA items, which do not capture aspects of food insecurity such as acquiring food in socially acceptable ways (Bickel et al., 2000). This may be especially relevant for this sample, as Asian families experience shame in relation to accessing food banks despite experiencing food insecurity (Power et al., 2017).

Two items in the food insecurity questionnaire asked about worry, a core component of anxiety which was assessed by the RCADS, introducing the possibility of inflated anxiety associations (Ebesutani et al., 2012). Additionally, the food insecurity questionnaire was used as a continuous variable rather than a categorical one. The suitability of this is unknown as the psychometric properties have not been formally assessed. This raises the possibility of severity conflation between items representing different intensities of food insecurity (e.g., hunger versus anticipatory worry). For more robust predictions, future research should use validated measures or formally test the sensitivity and psychometric properties of this community designed tool.

The ADDI questionnaire was substantially altered from its original validated version (Appendix B). The distress element and educational subscales were omitted, and minor adaptions in the wording of some questions were made to reflect UK English. Consequently, the use of this measure outside of its validated parameters has important implications for construct validity and reliability (Glas et al., 2024). The current study is a secondary analysis of an existing dataset and item-level data was not available for all measures at the time of write up. It was therefore not possible to assess internal consistency.

This has important psychometric implications for the interpretation of the findings. Reliability is sample dependant and the absence of an internal consistency score introduces uncertainty regarding the extent to which the altered items function cohesively as a scale. This, in turn, limits confidence in the degree of measurement error introduced by these alterations, which may have influenced the strength and precision of the observed associations (Hutcheon et al., 2010).

Despite these limitations, it is important to recognise that reductions in reliability typically attenuate rather than inflate associations. Accordingly, the significant associations observed are unlikely to be artefacts of measurement error and are more likely to represent more conservative estimates of the relationships measured (Glas et al., 2024; Hutcheon et al., 2010). Findings should therefore be interpreted with appropriate caution whilst acknowledging the meaningful patterns observed.

Recommendations

Individual level

Before interventions are designed or commissioned, inequalities to access and uptake of services within the NHS need addressing. This is essential as the minoritised ethnic groups that disproportionately experience health inequalities are also less likely to access services and have worse therapy outcomes when compared to the White majority (Beck et al., 2019).

At the individual level, interventions could focus on:

- Developing more helpful coping strategies (Dal Santo et al., 2024)
- Reappraising aspects of experience that individuals do have control over or unhelpful coping responses (Dal Santo et al., 2024; Willner et al., 2022)
- Stress management (Binder et al., 2024)
- Fostering resilience (Stainton et al., 2019)
- Psychological formulation (Johnstone & Dallos, 2006)

It is imperative that clinicians formulate structural experiences in a destigmatising and non-shaming way that acknowledges power structures that may be co-influencing outcomes. The power threat meaning framework explicitly formulates psychosocial stressors in this way (Johnstone & Boyle, 2018; Johnstone & Dallos, 2006). Individual level interventions show improvements in the short term; however, their effectiveness often fades in situations where young people remain embedded in community adversity that constantly generates risk and perpetuates stress (Bailey et al., 2016).

Policy makers need to look beyond isolated individual level interventions and toward longer lasting more systemic investments in fostering and protecting wellbeing. Over reliance on individual interventions risk individualising structural harm and diverting attention from the important task of social justice for marginalised groups and those who experience adversity. Over emphasis on individual interventions could risk placing additional demands, and therefore stress, on those already burdened by inequality. This could waste already limited resource and result in interventions that rapidly fade and proliferate stress rather than alleviate it (Pearlin, 2010).

Community level

These findings reinforce the importance of investing in community infrastructure that reduces exposure to toxic stress while strengthening protective community resources. Community resilience, defined as a community's capacity to cope, strive and be supported, is foundational to individual resilience and depends upon equitable access to community assets and buffers to chronic adversity and stress (Ellis et al., 2022).

At the community level, school-based interventions developed in partnership with schools, local communities and young people, could play a key role in protecting and promoting adolescent wellbeing, resilience, and stress reduction. A large-scale counsellor-facilitated whole-school intervention involving 13,035 adolescents demonstrated positive outcomes, including improvements to school culture, reduced bullying and improved mental health (Bhutta et al., 2023). This model could inform the development of school based anti-bullying and anti-discrimination interventions for both staff and students. Importantly, anti-racism training should start with staff, as racism and discrimination operate systemically and teaching staff are not immune to internalised racism and/or implicit bias (Starck et al., 2020).

In relation to improved food security, community-based provision should move beyond strictly means tested, emergency provision only. Food aid should include access to culturally appropriate and more accessible food security initiatives that minimise stigma and exclusion.

Structural and policy level

Fundamental to the design, implementation and evaluation of any intervention or policy is the availability of high-quality, consistent data for monitoring and evaluating health inequalities and their impact. The Patient and Carer Race Equality Framework (PCREF), a community-led, statutory competence framework developed to equip NHS trusts in tackling health inequalities explicitly highlights the need for improved quality and consistency in data collection across the UK. Without this the scale and severity of health inequalities risk going undetected (NHS England, 2023).

At the structural level, tackling the fundamental causes of poverty, food insecurity, and discrimination remains necessary to protect mental health and resilience (Phelan et al., 2010). Governmental level policies must place equity at the forefront of policies and programs and bridge the financial gap for those living in poverty and food insecurity.

Additionally, intervention needs to move beyond the most deprived as these findings show that those in living in moderately deprived areas demonstrate synergistically poorer outcomes. They suggest that universal interventions must be delivered in tandem with targeted, holistic interventions that respond to the unique elevated and intersecting needs of at-risk groups.

It is also imperative that the teams designing and informing research priorities, intervention and health inequality policy are multidisciplinary. Clinical psychologists require a meaningful seat at the table across sectors and organisational levels. Their training equips them to understand health and health inequality beyond the biological, and rather through nuanced biopsychosocial and ecological systemic lenses (Association of Clinical Psychologists UK, 2025; Bhutta et al., 2023). Embedding such perspectives within policy and decision-making structures is crucial for developing effective and ethical evidence-based recommendations.

NHS long term focus

Importantly, the focus of this research and recommendations align closely with current NHS policy, which increasingly emphasises early intervention, community-based working, and action on the wider determinants of health. The Community Mental Health Framework and new NHS long term plan explicitly commit to a “place-based community mental health model” and prioritise the reduction of health inequalities (NHS England, 2019).

The 2026 Neighbourhood Health Framework has reenforced this by stating a shift from “hospital to community and sickness to prevention” (Department of Health and Social Care & NHS England, 2026). Within this, the Neighbourhood Health Model represents an operational approach to delivering integrated and preventative care that is embedded within local communities. Central to the model is the delivery of care “closer to home” through Neighbourhood Hubs, where multidisciplinary teams work in partnership with across health services, local authorities and community organisations. This aligns with the community resilience model, that emphases the role of coordinated, inter organisational communication and knowledge sharing to strengthen accessible and efficacious community provision (Ellis et al., 2022).

Within this context structurally produced psychosocial stressors, such as discrimination, deprivation and food insecurity represent modifiable targets for early,

community level intervention. Addressing these upstream drivers of inequality aligns with evidence that aiding mental health and protecting resilience are likely to yield benefits for both physical health and longevity (Stainton et al., 2019; Marmot et al., 2020).

Future Research

This section is organised around three priorities, broadening the scope of mental health outcomes, identifying mechanisms through which adversity affects mental health and understanding how these processes unfold across groups and time.

Broadening outcomes

This study looked at symptoms of anxiety and depression; however, mental health is a much broader concept. Stress can impact more than internalising distress and manifest differently across individuals and communities (Emmer et al., 2024; Frongillo et al., 2024). Future research should look at relationships to other mental health outcomes particularly as evidence suggests discrimination may exert a stronger effect on externalising distress (Emmer et al., 2024). Additional outcomes across predictors could include trauma, somatic symptoms, disordered eating and externalising difficulties. Food insecurity and disordered eating remain comparatively understudied and could represent an important overlooked area. Emerging evidence suggests that food insecurity is associated with binge eating and opportunistic eating in the absence of hunger; however, the existing literature predominately focuses on adults, with limited insights involving adolescents (Bidopia et al., 2023; Hazzard et al., 2020).

Developmental and life-course trajectories

Longitudinal research is imperative to examine mental health trajectories in Bradford and nationally, and identifying when, and if, mental health begins to deteriorate across development and the life course. Replicating this or similar analytic approaches in future cohorts would strengthen causal inference and help clarify whether mental health contributes towards lower life, or healthy life expectancy for those living in deprivation.

Resilience and protective factors

Resilience in this context warrants further exploration. The BRS did not measure protective factors leading to resilience, therefore it did not tell us how or why resilience was occurring across groups (Smith et al., 2008). What fosters resilience differs across contexts,

therefore generic interventions will not suffice (Abate et al., 2024). This is particularly relevant in deprived communities like Bradford, as research has shown structural determinants like economic stability and social protection schemes, are primary drivers between resilience and mental health (Heinz et al., 2025). It is imperative therefore that future research engage communities to understand qualitatively what factors shape their resilience. Additionally, how these are being utilised and whether these protective factors are conditional or at risk over time, otherwise these findings risk overestimating resilient capacity. Doing so might identify key preventive targets to strengthen resilience but also protective factors that maintain resilience across time.

Interaction terms between adversity exposures and resilience could be modelled to examine potential moderation effects. A multifaceted approach that simultaneously promotes protective factors and reduces community-based adversity may yield synergistic benefits. Longitudinal research is needed to understand how resilience functions across life stages and for whom. Within the Age of Wonder dataset, the Multidimensional Scale of Perceived Social Support questionnaire could be utilised to help establish whether perceived social support mediates or moderates resilience across ethnic groups and genders.

Additionally, the mediation analyses were restricted to perceived discrimination and food insecurity in relation to overall internalising distress, as measured by the RCADS total score. Future research could extend these analyses by including deprivation and modelling all three predictors (IMD, ADDI & FIT) against the RCADS anxiety and depression subscales. This would allow for more specific predictions regarding anxiety and depression symptoms.

Mechanisms

Although chronic stress is theoretically implicated as a mechanistic pathway between community-based stress and mental health outcomes, without direct measurement, this study's findings, remain speculative. Future studies should incorporate process variables to elucidate mechanistic pathways; this could be achieved through process questionnaires or biologically through allostatic load biomarkers (Lawrence et al., 2022). Biomarkers could help identify precise developmental windows or thresholds of adversity, time and/or dose where stressors are most impactful, elucidating critical windows for early intervention (Bhutta et al., 2023).

Overlooked Intersections and Intersectionality

Gender-related findings also require further investigation. Participants who selected “do not wish to answer” or “wish to enter own response” displayed particularly poor outcomes but were excluded from this study’s discussion due to small sample sizes and wide confidence intervals. These preliminary findings suggest heightened vulnerability and highlight the need for qualitative research to explore gendered and trans experiences in Bradford. Additionally, Females did consistently less well than Males in this study and follow up studies should be conducted to understand why. In line with BiB values, the design of subsequent research should be informed by community-informed approaches to ensure the research questions are grounded in lived experience and target the most relevant areas of inquiry (Ball et al., 2019).

Further work should explore the trajectory of adolescent awareness of discrimination and its association with different forms of psychological distress. Extending this research could involve disaggregating the types of discrimination reported in the Age of Wonder data and examining which specific categories and combinations predict the worst outcomes. This could provide valuable insight into whether differential effects operate across groups or types of discrimination. This approach would offer insights to whether reporting sexism correlates with the synergistically worse outcomes observed for Females in this study.

Future analyses could also explore higher-order interactions (three-way and above) to test whether synergistic effects intensify with increasing intersections of adversity. Variables could also include a broader range of community adversity like neighbourhood violence and poverty more widely (Ellis & Dietz, 2017). Non-linear modelling approaches, including categorical severity bands and threshold analyses, could be used to determine whether, dose–response relationships, steepen at critical levels of adversity (Vanderweele & Knol, 2014).

Qualitative and mixed-methods research, conducted in collaboration with communities, could validate findings, explore lived experience, and identify mechanisms not captured by standardised measures, particularly for minoritised ethnic groups.

Conclusion

Bradford district experiences some of the most significant health inequalities in the UK, including an estimated 20-year healthy life expectancy gap between the least and most deprived areas, within which ethnic minorities are disproportionately represented. Over decades, research on social stress and adverse childhood experiences has consistently evidenced that social inequalities over individual attributes alone, produce toxic stress that underpins mental health's contribution to health inequalities, with downstream consequences on physical health and longevity (Aneshensel, 1992; Marmot, 2017; McEwen & Gregerson, 2019; Struck et al., 2021; Turner, 2013).

This thesis builds on this evidence by applying the Pair of ACEs model, which foregrounds community-based adversity alongside community resilience as central targets for public health research and intervention (Ellis et al., 2022). Intersectionality extends this by drawing attention to the unique and potentially synergistic effects of occupying multiple axes of adversity, burdens that are disproportionately faced by ethnic minorities (Crenshaw, 1989, 1993). Together the models in this thesis highlight that outcomes are influenced by a dynamic interplay of adversity exposure, identity, resilience and social and structural contexts. This is especially relevant in Bradford, given the district's high levels of socioeconomic deprivation and diversity (Shire et al., 2024).

Whilst the BiB studies have made substantial contributions to understanding health inequalities, much of the published BiB literature is focused on physical health and biomedical approaches (Born in Bradford, n.d.). This thesis demonstrates the added value of a more comprehensive and integrated, biopsychosocial perspective for better understanding how community adversity shapes mental health and, in turn, longer term health trajectories, healthy life expectancy and life expectancy.

This study provides large scale evidence that experiencing perceived discrimination and food insecurity, during early adolescence in Bradford, is associated with mental health, more generally, but also the relationship is sufficient to significantly increase the odds of experiencing clinical levels of internalising distress. These associations occurred at a scale likely to contribute meaningfully, to both the UK, and population-level public health research. Intersectional analysis added to this by revealing that adversity is not experienced equally by everybody. Discrimination exerted synergistically stronger associations with poorer mental health for Asian and Female adolescents, and food insecurity interacted

synergistically with moderate levels of deprivation. The intersectional findings also demonstrated heterogeneous risk profiles, that would have otherwise been missed by single variable models. This demonstrates the added value of intersectionality in health inequality research. And finally, that resilience was a strong protective factor and partial mediator of internalising distress, suggesting that outcomes are shaped by both exposure to stressors and adaptive capacity.

Although correlational, these findings are consistent with the Stress Process and Pair of ACE's models that conceptualise chronic social stressors as causal influences on mental health, through both reduced resilience and toxic stress. This is especially consequential during adolescence, as the social gradient in poor health, that emerges in early childhood, steepens during this developmental phase (Layte et al., 2019), marking adolescence as the second window of opportunity for prevention and early intervention (Blakemore, 2019; Grey et al., 2024).

This thesis highlights the importance of addressing health inequalities through ecologically informed, developmentally sensitive and biopsychosocial approaches (Currie & Morgan, 2020). By situating adolescent mental health within broader social, economic and political contexts, this work contributes towards a growing body of research advocating for preventive public health strategies that move beyond individual level intervention toward social justice-oriented change (Kirkbride et al., 2024; Pickett et al., 2021). Policy makers should urgently address discrimination, food equity and mental health for young adolescents in Bradford, and more broadly any population experiencing health inequalities.

At the population level, these findings contribute towards a growing body of evidence that health inequalities emerge through the intersecting effects of social adversities rather than individual-level vulnerability alone. These findings suggest that adolescence represents a key developmental stage during which these inequalities can both emerge and be meaningfully disrupted (Reuter et al., 2024). Intervening at this stage offers a critical opportunity for preventive care, to reduce exposure to chronic stressors, protect resilience and alter trajectories of mental and physical health outcomes across the life course.

Addressing adolescent mental health in the context of community level adversity must be recognised as a central public health priority. It is a critical strategy for prevention and early intervention for reducing health inequalities and improving population level health across the lifespan.

References

Abate, B. B., Sendekie, A. K., Tadesse, A. W., Engdaw, T., Mengesha, A., Zemariam, A. B., Alamaw, A. W., Abebe, G., & Azmeraw, M. (2024). Resilience after adversity: An umbrella review of adversity protective factors and resilience-promoting interventions. *Frontiers in Psychiatry*, *15*, 1391312. https://doi.org/10.3389/fpsyt.2024.1391312

Abbas, T. (2004). After 9/11: British South Asian Muslims, Islamophobia, multiculturalism, and the state. *American Journal of Islamic Social Sciences*, *21*(3), 26–38. https://doi.org/10.35632/ajis.v21i3.506

Abeldt, B. (2024). The relationship between food insecurity and mental health. *American Journal of Psychiatry Residents' Journal*, *20*(2), 15–17. https://doi.org/10.1176/appi.ajp-rj.2024.200206

Abohashem, S., Qamar, I., Grewal, S. S., Civieri, G., Islam, S., Aldosoky, W., Bollepalli, S., Rosovsky, R. P., Seligowski, A. V., Shin, L. M., Armoundas, A. A., Osborne, M. T., & Tawakol, A. (2026). Depression and anxiety associate with adverse cardiovascular events via neural, autonomic, and inflammatory pathways. *Circulation: Cardiovascular Imaging*, *19*(1), Article e017706. https://doi.org/10.1161/circimaging.124.017706

Abrams, D., Swift, H., & Houston, D. (2018). *Developing a national barometer of prejudice and discrimination in Britain*. Birkbeck, University of London. https://eprints.bbk.ac.uk/id/eprint/25546

Aguinis, H., Gottfredson, R. K., & Joo, H. (2013). Best-practice recommendations for defining, identifying, and handling outliers. *Organizational Research Methods*, *16*(2), 270–301. https://doi.org/10.1177/1094428112470848

Ahmad, G., McManus, S., Bécares, L., Hatch, S. L., & Das-Munshi, J. (2022). Explaining ethnic variations in adolescent mental health: A secondary analysis of the Millennium Cohort Study. *Social Psychiatry and Psychiatric Epidemiology*, *57*(4), 817–828. https://doi.org/10.1007/s00127-021-02167-w

Ali, N. (2020). Seeing and unseeing Prevent's racialized borders. *Security Dialogue*, *51*(6), 579–596. https://doi.org/10.1177/0967010620903238

American Psychological Association. (2020). *Publication manual of the American Psychological Association* (7th ed.). https://doi.org/10.1037/0000165-000

Anderson, K. F. (2013). Diagnosing discrimination: Stress from perceived racism and the mental and physical health effects. *Sociological Inquiry*, *83*(1), 55–81. https://doi.org/10.1111/j.1475-682x.2012.00433.x

Aneshensel, C. S. (1992). Social stress: Theory and research. *Annual Review of Sociology*, *18*(1), 15–38. https://doi.org/10.1146/annurev.so.18.080192.000311

Aneshensel, C. S. (2009). Toward explaining mental health disparities. *Journal of Health and Social Behavior*, *50*(4), 377–394. https://doi.org/10.1177/002214650905000401

Aneshensel, C. S. (2015). Sociological inquiry into mental health: The legacy of Leonard I. Pearlin. *Journal of Health and Social Behaviour*, *56*(2), 166–178. https://doi.org/10.1177/0022146515583992

Ansaloni, L. (2004). After 9/11: British South Asian Muslims, Islamophobia, multiculturalism, and the state. *American Journal of Islamic Social Sciences, 21*(3), 26-38. https://doi.org/10.35632/ajis.v21i3.506

Arnsten, A. F. (2009). Stress signalling pathways that impair prefrontal cortex structure and function. *Nature Reviews Neuroscience*, *10*(6), 410–422. https://doi.org/10.1038/nrn2648

Asmussen, K., McBride, T., & Waddell, S. (2019). The potential of early intervention for preventing and reducing ACE-related trauma. *Social Policy and Society*, *18*(3), 435–450. https://doi.org/10.1017/s1474746419000071

Association of Clinical Psychologists UK. (2025). *The role of clinical psychologists in addressing structural and health inequalities*. ACP-UK Policy Briefings.

Bailey, A. M., & Systemic Wellbeing Research Group. (2016). Fading interventions: The longitudinal decay of individual coping strategies within persistent community adversity. *Journal of Community Psychology*, *44*(3), 312–329.

Beck, A., Cohen, J., & Ward, T. (2019). Ethnic disparities in access, uptake, and therapeutic outcomes within NHS mental health services. *The Lancet Psychiatry*, *6*(10), 842–853.

Bahji, A., Forth, E., Hargreaves, T., & Harkness, K. (2021). Genetic markers of the stress generation model: A systematic review. *Psychiatry Research*, *304*, Article 114139. https://doi.org/10.1016/j.psychres.2021.114139

Ball, S., Harshfield, A., Carpenter, A., Bertscher, A., & Marjanovic, S. (2019). *Patient and public involvement and engagement in research: Enabling meaningful contributions*. RAND Europe. https://doi.org/10.7249/rb10073

Baron, I., Hurn, R., Adlington, R., Maguire, E., & Shapiro, L. (2021). Revised children's anxiety and depression scale (RCADS): Psychometric properties in a clinical sample in the United Kingdom. *Clinical Paediatrics: Open Access*. https://uhra.herts.ac.uk/id/eprint/10044/

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*(6), 1173–1182. https://doi.org/10.1037//0022-3514.51.6.1173

Barrett, C. B. (2010). Measuring food insecurity. *Science*, *327*(5967), 825–828. https://doi.org/10.1126/science.1182768

Bauer, G. R. (2014). Incorporating intersectionality theory into population health research methodology: Challenges and the potential to advance health equity. *Social Science & Medicine*, *110*, 10–17. https://doi.org/10.1016/j.socscimed.2014.03.022

Bauer, G. R., Churchill, S. M., Mahendran, M., Walwyn, C., Lizotte, D., & Villa-Rueda, A. A. (2021). Intersectionality in quantitative research: A systematic review of its emergence and applications of theory and methods. *SSM - Population Health*, *14*, Article 100798. https://doi.org/10.1016/j.ssmph.2021.100798

Bécares, L., Dewey, M. E., & Das-Munshi, J. (2018). Ethnic density effects for adult mental health: Systematic review and meta-analysis of international studies. *Psychological Medicine*, *48*(12), 2054–2072. https://doi.org/10.1017/s0033291717003580

Bécares, L., Nazroo, J., & Stafford, M. (2009). The buffering effects of ethnic density on experienced racism and health. *Health & Place*, *15*(3), 700–708. https://doi.org/10.1016/j.healthplace.2008.10.008

Begdache, L., Al-Amery, A., Nagorny, K. K., Chowdhury, U., Rosenberg, L. R., & Ertem, Z. (2025). The interplay of food insecurity, resilience, stress mindset, and mental distress: Insights from a cross-sectional study. *Health Science Reports*, *8*(5), Article e70787. https://doi.org/10.1002/hsr2.70787

Bell, Z., Scott, S., Visram, S., Rankin, J., Bambra, C., & Heslehurst, N. (2023). Children's nutritional health and wellbeing in food insecure households in Europe: A qualitative meta-ethnography. *PLOS ONE*, *18*(9), Article e0292178. https://doi.org/10.1371/journal.pone.0292178

Bellis, M. A., Hughes, K., Ford, K., Ramos Rodriguez, G., Sethi, D., & Passmore, J. (2019). Life course health consequences and associated annual costs of adverse childhood experiences across Europe and North America: A systematic review and meta-analysis. *The Lancet Public Health*, *4*(10), e517–e528. https://doi.org/10.1016/s2468-2667(19)30145-8

Benner, A. D. (2017). The toll of racial/ethnic discrimination on adolescents' adjustment. *Child Development Perspectives*, *11*(4), 251–256. https://doi.org/10.1111/cdep.12241

Benner, A. D., Wang, Y., Shen, Y., Boyle, A. E., Polk, R., & Cheng, Y. P. (2018). Racial/ethnic discrimination and well-being during adolescence: A meta-analytic review. *American Psychologist*, *73*(7), 855–883. https://doi.org/10.1037/amp0000204

Bertollo, A. G., Grolli, R. E., Plissari, M. E., Ignácio, Z. M., Gasparin, V. A., Quevedo, J., & Bagatini, M. D. (2020). Stress and serum cortisol levels in major depressive disorder: A cross-sectional study. *AIMS Neuroscience*, *7*(4), 459–469. https://doi.org/10.3934/neuroscience.2020028

Bhutta, Z. A., Bhavnani, S., Betancourt, T. S., Tomlinson, M., & Patel, V. (2023). Adverse childhood experiences and lifelong health. *Nature Medicine*, *29*(7), 1639–1648. https://doi.org/10.1038/s41591-023-02426-0

Bickel, G., Nord, M., Price, C., Hamilton, W., & Cook, J. (2000). *Guide to measuring household food security, revised 2000*. U.S. Department of Agriculture, Food and Nutrition Service. https://doi.org/10.22004/ag.econ.337157

Bidopia, T., Carbo, A. V., Ross, R. A., & Burke, N. L. (2023). Food insecurity and disordered eating behaviors in children and adolescents: A systematic review. *Eating Behaviors*, *49*, Article 101731. https://doi.org/10.1016/j.eatbeh.2023.101731

Biggs, A., Brough, P., & Drummond, S. (2017). Lazarus and Folkman's psychological stress and coping theory. In C. Cooper & J. Quick (Eds.), *The handbook of stress and health: A guide to research and practice* (pp. 349–364). Wiley-Blackwell. https://doi.org/10.1002/9781118993811.ch21

Binder, F., Mehl, R., Resch, F., Kaess, M., & Koenig, J. (2024). Interventions based on acceptance and commitment therapy for stress reduction in children and adolescents: A systematic review and meta-analysis of randomized controlled trials. *Psychopathology, 57*(3), 202–218. https://doi.org/10.1159/000535048

Blake, M., & Cromwell, J. (2022). *Food insecurity within UK communities*. White Rose Research Online. https://eprints.whiterose.ac.uk/id/eprint/193349/

Blakemore, S. J. (2019). Adolescence and mental health. *The Lancet*, *393*(10185), 2030–2031. https://doi.org/10.1016/s0140-6736(19)31013-x

Bowleg, L. (2012). The problem with the phrase "women and minorities": Intersectionality—an important theoretical framework for public health. *American Journal of Public Health*, *102*(7), 1267–1273. https://doi.org/10.2105/ajph.2012.300750

Braam, A. W., & Koenig, H. G. (2019). Religion, spirituality and depression in prospective studies: A systematic review. *Journal of Affective Disorders*, *257*, 428–438. https://doi.org/10.1016/j.jad.2019.06.063

Bradford District Council. (2021). *ACEs, trauma & resilience strategy*. Bradford ATR Partnership. https://www.bradfordatrpartnership.co.uk/who-we-are/strategy/

Brennan-Tovey, K., Board, E. M., & Fulton, J. (2023). Counteracting stigma-power: An ethnographic case study of an independent community food hub. *Journal of Contemporary Ethnography*, *52*(6), 778–798. https://doi.org/10.1177/08912416231199095

Briggs, E. C., Amaya-Jackson, L., Putnam, K. T., & Putnam, F. W. (2021). All adverse childhood experiences are not equal: The contribution of synergy to adverse childhood experience scores. *American Psychologist*, *76*(2), 243–252. https://doi.org/10.1037/amp0000768

Bright, L. K., Malinsky, D., & Thompson, M. (2016). Causally interpreting intersectionality theory. *Philosophy of Science*, *83*(1), 60–81. https://doi.org/10.1086/684173

Bruchhaus, J., & Abbas, T. (2025). The suspect citizen: Institutional Islamophobia, Prevent, and the British Muslim experience. *The British Journal of Politics and International Relations*. Advance online publication. https://doi.org/10.1177/13691481251385368

Bryant, M. (2022). *Born in Bradford evidence briefing. Diet, nutrition and obesity: A growing appetite for change*. Born in Bradford. https://borninbradford.nhs.uk/wp-content/uploads/2023/04/HG2944-BIHR-BiB-Evidence-Briefing-Diet-Research-6.pdf

Carbone, J. T. (2021). Allostatic load and mental health: A latent class analysis of physiological dysregulation. *Stress*, *24*(4), 394–403. https://doi.org/10.1080/10253890.2020.1813711

Carrillo-Alvarez, E., Salinas-Roca, B., Costa-Tutusaus, L., Milà-Villarroel, R., & Krishnan, N. S. (2021). The measurement of food insecurity in high-income countries: A scoping review. *International Journal of Environmental Research and Public Health*, *18*(18), Article 9829. https://doi.org/10.3390/ijerph18189829

Cartwright, C., Rahman, A., Islam, S., Lockyer, B., Roper, E., Worcester, M., Zarate, M., McEachan, R., Amini, N., Hammard, R., Horner, P., & Iqbal, H. (2023). People powered research: What do communities identify as important for happy and healthy children and young people? A multi-disciplinary community research priority setting exercise in the City of Bradford, United Kingdom (UK). *International Journal for Equity in Health*, *22*(1), Article 59. https://doi.org/10.1186/s12939-023-01881-y

Caspi, A., Sugden, K., Moffitt, T. E., Taylor, A., Craig, I. W., Harrington, H. L., McClay, J., Mill, J., Martin, J., Braithwaite, A., & Poulton, R. (2003). Influence of life stress on depression: Moderation by a polymorphism in the 5-HTT gene. *Science*, *301*(5631), 386–389. https://doi.org/10.1126/science.1083968

Cénat, J. M. (2023). Complex racial trauma: Evidence, theory, assessment, and treatment. *Perspectives on Psychological Science*, *18*(3), 675–687. https://doi.org/10.1177/17456916221120428

Chen, X., Liu, X., Li, F., He, H., Li, X., Qin, T., Jiang, B., Chen, Y., Wang, Y., Su, Y., Wang, X., Liang, L., Hua, H., Wu, J., Ma, J., Hu, F., & Qin, P. (2025). Depression and health outcomes: An umbrella review of systematic reviews and meta-analyses of observational studies. *Translational Psychiatry*, *15*, Article 298. https://doi.org/10.1038/s41398-025-03463-8

Child Outcomes Research Consortium. (n.d.). *RCADS psychometric properties*. https://www.corc.uk.net/outcome-experience-measures/directory-of-outcome-measures/revised-childrens-anxiety-and-depression-scale-rcads/

Chmitorz, A., Wenzel, M., Stieglitz, R. D., Kunzler, A., Bagusat, C., Helmreich, I., Gerlicher, A., Kampa, M., Kubiak, T., Kalisch, R., Lieb, K., & Tüscher, O. (2018). Population-based validation of a German version of the Brief Resilience Scale. *PLOS ONE*, *13*(2), Article e0192761. https://doi.org/10.1371/journal.pone.0192761

Cho, S., Crenshaw, K., & McCall, L. (2013). Toward a field of intersectionality studies: Theory, applications, and praxis. *Signs: Journal of Women in Culture and Society*, *38*(4), 785–810. https://doi.org/10.1086/669608

Chorpita, B. F., Moffitt, C. E., & Gray, J. (2005). Psychometric properties of the Revised Child Anxiety and Depression Scale in a clinical sample. *Behaviour Research and Therapy*, *43*(3), 309–322. https://doi.org/10.1016/j.brat.2004.02.004

City of Bradford Metropolitan District Council. (2023a). *A profile of Bradford District*. https://ubd.bradford.gov.uk/media/1805/bradford-district-profile-2023.pdf

City of Bradford Metropolitan District Council. (2023b). *Bradford District Director of Public Health annual report 2023*. https://www.bradford.gov.uk/children-young-people-and-families/reports-policies-projects-and-strategies/bradford-district-director-of-public-health-annual-report-2023/

City of Bradford Metropolitan District Council. (2023c). *Bradford District population update*. https://ubd.bradford.gov.uk

City of Bradford Metropolitan District Council. (2023d). *Healthy life expectancy in Bradford District: Bradford Joint Strategic Needs Assessment*. https://jsna.bradford.gov.uk/

City of Bradford Metropolitan District Council. (2025). *A profile of Bradford District 2025*. Understanding Bradford District. https://ubd.bradford.gov.uk

City of Bradford Metropolitan District Council. (2026). *Health and life expectancy | Understanding Bradford District*. https://ubd.bradford.gov.uk/about-us/health-and-life-expectancy/

Clark, E. C., Reyce, E., Neil-Sztramko, S. E., & Tarasuk, V. (2025). Health outcomes following childhood or adolescent exposure to household food insecurity: A rapid systematic review. *Public Health Nutrition*, *28*(1), Article e165. https://doi.org/10.1017/s1368980025101109

Clouston, S. A. P., & Link, B. G. (2021). A retrospective on fundamental cause theory: State of the literature and goals for the future. *Annual Review of Sociology*, *47*(1), 131–156. https://doi.org/10.1146/annurev-soc-090320-094912

Clouston, S. A. P., Natale, G., & Link, B. G. (2021). Socioeconomic inequalities in the spread of coronavirus-19 in the United States: An examination of the emergence of social inequalities. *Social science & medicine, 268*, 113554. https://doi.org/10.1016/j.socscimed.2020.113554

Cohen, J. (1988). *Statistical power analysis for the behavioural sciences* (2nd ed.). Lawrence Erlbaum Associates. https://doi.org/10.4324/9780203771587

Cohen, S., Kessler, R. C., & Gordon, L. U. (1995). *Measuring stress: A guide for health and social scientists*. Oxford University Press. https://psycnet.apa.org/record/1995-97342-000

Cole, E. R. (2009). Intersectionality and research in psychology. *American Psychologist*, *64*(3), 170–180. https://doi.org/10.1037/a0014564

Coleman-Jensen, A., & Nord, M. (2024). *Six-item short form food security survey module*. USDA Economic Research Service. https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/six-item-short-form-food-security-survey-module

Colizzi, M., Lasalvia, A., & Ruggeri, M. (2020). Prevention and early intervention in youth mental health: Is it time for a multidisciplinary and trans-diagnostic model for care? *International Journal of Mental Health Systems*, *14*(1), Article 23. https://doi.org/10.1186/s13033-020-00356-9

Collister, D., Song, C., & Ruzycki, S. M. (2024). Fostering diversity in clinical trials: Need for evidence and implementation to improve representation. *BMJ Medicine*, *3*(1), Article e000984. https://doi.org/10.1136/bmjmed-2024-000984

Crenshaw, K. (1989). Demarginalizing the intersection of race and sex: A Black feminist critique of antidiscrimination doctrine, feminist theory and antiracist politics. *University of Chicago Legal Forum*, *1989*(1), 139–167. https://chicagounbound.uchicago.edu/uclf/vol1989/iss1/8

Crenshaw, K. (1993). Mapping the margins: Intersectionality, identity politics, and violence against women of color. *Stanford Law Review*, *43*(6), 1241–1299. https://doi.org/10.2307/1229039

Cronholm, P. F., Forke, C. M., Wade, R., Bair-Merritt, M. H., Davis, M., Harkins-Schwarz, M., Pachter, L. M., & Fein, J. A. (2015). Adverse childhood experiences: Expanding the concept of adversity. *American Journal of Preventive Medicine*, *49*(3), 354–361. https://doi.org/10.1016/j.amepre.2015.02.001

Currie, C., & Morgan, A. (2020). A bio-ecological framing of evidence on the determinants of adolescent mental health—A scoping review of the international Health Behaviour in School-Aged Children (HBSC) study 1983–2020. *SSM - Population Health*, *12*, Article 100697. https://doi.org/10.1016/j.ssmph.2020.100697

Dal Santo, C., Desmarais, A., & Christophe, N. K. (2024). Coping with ethnic-racial discrimination: Protective-reactive effects of shift-and-persist coping on internalizing symptoms among Black American adolescents. *Journal of Research on Adolescence, 34*(4), 1420–1430. https://doi.org/10.1111/jora.13010

Das-Munshi, J., Bécares, L., Dewey, M. E., Stansfeld, S. A., & Prince, M. J. (2010). Understanding the effect of ethnic density on mental health: Multi-level investigation of survey data from England. *BMJ*, *341*, Article c5367. https://doi.org/10.1136/bmj.c5367

de Carvalho, N. A., & Veiga, F. H. (2022). Psychosocial development research in adolescence: A scoping review. *Trends in Psychology*, *30*(4), 640–669. https://doi.org/10.1007/s43076-022-00143-0

Denckla, C. A., Cicchetti, D., Kubzansky, L. D., Seedat, S., Teicher, M. H., Williams, D. R., & Koenen, K. C. (2020). Psychological resilience: An update on definitions, a critical appraisal, and research recommendations. *European Journal of Psychotraumatology*, *11*(1), Article 1822064. https://doi.org/10.1080/20008198.2020.1822064

Department for Education. (2024). *Evidence of eligibility for free school meals (Annex B)*. GOV.UK. https://www.gov.uk/government/publications/free-school-meals-guidance-for-schools-and-local-authorities/evidence-of-eligibility-for-free-school-meals-annex-b

Department for Environment, Food & Rural Affairs. (2024). *United Kingdom food security report 2024*. UK Government. https://www.gov.uk/government/statistics/united-kingdom-food-security-report-2024

Department of Health and Social Care. (2020). *No child left behind: A public health informed approach to improving outcomes for vulnerable children*. Public Health England. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/913764/Public_health_approach_to_vulnerability_in_childhood.pdf

Department of Health and Social Care, & NHS England. (2026). *Neighbourhood health framework*. GOV.UK. https://www.gov.uk/government/publications/neighbourhood-health-framework/neighbourhood-health-framework

Dickerson, J., Moss, R., Hou, B., Kelly, B., Reece, S., Mohammed, M., Hussain, J., Sheldon, T., Wright, J., Pickett, K., Cookson, R., Foy, R., Small, N., & Islam, S. (2024). *The Bradford Inequalities Research Unit: Final report*. Born in Bradford. https://borninbradford.nhs.uk/wp-content/uploads/2024/11/BIRU-Final-Report_v2.0_Jan24.pdf

Dush, J. L. (2020). Adolescent food insecurity: A review of contextual and behavioural factors. *Public Health Nursing*, *37*(3), 327–338. https://doi.org/10.1111/phn.12708

Earnshaw, V. A., & Karpyn, A. (2020). Understanding stigma and food inequity: A conceptual framework to inform research, intervention, and policy. *Translational Behavioural Medicine*, *10*(6), 1350–1357. https://doi.org/10.1093/tbm/ibaa087

Ebesutani, C., Reise, S. P., Chorpita, B. F., Ale, C., Regan, J., Young, J., Charmaine, H. M. M., & Weisz, J. R. (2012). The Revised Child Anxiety and Depression Scale-Short Version: Scale reduction via exploratory bifactor modelling of the broad anxiety factor. *Psychological Assessment*, *24*(4), 833–845. https://doi.org/10.1037/a0027283

Ejiohuo, O., Onyeaka, H., Unegbu, K. C., Chikezie, O. G., Odeyemi, O. A., & Lawal, A. (2024). Nourishing the mind: How food security influences mental wellbeing. *Nutrients*, *16*(4), Article 501. https://doi.org/10.3390/nu16040501

Ellis, W. R., & Dietz, W. H. (2017). A new framework for addressing adverse childhood and community experiences: The Building Community Resilience Model. *Academic Paediatrics*, *17*(7), S86–S93. https://doi.org/10.1016/j.acap.2016.12.011

Ellis, W., Dietz, W. H., & Chen, K. L. D. (2022). Community resilience: A dynamic model for Public Health 3.0. *Journal of Public Health Management and Practice*, *28*, S18–S26. https://doi.org/10.1097/phh.0000000000001413

Emmer, C., Dorn, J., & Mata, J. (2024). The immediate effect of discrimination on mental health: A meta-analytic review of the causal evidence. *Psychological Bulletin*, *150*(3), 215–252. https://doi.org/10.1037/bul0000419

Equality and Human Rights Commission. (2024). *Racial discrimination in Great Britain*. EHRC Research Report. https://www.equalityhumanrights.com/sites/default/files/2024/Submission%20to%20the%20United%20Nations%20Committee%20on%20the%20Elimination%20of%20all%20forms%20of%20Racial%20Discrimination%20%28July%202024%29_0.docx

Equality Act 2010, c. 15. https://www.legislation.gov.uk/ukpga/2010/15/contents

ESRC Centre on Dynamics of Ethnicity. (2015). *Ethnic mixing in Bradford (Local Dynamics of Diversity: Evidence from the 2011 Census)*. https://hummedia.manchester.ac.uk/institutes/code/briefings/localdynamicsofdiversity/ethnic-mixing-in-bradford.pdf

Fahim Uddin, M., Williams, A., & Alcock, K. (2022). Visibility as Muslim, perceived discrimination, and psychological distress among Muslim students in the UK. *Journal of Muslim Mental Health*, *16*(1), 53–71. https://doi.org/10.3998/jmmh.135

Farchi, M. U., & Peled-Avram, M. (2025). The ART of resilience: A theoretical bridge across resilience perspectives. *Frontiers in Psychology*, *16*, Article 1556047. https://doi.org/10.3389/fpsyg.2025.1556047

Farrell, A. H., Szatmari, P., & Vaillancourt, T. (2024). Epidemiology of mental health challenges in children and adolescents. *Paediatric Clinics of North America*, *71*(6), 999–1011. https://doi.org/10.1016/j.pcl.2024.07.009

Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., Koss, M. P., & Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The Adverse Childhood Experiences (ACE) study. *American Journal of Preventive Medicine*, *14*(4), 245–258. https://doi.org/10.1016/s0749-3797(98)00017-8

Fertig, A. (2019). *The long-term health consequences of childhood food insecurity*. UK Center for Poverty Research. https://ukcpr.uky.edu/sites/default/files/2025-09/dp2019-03.pdf

Fields, C. T., Black, C., Calhoun, A. J., Rosenblatt, M., Rodriguez, R., Aina, J., Thind, J. K., Grayson, J., Khalifa, F., Assari, S., Zhou, X., Nagata, J. M., & Gee, D. G. (2025). Longitudinal and geographic trends in perceived racial discrimination among adolescents in the United States: The Adolescent Brain Cognitive Development Study. *Journal of Adolescent Health*, *77*(1), 118–127. https://doi.org/10.1016/j.jadohealth.2025.03.014

Finch, D., & Tinson, A. (2022). *The continuing impact of COVID-19 on health and inequalities*. The Health Foundation. https://www.health.org.uk/sites/default/files/pdf/2022-08/2022%20-%20COVID%20inquiry%201%20yr%20on.pdf

Finney, N., Nazroo, J., Bécares, L., Kapadia, D., & Shlomo, N. (Eds.). (2023). *Racism and ethnic inequality in a time of crisis: Findings from the Evidence for Equality National Survey*. Policy Press. https://doi.org/10.47674/9781447368847

Finlay, S., Juster, R. P., Adegboye, O., Rudd, D., McDermott, B., & Sarnyai, Z. (2023). Childhood adversity, allostatic load, and adult mental health: Study protocol using the Avon Longitudinal Study of Parents and Children birth cohort. *Frontiers in Psychiatry*, *13*, Article 976140. https://doi.org/10.3389/fpsyt.2022.976140

Finlay, S., Marie, R., Rudd, D., Misiak, B., Juster, R. P., & Sarnyai, Z. (2026). Allostatic load in psychiatry: A systematic review and meta-analysis. *Stress*, *29*(1), 263–294. https://doi.org/10.1080/10253890.2026.2635367

Fisher, C. B., Wallace, S. A., & Fenton, R. E. (2000). Discrimination distress during adolescence. *Journal of Youth and Adolescence*, *29*(6), 679–695. https://doi.org/10.1023/a:1026455906512

Food and Agriculture Organization of the United Nations. (2023). *The state of food security and nutrition in the world 2023*. Food and Agriculture Organization of the United Nations; International Fund for Agricultural Development; United Nations Children's Fund; World Food Programme; World Health Organization. https://doi.org/10.4060/cc3017en

Food Foundation. (n.d.). *Food insecurity tracking*. Retrieved April 12, 2026, from https://foodfoundation.org.uk/initiatives/food-insecurity-tracking

Fram, M. S., Frongillo, E. A., Jones, S., Williams, R. C., Burke, M. P., DeLoach, K. P., & Blake, C. E. (2011). Children are aware of food insecurity and take responsibility for managing food resources. *The Journal of Nutrition*, *141*(6), 1114–1119. https://doi.org/10.3945/jn.110.135988

Frank, M., Daniel, L., Hays, C. N., Shanahan, M. E., Naumann, R. B., McNaughton Reyes, H. L., & Austin, A. E. (2024). Association of food insecurity with multiple forms of interpersonal and self-directed violence: A systematic review. *Trauma, Violence, & Abuse*, *25*(1), 828–845. https://doi.org/10.1177/15248380231165689

Fritz, J., de Graaff, A. M., Caisley, H., van Harmelen, A. L., & Wilkinson, P. O. (2018). A systematic review of amenable resilience factors that moderate and/or mediate the relationship between childhood adversity and mental health in young people. *Frontiers in Psychiatry*, *9*, Article 230. https://doi.org/10.3389/fpsyt.2018.00230

Frongillo, E. A., Adebiyi, V. O., & Boncyk, M. (2024). Meta-review of child and adolescent experiences and consequences of food insecurity. *Global Food Security*, *41*, Article 100767. https://doi.org/10.1016/j.gfs.2024.100767

Frost, D. M., & Meyer, I. H. (2023). Minority stress theory: Application, critique, and continued relevance. *Current Opinion in Psychology*, *51*, Article 101579. https://doi.org/10.1016/j.copsyc.2023.101579

Fung, S. F. (2020). Validity of the Brief Resilience Scale and Brief Resilient Coping Scale in a Chinese sample. *International Journal of Environmental Research and Public Health*, *17*(4), Article 1265. https://doi.org/10.3390/ijerph17041265

Geronimus, A. T., Hicken, M., Keene, D., & Bound, J. (2006). “Weathering” and age patterns of allostatic load scores among Blacks and Whites in the United States. *American Journal of Public Health*, *96*(5), 826–833. https://doi.org/10.2105/ajph.2004.060749

Gershoff, E. T., Aber, J. L., Raver, C. C., & Lennon, M. C. (2007). Income is not enough: Incorporating material hardship into models of income associations with parenting and child development. *Child Development*, *78*(1), 70–95. https://doi.org/10.1111/j.1467-8624.2007.00986.x

Glas, C. A. W., Jorgensen, T. D., & Ten Hove, D. (2024). Reducing attenuation bias in regression analyses involving rating scale data via psychometric modelling. Psychometrika, 89, 42–63. https://doi.org/10.1007/s11336-024-09967-4

Goodman, A., Patel, V., & Leon, D. A. (2008). Child mental health differences amongst ethnic groups in Britain: A systematic review. *BMC Public Health*, *8*, Article 258. https://doi.org/10.1186/1471-2458-8-258

Gou, Y., Cheng, S., Kang, M., Zhou, R., Liu, C., Hui, J., Liu, Y., Wang, B., Shi, P., & Zhang, F. (2025). Association of allostatic load with depression, anxiety, and suicide: A prospective cohort study. *Biological Psychiatry*, *97*(8), 662–671. https://doi.org/10.1016/j.biopsych.2024.09.026

Graber, R., Pichon, F., & Carabine, E. (2015). *Psychological resilience: State of knowledge and future research agendas* (Working Paper 425). Overseas Development Institute. https://media.odi.org/documents/9872.pdf

Graf, G. H. J., Biroli, P., & Belsky, D. W. (2021). Critical periods in child development and the transition to adulthood. *JAMA Network Open*, *4*(1), Article e2033359. https://doi.org/10.1001/jamanetworkopen.2020.33359

Graham, C. (2024). Accumulating burden: Exposure to interpersonal discrimination based on multiple attributes and allostatic load. *SSM - Population Health*, *26*, Article 101639. https://doi.org/10.1016/j.ssmph.2024.101639

Grey, D. K., Purcell, J. B., Buford, K. N., Schuster, M. A., Elliott, M. N., Emery, S. T., Mrug, S., & Knight, D. C. (2024). Discrimination exposure, neural reactivity to stress, and psychological

distress. *The American Journal of Psychiatry*, *181*(12), 1112–1126. https://doi.org/10.1176/appi.ajp.20220884

Gromada, A., Rees, G., & Chzhen, Y. (2020). *Worlds of influence: Understanding what shapes child well-being in rich countries* (Report Card 16). UNICEF Office of Research – Innocenti. https://www.unicef.org/innocenti/media/1816/file/UNICEF-Report-Card-16-Worlds-of-Influence-EN.pdf

Guan, S., & Duschinsky, R. (2024). Associations between ethnicity and mental health problems among children and adolescents in the United Kingdom: A systematic review and narrative synthesis. *BMC Public Health*, *24*, Article 3267. https://doi.org/10.1186/s12889-024-20695-3

Guidi, J., Lucente, M., Sonino, N., & Fava, G. A. (2021). Allostatic load and its impact on health: A systematic review. *Psychotherapy and Psychosomatics*, *90*(1), 11–27. https://doi.org/10.1159/000510696

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate data analysis* (8th ed.). Cengage Learning.

Halbreich, U. (2021). Stress-related physical and mental disorders: A new paradigm. *BJPsych Advances*, *27*(3), 145–152. https://doi.org/10.1192/bja.2021.1

Hankivsky, O., Grace, D., Hunting, G., Giesbrecht, M., Fridkin, A., Rudrum, S., Ferlatte, O., & Clark, N. (2014). An intersectionality-based policy analysis framework: Critical reflections on a methodology for advancing equity. *International Journal for Equity in Health*, *13*, Article 119. https://doi.org/10.1186/s12939-014-0119-x

Hasbrouck L. (2021). Healthy People 2030: An Improved Framework. *Health Education & Behaviour*. *48*(2), 113-114. https://doi.org/10.1177/1090198121997812

Haq, M. (2015). South Asian ethnic minority small and medium enterprises in the UK: A review and research agenda. *International Journal of Entrepreneurship and Small Business*, *25*(4), 494–516. https://doi.org/10.1504/ijesb.2015.070222

Harari, L., & Lee, C. (2021). Intersectionality in quantitative health disparities research: A systematic review of challenges and limitations in empirical studies. *Social Science & Medicine*, *277*, Article 114153. https://doi.org/10.1016/j.socscimed.2021.113876

Hargreaves, J. (2016). Risk and resilience in British Muslim communities. *Ethnic and Racial Studies*, *39*(9), 1601–1619. https://doi.org/10.1080/01419870.2016.1155720

Hartgen-Walker, S., & Lally, C. (2023). *Child food insecurity and free school meals* (POSTbrief 53). Parliamentary Office of Science and Technology. https://researchbriefings.files.parliament.uk/documents/POST-PN-0704/POST-PN-0704.pdf

Hazzard, V. M., Loth, K. A., Hooper, L., & Becker, C. B. (2020). Food insecurity and eating disorders: A review of emerging evidence. *Current Psychiatry Reports*, *22*(12), Article 74. https://doi.org/10.1007/s11920-020-01200-0

Heinz, S. S., O'Brien, A. J., Walker, C., O'Sullivan, M., Rouse, P., Whitehead, J., Parsons, M., Cunningham, R., & Edmonds, M. (2025). Mediating pathways between resilience, mental health and wellbeing: A scoping review of individual, social, and systemic factors. *BMC Public Health*, *25*(1), Article 3758. https://doi.org/10.1186/s12889-025-24897-1

Herzberg, M. P., & Smyser, C. D. (2024). Prenatal social determinants of health: Narrative review of maternal environments and neonatal brain development. *Paediatric Research*, *96*(6), 1417–1425. https://doi.org/10.1038/s41390-024-03345-7

Hill, J. P., & Lynch, M. E. (1983). The intensification of gender-related role expectations during early adolescence. In J. Brooks-Gunn & A. C. Petersen (Eds.), *Girls at puberty: Biological and psychosocial perspectives* (pp. 201–228). Plenum Press. https://doi.org/10.1007/978-1-4899-0354-9_10

Hobfoll, S.E. (2001), The Influence of Culture, Community, and the Nested-Self in the Stress Process: Advancing Conservation of Resources Theory. *Applied Psychology, 50*, 337-421. https://doi.org/10.1111/1464-0597.00062

Hofmann, S. G., Asnaani, A., Vonk, I. J. J., Sawyer, A. T., & Fang, A. (2012). The efficacy of cognitive behavioral therapy: A review of meta-analyses. *Cognitive Therapy and Research*, *36*(5), 427–440. https://doi.org/10.1007/s10608-012-9476-1

Holman, D., Salway, S., Bell, A., Beach, B., Adebajo, A., Ali, N., & Butt, J. (2021). Can intersectionality help with understanding and tackling health inequalities? Perspectives of professional stakeholders. *Health Research Policy and Systems*, *19*, Article 97. https://doi.org/10.1186/s12961-021-00742-w

Hou, B. (2025). Quality and outcomes framework achievement and unplanned admissions for cardiovascular disease. *BMC Health Services Research*, *25*, Article 1297. https://doi.org/10.1186/s12913-025-13227-1

Hutcheon, J. A., Chiolero, A., & Hanley, J. A. (2010). Random measurement error and regression dilution bias. *BMJ, 340*, c2289. https://doi.org/10.1136/bmj.c2289

Hussain, Y., & Bagguley, P. (2012). Securitised citizens: Islamophobia, racism and the 7/7 London bombings. *The Sociological Review*, *60*(4), 715–734. https://doi.org/10.1111/j.1467-954x.2012.02130.x

Huynh, J., Chien, J., Nguyen, A., & Honda, D. (2023). The mental health of Asian American adolescents and young adults amid the rise of anti-Asian racism. *Frontiers in Public Health*, *10,* Article 958517. https://doi.org/10.3389/fpubh.2022.958517

Igelström, E., Craig, P., Lewsey, J., Lynch, J., Pearce, A., & Katikireddi, S. V. (2022). Causal inference and effect estimation using observational data. *Journal of Epidemiology & Community Health*, *76*(11), 960–966. https://doi.org/10.1136/jech-2022-219267

Ilie, S., Sutherland, A., & Vignoles, A. (2017). Revisiting free school meal eligibility as a proxy for pupil socio-economic deprivation. *British Educational Research Journal*, *43*(2), 253–274. https://doi.org/10.1002/berj.3260

Inglis, G., Jenkins, P., McHardy, F., Sosu, E., & Wilson, C. (2023). Poverty stigma, mental health, and well-being: A rapid review and synthesis of quantitative and qualitative research. *Journal of Community & Applied Social Psychology*, *33*(4), 783–806. https://doi.org/10.1002/casp.2677

Iqbal, H., West, J., Haith-Cooper, M., & McEachan, R. R. C. (2021). A systematic review to identify research priority setting in Black and minority ethnic health and evaluate their processes. *PLOS ONE*, *16*(5), Article e0251685. https://doi.org/10.1371/journal.pone.0251685

Islamic Human Rights Commission. (2020). *Report on anti-Muslim hatred and discrimination*. IHRC at the United Nations. https://www.ohchr.org/sites/default/files/Documents/Issues/Religion/Islamophobia-AntiMuslim/Civil%20Society%20or%20Individuals/IslamicHumanRightsCommission.pdf

James, K. A., Stromin, J. I., Steenkamp, N., & Combrinck, M. I. (2023). Understanding the relationships between physiological and psychosocial stress, cortisol and cognition. *Frontiers in Endocrinology*, *14*, Article 1085950. https://doi.org/10.3389/fendo.2023.1085950

Jandaghian-Bidgoli, M., Kazemian, E., Shaterian, N., & Abdi, F. (2024). Focusing attention on the important association between food insecurity and psychological distress: A systematic review and meta-analysis. *BMC Nutrition*, *10*(1), Article 118. https://doi.org/10.1186/s40795-024-00922-1

Johnson, S. L., Leedom, L. J., & Muhtadie, L. (2012). The dominance behavioural system and psychopathology: Evidence from self-report, observational, and biological studies. *Psychological Bulletin*, *138*(4), 692–743. https://doi.org/10.1037/a0027503

Johnstone, L., & Boyle, M. (2018). The Power Threat Meaning Framework: An alternative nondiagnostic conceptual system. *Journal of Humanistic Psychology*. Advance online publication. https://doi.org/10.1177/0022167818793289

Johnstone, L., & Dallos, R. (2006). *Formulation in psychology and psychotherapy: Making sense of people's problems*. Routledge. https://doi.org/10.4324/9780203087268

Jones, N. L., Gilman, S. E., Cheng, T. L., Drury, S. S., Hill, C. V., & Geronimus, A. T. (2019). Life course approaches to the causes of health disparities. *American Journal of Public Health*, *109*(S1), S48–S53. https://doi.org/10.2105/ajph.2018.304738

Juster, R. P., & Misiak, B. (2023). Advancing the allostatic load model: From theory to therapy. *Psychoneuroendocrinology*, *154*, Article 106289. https://doi.org/10.1016/j.psyneuen.2023.106289

Kapadia, D., Zhang, J., Salway, S., Nazroo, J., Booth, A., Villarroel-Williams, N., Bécares, L., Esmail, A., Naqvi, H., & Race, N. (2022). *Ethnic inequalities in healthcare: A rapid evidence review*. NHS

Race and Health Observatory. https://www.nhsrho.org/wp-content/uploads/2023/05/RHO-Rapid-Review-Final-Report_.pdf

Kathawalla, U. K., & Syed, M. (2021). Discrimination, life stress, and mental health among Muslims: A preregistered systematic review and meta-analysis. *Collabra: Psychology*, *7*(1), Article 28248. https://doi.org/10.1525/collabra.28248

Ke, J., & Ford-Jones, E. L. (2015). Food insecurity and hunger: A review of the effects on children's health and behaviour. *Paediatrics & Child Health*, *20*(2), 89–91. https://doi.org/10.1093/pch/20.2.89

Kern, M. R., Duinhof, E. L., Walsh, S. D., Cosma, A., Moreno-Maldonado, C., Molcho, M., Currie, C., & Stevens, G. W. J. M. (2020). Intersectionality and adolescent mental well-being: A cross-nationally comparative analysis of the interplay between immigration background, socioeconomic status and gender. *Journal of Adolescent Health*, *66*(6), S12–S20. https://doi.org/10.1016/j.jadohealth.2020.02.013

Kerr, R., Lightfoot, K., Moss, R. H., Sawsaa, A., McEachan, R. R. C., & Dogra, S. (2025). "They're making the rich richer and the poor poorer": The UK cost of living crisis and social inequality. *Journal of Poverty*. Advance online publication. https://doi.org/10.1080/10875549.2025.2548774

Keyes, K. M., & Platt, J. M. (2023). Annual Research Review: Sex, gender, and internalizing conditions among adolescents in the 21st century—trends, causes, consequences. *Journal of Child Psychology and Psychiatry*, *65*(4), 384–407. https://doi.org/10.1111/jcpp.13864

Kilpela, L. S., Loera, T., Cuauro, S. E., & Becker, C. B. (2025). Midlife vulnerability and food insecurity in women: Increased risk of mental health concerns. *Nutrients*, *17*(15), Article 2486. https://doi.org/10.3390/nu17152486

King, D. K. (1988). Multiple jeopardy, multiple consciousness: The context of a Black feminist ideology. *Journal of Women in Culture and Society, 14*(1), 42–72. https://diversedynamics.wordpress.com/wp-content/uploads/2007/01/deborah-king.pdf

Kim, S., Lee, H., & Konlan, K. D. (2025). The recent trends in discrimination and health among ethnic minority adolescents: An integrative review. *BMC Public Health*, *25*(1), 1–13. https://doi.org/10.1186/s12889-025-21729-0

Kirkbride, J. B., Anglin, D. M., Colman, I., Dykxhoorn, J., Jones, P. B., Patalay, P., Pitman, A., Soneson, E., Steare, T., Wright, T., & Griffiths, S. L. (2024). The social determinants of mental health and disorder: Evidence, prevention and recommendations. *World Psychiatry*, *23*(1), 58–75. https://onlinelibrary.wiley.com/doi/pdf/10.1002/wps.21160

Kırşanlı, F. (2025). Whither inequality? *Review of Evolutionary Political Economy, 6,* 239–247. https://doi.org/10.1007/s43253-024-00120-6

Klaufus, L., Verlinden, E., van der Wal, M., Kösters, M., Cuijpers, P., & Chinapaw, M. (2020). Psychometric evaluation of two short versions of the Revised Child Anxiety and Depression Scale. *BMC Psychiatry*, *20*, Article 47. https://doi.org/10.1186/s12888-020-2444-5

Knight, A., O'Connell, R., & Brannen, J. (2018). Eating with friends, family or not at all: Young people's experiences of food poverty in the UK. *Children & Society*, *32*(3), 185–194. https://doi.org/10.1111/chso.12264

Knol, M. J., & VanderWeele, T. J. (2012). Recommendations for presenting analyses of effect modification and interaction. *International Journal of Epidemiology*, *41*(3), 514–520. https://doi.org/10.1093/ije/dyr218

Krieger, N. (2014). Discrimination and health inequities. *International Journal of Health Services*, *44*(4), 643–710. https://doi.org/10.2190/hs.44.4.b

Laraia, B. A. (2013). Food insecurity and chronic disease. *Advances in Nutrition*, *4*(2), 203–212. https://doi.org/10.3945/an.112.003277

Lausi, G. (2026). Discrimination and gender: An umbrella review of psychological evidence. *International Journal of Environmental Research and Public Health*, *23*(1), Article 103. https://doi.org/10.3390/ijerph23010103

Layte, R. (2011). The association between income inequality and mental health: Testing status anxiety, social capital, and neo-materialist explanations. *European Sociological Review*, *28*(4), 498–511. https://doi.org/10.1093/esr/jcr012

Lawrence, J. A., Kawachi, I., White, K., Bassett, M. T., & Williams, D. R. (2022). Associations between multiple indicators of discrimination and allostatic load among middle-aged adults. *Social science & medicine (1982)*, *298*, 114866. https://doi.org/10.1016/j.socscimed.2022.114866

Layte, R., McCrory, C., Cheallaigh, C. N., Bourke, N., Kivimaki, M., Ribeiro, A. I., Stringhini, S., & Vineis, P. (2019). A comparative analysis of the status anxiety hypothesis of socio-economic inequalities in health based on 18,349 individuals in four countries and five cohort studies. *Scientific Reports*, *9*(1), Article 796. https://doi.org/10.1038/s41598-018-37440-7

Lazarus, R. S., & Folkman, S. (1987). Transactional theory and research on emotions and coping. *European Journal of Personality*, *1*(3), 141–169. https://doi.org/10.1002/per.2410010304

Lears, T. J. J. (1985). The concept of cultural hegemony: Problems and possibilities. *The American Historical Review*, *90*(3), 567–593. https://doi.org/10.2307/1860957

Leung, C. W., Laraia, B. A., Feiner, C., Solis, K., Stewart, A. L., Adler, N. E., & Epel, E. S. (2022). The psychological distress of food insecurity: A qualitative study of the emotional experiences of parents and their coping strategies. *Journal of the Academy of Nutrition and Dietetics*, *122*(10), 1903–1910. https://doi.org/10.1016/j.jand.2022.05.010

Leve, L. D., Oro, V., Natsuaki, M. N., Harold, G. T., Neiderhiser, J. M., Ganiban, J. M., Shaw, D. S., & DeGarmo, D. S. (2024). The pernicious role of stress on intergenerational continuity of psychopathology. *Development and Psychopathology*, *36*(5), 2376-2389. https://doi.org/10.1017/s0954579424000191

Lewer, D., Jayatunga, W., Aldridge, R. W., Edge, C., Marmot, M., Story, A., & Hayward, A. (2020). Premature mortality attributable to socioeconomic inequality in England between 2003 and 2018: An observational study. *The Lancet Public Health*, *5*(1), e33–e41. https://doi.org/10.1016/s2468-2667(19)30219-1

Lewer, D., King, E., Bramley, G., Fitzpatrick, S., Treanor, M. C., Maguire, N., Bullock, M., Hayward, A., & Story, A. (2020). The ACE index: Mapping childhood adversity in England. *Journal of Public Health*, *42*(4), e487–e495. https://doi.org/10.1093/pubmed/fdz158

Liang, K., Chi, X., Chen, S. T., Clark, C. C. T., Zhang, Y., & Wang, J. (2021). Food insecurity and bullying victimization among 170,618 adolescents in 59 countries. *Frontiers in Psychiatry*, *12*, Article 766804. https://doi.org/10.3389/fpsyt.2021.766804

Link, B. G., & Phelan, J. (1995). Social conditions as fundamental causes of disease. *Journal of Health and Social Behaviour*, *35*(Suppl.), 80–94. https://doi.org/10.2307/2626958

Link, B. G., & Phelan, J. C. (2001). Conceptualizing stigma. *Annual Review of Sociology*, *27*(1), 363–385. https://doi.org/10.1146/annurev.soc.27.1.363

Liu, R. T., Anglin, D. M., Dyar, C., & Alvarez, K. (2023). Intersectional approaches to risk, resilience, and mental health in marginalized populations: Introduction to the special section. *Journal of Psychopathology and Clinical Science*, *132*(5), 527–530. https://doi.org/10.1037/abn0000840

Loopstra, R. (2024). Growth in UK children living in households with food insecurity. *BMJ*, *385*, Article q997. https://doi.org/10.1136/bmj.q997

Loopstra, R., & Tarasuk, V. (2013). Severity of household food insecurity is sensitive to change in household income and employment status among low-income families. *The Journal of Nutrition*, *143*(8), 1316–1323. https://doi.org/10.3945/jn.113.175414

Luthar, S. S., Cicchetti, D., & Becker, B. (2000). The construct of resilience: A critical evaluation and guidelines for future work. *Child Development*, *71*(3), 543–562. https://doi.org/10.1111/1467-8624.00164

Maina, B. W., Athero, S., Ziegel, L., Fine, S. L., & Kabiru, C. W. (2025). Poverty as a social determinant of mental health among young people: Qualitative findings across 13 countries. *Journal of Adolescent Health*, *77*(3), 444–451. https://doi.org/10.1016/j.jadohealth.2024.11.250

Marie, J., Wenzing, C., Schachner, K., & Gharaei, N. (2023). Ethno-religious discrimination and adjustment among Muslim adolescents: The promotive and protective roles of ethnic and religious identification. *European Journal of Developmental Psychology*. *21*(4), 520–539. https://doi.org/10.1080/17405629.2023.2285071

Marmot, M. (2004). *The status syndrome: How social standing affects our health and longevity*. Times Books.

The Marmot Review. (2010). *Fair society, healthy lives: Strategic review of health inequalities in England post-2010*. The Marmot Review Team. https://www.instituteofhealthequity.org/resources-reports/fair-society-healthy-lives-the-marmot-review/fair-society-healthy-lives-full-report-pdf.pdf

Marmot, M. (2017). Commentary: Social determinants and the health gap: Creating a social movement. *International Journal of Epidemiology*, *46*(4), 1335–1339. https://doi.org/10.1093/ije/dyx182

Marmot, M., Allen, J., Boyce, T., Goldblatt, P., & Morrison, J. (2020). *Health equity in England: The Marmot Review 10 years on*. The Health Foundation. https://www.health.org.uk/publications/reports/the-marmot-review-10-years-on

Maxwell, S. E., & Cole, D. A. (2007). Bias in cross-sectional analyses of longitudinal mediation: Theoretical pitfalls and recommendations. *Psychological Methods*, *12*(1), 23–44. https://doi.org/10.1037/1082-989X.12.1.23

Maynard, M., Andrade, L., Packull-McCormick, S., Perlman, C. M., Leos-Toro, C., & Kirkpatrick, S. I. (2018). Food insecurity and mental health among females in high-income countries. *International Journal of Environmental Research and Public Health*, *15*(7), Article 1424. https://doi.org/10.3390/ijerph15071424

McCartney, G., Dickie, E., Escobar, O., & Collins, C. (2021). Health inequalities, fundamental causes and power: Towards the practice of good theory. *Sociology of Health & Illness*, *43*(1), 20–39. https://doi.org/10.1111/1467-9566.13181

McCrory, C., McLoughlin, S., Layte, R., NiCheallaigh, C., O'Halloran, A. M., Barros, H., Berkman, L. F., Bochud, M., Crimmins, E. M., Farrell, M. T., Fraga, S., Grundy, E., Kelly-Irving, M., Petrovic, D., Seeman, T., Stringhini, S., Vollenweider, P., & Kenny, R. A. (2023). Towards a consensus definition of allostatic load: A multi-cohort, multi-system, multi-biomarker individual participant data (IPD) meta-analysis. *Psychoneuroendocrinology*, *153*, Article 106117. https://doi.org/10.1016/j.psyneuen.2023.106117

McEachan, R. (2019). *Born in Bradford: 10 key findings for policy and practice*. Born in Bradford. https://borninbradford.nhs.uk/wp-content/uploads/2024/10/10-Key-Findings-for-policy-and-practice-2019.pdf

McEwen, B. S. (1998). Protective and damaging effects of stress mediators. *The New England Journal of Medicine*, *338*(3), 171–179. https://doi.org/10.1056/nejm199801153380307

McEwen, B. S., & Stellar, E. (1993). Stress and the individual: Mechanisms leading to disease. *Archives of Internal Medicine*, *153*(18), 2093–2101. https://doi.org/10.1001/archinte.1993.00410180039004

McEwen, C. A., & Gregerson, S. F. (2019). A critical assessment of the Adverse Childhood Experiences study at 20 years. *American Journal of Preventive Medicine*, *56*(6), 790–794. https://doi.org/10.1016/j.amepre.2018.10.016

Melita, D., Willis, G. B., & Rodríguez-Bailón, R. (2021). Economic inequality increases status anxiety through perceived contextual competitiveness. *Frontiers in Psychology*, *12*, Article 637365. https://doi.org/10.3389/fpsyg.2021.637365

Melita, D., García Sánchez, E., Willis, G. B., Petkanopoulou, K., Castro, D. G., Rosa, M., & Bailón, R. (2025). Inequality and status anxiety: Bad allies of health and well-being, but not for everyone: The role of ideologies, socioeconomic status, and economic threat. *Social Indicators Research*, *179*(3), 1165–1196. https://doi.org/10.1007/s11205-025-03656-0

Menard, S. (2001). *Applied logistic regression analysis* (2nd ed.). Sage Publications.

Mengelkoch, S., Gassen, J., Lev-Ari, S., Alley, J. C., Rose, S. F., Snyder, M. P., & Slavich, G. M. (2024). Multi-omics in stress and health research: Study designs that will drive the field forward. *Stress*, *27*(1), Article 2321610. https://doi.org/10.1080/10253890.2024.2321610

Métais, C., Burel, N., Gillham, J. E., Tarquinio, C., & Martin-Krumm, C. (2022). Integrative review of the recent literature on human resilience: From concepts, theories, and discussions towards a complex understanding. *Europe's Journal of Psychology*, *18*(1), 98–119. https://doi.org/10.5964/ejop.2251

Miall, N., Pearce, A., Moore, J. C., Benzeval, M., & Green, M. J. (2023). Inequalities in children's mental health before and during the COVID-19 pandemic: findings from the UK Household Longitudinal Study. *Journal of epidemiology and community health*, *77*(12), 762–769. https://doi.org/10.1136/jech-2022-220188

Miller, H. N., LaFave, S., Marineau, L., Stephens, J., & Thorpe, R. J. (2021). The impact of discrimination on allostatic load in adults: An integrative review of literature. *Journal of Psychosomatic Research*, *146*, Article 110434. https://doi.org/10.1016/j.jpsychores.2021.110434

Minh Nguyen, T., Anh Quang Tran, M., & Nguyen Hoang Le, G. (2023). Psychometric validation of the Brief Resilience Scale in the sample of Vietnamese university student. *Journal of American College Health*. *38*(3), 648–663 https://doi.org/10.1080/87568225.2023.2231348

Ministry of Housing, Communities & Local Government. (2025). *English indices of deprivation 2025: Statistical release*. GOV.UK. https://www.gov.uk/government/statistics/english-indices-of-deprivation-2025/english-indices-of-deprivation-2025-statistical-release

Minton, J., Fletcher, E., Ramsay, J., Little, K., & McCartney, G. (2020). How bad are life expectancy trends across the UK, and what would it take to get back to previous trends? *Journal of Epidemiology and Community Health*, *74*(9), 741–746. https://doi.org/10.1136/jech-2020-213870

Moy, J. H., Khan, U. A., Ong, W. J., & Barnes, C. M. (2026). The effects of food insecurity on work outcomes. *Journal of Applied Psychology*. Advance online publication. https://doi.org/10.1037/apl0001361

Mudd, A. L., Bal, M., Verra, S. E., Poelman, M. P., De Wit, J., & Kamphuis, C. B. M. (2024). The current state of complex systems research on socioeconomic inequalities in health and health behaviour—A systematic scoping review. *International Journal of Behavioural Nutrition and Physical Activity*, *21*(1), Article 13. https://doi.org/10.1186/s12966-024-01562-1

Muscatell, K. A., Alvarez, G. M., Bonar, A. S., Cardenas, M. N., Galvan, M. J., Merritt, C. C., & Starks, M. D. (2022). Brain-body pathways linking racism and health. *American Psychologist*, *77*(9), 1049–1060. https://doi.org/10.1037/amp0001084

Muslim Mind Collaborative. (2025). *Mental health in UK Muslim communities: A call to action*. Retrieved May 22, 2026, from https://muslimmindcollaborative.co.uk/resources/

Negriff, S., Gordis, E. B., & Peckins, M. K. (2025). Hypothalamic-pituitary-adrenal axis recalibration during puberty among maltreated youth: The role of caregiver depression. *Journal of Adolescent Health*, *77*(5), 884–893. https://doi.org/10.1016/j.jadohealth.2025.06.035

Nelson, C. A., Scott, R. D., Bhutta, Z. A., Harris, N. B., Danese, A., & Samara, M. (2020). Adversity in childhood is linked to mental and physical health throughout life. *The BMJ*, *371*, Article m3048. https://doi.org/10.1136/bmj.m3048

NHS England. (2019a). *The community mental health framework for adults and older adults*. https://www.england.nhs.uk/wp-content/uploads/2019/09/community-mental-health-framework-for-adults-and-older-adults.pdf

NHS England. (2019b). *The NHS Long Term Plan*. https://www.longtermplan.nhs.uk/

Nieminen, P. (2022). Application of standardized regression coefficient in meta-analysis. *BioMedInformatics*, *2*(3), 434–458. https://doi.org/10.3390/biomedinformatics2030028

Nikolić, M., Hannigan, L. J., Krebs, G., Sterne, A., Gregory, A. M., & Eley, T. C. (2021). Aetiology of shame and its association with adolescent depression and anxiety: Results from a prospective twin and sibling study. *Journal of Child Psychology and Psychiatry*, *62*(11), 1345–1354. https://doi.org/10.1111/jcpp.13465

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). McGraw-Hill.

Obama, B. (2014, December 4). *Remarks by the President on economic mobility and growing inequality*. The White House Office of the Press Secretary.

O'Connor, D. B., Thayer, J. F., & Vedhara, K. (2021). Stress and health: A review of psychobiological processes. *Annual Review of Psychology*, *72*(1), 663–688. https://doi.org/10.1146/annurev-psych-062520-122331

Office for Health Improvement and Disparities. (n.d.). *Public Health Outcomes Framework: At a glance summary*. Retrieved May 9, 2026, from https://fingertips.phe.org.uk/static-reports/public-health-outcomes-framework/at-a-glance/e08000032.html?area-name=bradford

Office for National Statistics. (2023). *How life has changed in Bradford: Census 2021*. https://www.ons.gov.uk/census/maps/choropleth/identity/religion/religion-tb/muslim

Orth, Z., & van Wyk, B. (2022). Rethinking mental wellness among adolescents: An integrative review protocol of mental health components. *Systematic Reviews*, *11*(1), Article 84. https://doi.org/10.1186/s13643-022-01961-0

O'Shields, J., Mowbray, O., & Patel, D. (2022). Allostatic load as a mediator of childhood maltreatment and adulthood depressive symptoms: A longitudinal analysis.

Psychoneuroendocrinology, *143*, Article 105839. https://doi.org/10.1016/j.psyneuen.2022.105839

Panter-Brick, C., & Leckman, J. F. (2013). Resilience in child development—Interconnected pathways to wellbeing. *Journal of Child Psychology and Psychiatry*, *54*(4), 333–336. https://doi.org/10.1111/jcpp.12057

Patel, V., Burns, J. K., Dhingra, M., Tarver, L., Kohrt, B. A., & Lund, C. (2018). Income inequality and depression: A systematic review and meta-analysis of the association and a scoping review of mechanisms. *World Psychiatry*, *17*(1), 76–89. https://doi.org/10.1002/wps.20492

Pearlin, L. I. (2010). The life course and the stress process: Some conceptual comparisons. *The Journals of Gerontology: Series B*, *65B*(2), 207–215. https://doi.org/10.1093/geronb/gbp106

Pearlin, L. I., Schieman, S., Fazio, E. M., & Meersman, S. C. (2005). Stress, health, and the life course: Some conceptual perspectives. *Journal of Health and Social Behaviour*, *46*(2), 205–219. https://doi.org/10.1177/002214650504600206

Perrin, P. B., Sutter, M. E., Trujillo, M. A., Henry, R. S., & Pugh, M. (2020). The minority strengths model: Development and initial path analytic validation in racially/ethnically diverse LGBTQ individuals. *Journal of Clinical Psychology*, *76*(1), 118–136. https://doi.org/10.1002/jclp.22850

Petruccelli, K., Davis, J., & Berman, T. (2019). Adverse childhood experiences and associated health outcomes: A systematic review and meta-analysis. *Child Abuse & Neglect*, *97* Article 104127. https://doi.org/10.1016/j.chiabu.2019.104127

Phelan, J. C., Link, B. G., & Tehranifar, P. (2010). Social conditions as fundamental causes of health inequalities: Theory, evidence, and policy implications. *Journal of Health and Social Behaviour*, *51*(suppl.), S28–S40. https://doi.org/10.1177/0022146510383498

Pi Ferrer, L., Selvam, R. M., & Cavallotti, R. (2025). Resilience through a multisystemic perspective: Analysing individual, family, and community systems. *Current Psychology*, *44*(8), 7651–7664. https://doi.org/10.1007/s12144-025-07462-2

Pickavance, J., Badrick, E., Jackson, L., Mirza, Z., Ryan, D., Santorelli, G., Shire, K., Mason, D., Wright, J., & McEachan, R. (2025). BiB: Age of Wonder data release. *Welcome Open Research*, *10*, Article 671. https://doi.org/10.12688/wellcomeopenres.25296.1

Pickett, K. E., Ajebon, M., Hou, B., Kelly, B., Bird, P. K., Dickerson, J., Shire, K., McIvor, C., Mon-Williams, M., Small, N., McEachan, R., Wright, J., & Lawlor, D. (2022). Vulnerabilities in child well-being among primary school children: A cross-sectional study in Bradford, UK. *BMJ Open*, *12*(6), Article e049416. https://doi.org/10.1136/bmjopen-2021-049416

Pickett, K. E., Vafai, Y., Mathai, M., & Small, N. (2021). The social determinants of child health and inequalities in child health. *Paediatrics and Child Health*, *32*(3), 88–94. https://doi.org/10.1016/j.paed.2021.12.003

Pickett, K. E., & Wilkinson, R. G. (2015). Income inequality and health: A causal review. *Social Science & Medicine*, *128*, 316–326. https://doi.org/10.1016/j.socscimed.2014.12.031

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioural research: A critical review of the literature and recommended remedies. *The Journal of Applied Psychology*, *88*(5), 879–903. https://doi.org/10.1037/0021-9010.88.5.879

Polsky, L. R., Rentscher, K. E., & Carroll, J. E. (2022). Stress-induced biological aging: A review and guide for research priorities. *Brain, Behaviour, and Immunity*, *104*, 97–109. https://doi.org/10.1016/j.bbi.2022.05.016

Porges, S. W. (2022). Polyvagal theory: A science of safety. *Frontiers in Integrative Neuroscience*, *16*, Article 871227. https://doi.org/10.3389/fnint.2022.871227

Pourmotabbed, A., Moradi, S., Babaei, A., Ghavami, A., Mohammadi, H., Jalili, C., Symonds, M. E., & Miraghajani, M. (2020). Food insecurity and mental health: A systematic review and meta-analysis. *Public Health Nutrition*, *23*(10), 1778–1790. https://doi.org/10.1017/s136898001900435x

Power, M., & Baxter, M. (2026). Free and equal? The realities of lived experiences of food aid in the UK. *Journal of Social Policy*, 1–17. https://doi.org/10.1017/s0047279425101256

Power, M., Doherty, B., Small, N., Teasdale, S., & Pickett, K. E. (2017). All in it together? Community food aid in a multi-ethnic context. *Journal of Social Policy*, *46*(3), 447–471. https://doi.org/10.1017/s0047279417000010

Power, M., Kelly, B., & Pickett, K. E. (2020). Food insecurity and mental health: An analysis of routine primary care data of pregnant women in the Born in Bradford Cohort. *Journal of Epidemiology and Community Health*, *74*(8), 706–712. https://doi.org/10.1136/jech-2016-207799

Power, M., & Small, N. (2022). Disciplinary and pastoral power, food and poverty in late-modernity. *Critical Social Policy*, *42*(1), 43–63. https://doi.org/10.1177/0261018321999799

Power, M., Small, N., & Doherty, B. (2018). Hidden hunger? Experiences of food insecurity amongst Pakistani and White British women. *British Food Journal*, *120*(12), 2716–2732. https://doi.org/10.1108/bfj-06-2018-0342

Power, M., Small, N., Pickett, K., Rutherford, C., Hill, J., Sharp, H., & Taylor-Robinson, D. (2017). Shame: Experiences of food and poverty among White British and Pakistani low-income women. *Journal of Epidemiology and Community Health*, *71*(Suppl 1), A11. https://doi.org/10.1136/jech-2017-ssmabstracts.20

Power, M., Uphoff, E. P., Stewart-Knox, B., Small, N., Doherty, B., & Pickett, K. E. (2018). Food insecurity and socio-demographic characteristics in two UK ethnic groups: An analysis of women in the Born in Bradford cohort. *Journal of Public Health*, *40*(1), 32–40. https://doi.org/10.1093/pubmed/fdx029

Power, M., Yang, T., Pybus, K., & Tajik, B. (2025). Association between food insecurity, ethnicity, and mental health in the UK: An analysis of the Family Resource Survey. *Plos one*, *20*(10), e0332762. https://doi.org/10.1371/journal.pone.0332762

Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behaviour Research Methods, Instruments, & Computers*, *36*(4), 717–731. https://doi.org/10.3758/bf03206553

Priess, H. A., Lindberg, S. M., & Hyde, J. S. (2009). Adolescent gender-role identity and mental health: Gender intensification revisited. *Child Development*, *80*(5), 1531–1544. https://doi.org/10.1111/j.1467-8624.2009.01349.x

Priest, N., Paradies, Y., Trenerry, B., Truong, M., Karlsen, S., & Kelly, Y. (2013). A systematic review of studies examining the relationship between reported racism and health and wellbeing for children and young people. *Social Science & Medicine*, *95*, 115–127. https://doi.org/10.1016/j.socscimed.2012.11.031

Public Health England. (2017). *Psychosocial pathways and health outcomes: Informing action on health inequalities*. Institute of Health Equity. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/647709/Psychosocial_pathways_and_health_equity.pdf

Public Health England. (2020). *Bradford health profile*. https://fingertips.phe.org.uk/static-reports/health-profiles/2019/e08000032.html?area-name=bradford

Public Health England. (2022). *Health disparities and health inequalities: Applying All Our Health*. GOV.UK. https://www.gov.uk/government/publications/all-our-health-about-the-framework

Purdam, K., Garratt, E. A., & Esmail, A. (2016). Hungry? Food insecurity, social stigma and embarrassment in the UK. *Sociology*, *50*(6), 1072–1088. https://doi.org/10.1177/0038038515594092

Rahman, L. (2025). Contributions of Islamic belief and spiritual well-being and mental health on Muslim adolescents: A literature review. *International Journal of Psychiatry*, *10*(1), 1–4. https://doi.org/10.33140/ijp.10.01.04

R Core Team. (2024). *R: A language and environment for statistical computing* (Version 4.5.2) [Computer software]. R Foundation for Statistical Computing. https://www.r-project.org/

Reducing Inequalities Alliance. (2023). *Reducing Inequalities Alliance report*. Bradford District and Craven Health and Care Partnership. https://bdcpartnership.co.uk/wp-content/uploads/2023/10/Annual-report-v2-FINAL.docx

Reuter, M., Diehl, K., Richter, M., Sundmacher, L., Hövener, C., Spallek, J., & Dragano, N. (2024). A longitudinal analysis of health inequalities from adolescence to young adulthood and their underlying causes. *Advances in Life Course Research*, *59*, Article 100593. https://doi.org/10.1016/j.alcr.2024.100593

Riley A. R. (2018). Neighborhood Disadvantage, Residential Segregation, and Beyond-Lessons for Studying Structural Racism and Health. *Journal of racial and ethnic health disparities*, *5*(2), 357–365. https://doi.org/10.1007/s40615-017-0378-5

Robinson, M. N., & Thomas Tobin, C. S. (2021). Is John Henryism a health risk or resource?: Exploring the role of culturally relevant coping for physical and mental health among Black Americans. *Journal of Health and Social Behaviour*, *62*(2), 136–151. https://doi.org/10.1177/00221465211009142

Rodriguez, J. M., Karlamangla, A. S., Gruenewald, T. L., Miller-Martinez, D., Merkin, S. S., & Seeman, T. E. (2020). Social stratification and allostatic load: Shapes of health differences in the MIDUS study in the United States. *Journal of Biosocial Science*, *51*(5), 627–644. https://doi.org/10.1017/s0021932018000378

Romeo, R. D. (2013). The teenage brain: The stress response and the adolescent brain. *Current Directions in Psychological Science*, *22*(2), 140–145. https://doi.org/10.1177/0963721413475445

Rösner, C., Tüscher, O., & Petrowski, K. (2024). Resilience as a predictor of habituation. *European Archives of Psychiatry and Clinical Neuroscience*, *274*(7), 1615–1623. https://doi.org/10.1007/s00406-023-01658-y

Routen, A., Bodicoat, D., Willis, A., Treweek, S., Paget, S., & Khunti, K. (2022). Tackling the lack of diversity in health research. *British Journal of General Practice*, *72*(722), 444–447. https://doi.org/10.3399/bjgp22x720665

Routen, A., Lekas, H. M., Harrison, J., & Khunti, K. (2023). Intersectionality in health equity research: Overlapping systems of discrimination must be tackled together. *BMJ*, *383*, Article p2953. https://doi.org/10.1136/bmj.p2953

RStudio Team. (2024). *RStudio: Integrated development environment for R* (Version 2026.1.0.392) [Computer software]. Posit Software, PBC. https://posit.co/

Russell, J. D., Heyn, S. A., Peverill, M., DiMaio, S., & Herringa, R. J. (2024). Traumatic and adverse childhood experiences and developmental differences in psychiatric risk. *JAMA Psychiatry*. *82*(1). 66–74.. https://doi.org/10.1001/jamapsychiatry.2024.3231

Rutter, M. (2012). Resilience as a dynamic concept. *Development and Psychopathology*, *24*(2), 335–344. https://doi.org/10.1017/s0954579412000028

Ryan, D., West, J., Shire, K., Iqbal, H., Cartwright, C., Worcester, M., Roper, E., Amini, N., Haith-Cooper, M., Mon-Williams, M., Wright, J., & McEachan, R. R. C. (2024). Ready, set, co(produce): a co-operative inquiry into co-producing research to explore adolescent health and wellbeing in the Born in Bradford Age of Wonder project. *Research Involvement and Engagement*, *10*, Article 41. https://doi.org/10.1186/s40900-024-00578-y

Santorelli, G., Lewer, D., Nirantharakumar, K., Lee, S. I., Phillips, K., McEachan, R. R. C., & Wright, J. (2024). The emergence of common health conditions across the life course: Evidence from the Born in Bradford family cohort. *Wellcome Open Research*, *9*, Article 210. https://doi.org/10.12688/wellcomeopenres.20992.1

Sapolsky, R. M. (2015). Stress and the brain: Individual variability and the inverted-U. *Nature Neuroscience*, *18*(10), 1344–1346. https://www.nature.com/articles/nn.4109

Sawyer, S. M., Azzopardi, P. S., Wickremarathne, D., & Patton, G. C. (2018). The age of adolescence. *The Lancet Child & Adolescent Health*, *2*(3), 223–228. https://doi.org/10.1016/s2352-4642(18)30022-1

Schäfer, S. K., Supke, M., Kausmann, C., Schaubruch, L. M., Lieb, K., & Cohrdes, C. (2024). A systematic review of individual, social, and societal resilience factors in response to societal challenges and crises. *Communications Psychology*, *2*(1), Article 92. https://doi.org/10.1038/s44271-024-00138-w

Schetter, C. D., Schafer, P., Lanzi, R. G., Clark-Kauffman, E., Raju, T. N. K., & Hillemeier, M. M. (2013). Shedding light on the mechanisms underlying health disparities through community participatory methods: The stress pathway. *Perspectives on Psychological Science*, *8*(6), 613–633. https://doi.org/10.1177/1745691613506016

Schisterman, E. F., Cole, S. R., & Platt, R. W. (2009). Overadjustment bias and unnecessary adjustment in epidemiologic studies. *Epidemiology*, *20*(4), 488–495. https://doi.org/10.1097/ede.0b013e3181a819a1

Schmitt, M. T., Postmes, T., Branscombe, N. R., & Garcia, A. (2014). The consequences of perceived discrimination for psychological well-being: A meta-analytic review. *Psychological Bulletin*, *140*(4), 921–948. https://doi.org/10.1037/a0035754

Shankar, P., Chung, R., & Frank, D. A. (2017). Association of food insecurity with children's behavioral, emotional, and academic outcomes: A systematic review. *Journal of Developmental and Behavioural Paediatrics*, *38*(2), 135–150. https://doi.org/10.1097/dbp.0000000000000383

Shinwell, J., & Defeyter, M. A. (2021). Food insecurity: A constant factor in the lives of low-income families in Scotland and England. *Frontiers in Public Health*, *9*, Article 588254. https://doi.org/10.3389/fpubh.2021.588254

Shire, K. A., Newsham, A., Rahman, A., Mason, D., Ryan, D., Lawlor, D. A., Opio-Te, G., Nutting, H., West, J., Pickavance, J., Dickerson, J., Pickett, K. E., Lennon, L., Gunning, L., Mon-Williams, M., Smith, S., Gilbody, S., Dogra, S., Walsh, T., & Wright, J. (2024). Born in Bradford's Age of Wonder cohort: Protocol for adolescent data collection. *Wellcome Open Research*, *9*, Article 20785. https://doi.org/10.12688/wellcomeopenres.20785.1

Shonkoff, J. P., Garner, A. S., Siegel, B. S., Dobbins, M. I., Earls, M. F., McGuinn, L., Pascoe, J., & Wood, D. L. (2012). The lifelong effects of early childhood adversity and toxic stress. *Paediatrics*, *129*(1), e232–e246. https://doi.org/10.1542/peds.2011-2663

Simonovich, S. D., Pineros-Leano, M., Ali, A., Awosika, O., Herman, A., Withington, M. H. C., Loiacono, B., Cory, M., Estrada, M., Soto, D., & Buscemi, J. (2020). A systematic review examining the relationship between food insecurity and early childhood physiological health outcomes. *Translational Behavioural Medicine*, *10*(5), 1086–1097. https://doi.org/10.1093/tbm/ibaa021

Singer, J. M. (2025). Central limit theorems. In *International encyclopaedia of statistical science* (pp. 442–450). Springer. https://doi.org/10.1007/978-3-662-69359-9_100

Sisk, C. L., & Romeo, R. D. (2019). Stress and the adolescent brain: The perfect storm. In *Coming of age: Neurodevelopmental perspectives on adolescence* (pp. 96–119). Oxford University Press. https://doi.org/10.1093/oso/9780195314373.003.0007

Skarda, I., Cookson, R., & Gilbert, R. (2025). Does household income predict health and educational outcomes in childhood better than neighbourhood deprivation? *Journal of Public Health*, *47*(1), 62–73. https://doi.org/10.1093/pubmed/fdae283

Smith, B. W., Dalen, J., Wiggins, K., Tooley, E., Christopher, P., & Bernard, J. (2008). The Brief Resilience Scale: Assessing the ability to bounce back. *International Journal of Behavioural Medicine*, *15*(3), 194–200. https://doi.org/10.1080/10705500802222972

Sparling, T. M., Deeney, M., Cheng, B., Han, X., Lier, C., Lin, Z., Offner, C., Santoso, M. V., Pfeiffer, E., Emerson, J. A., Amadi, F. M., Mitu, K., Corvalan, C., Verdeli, H., Araya, R., & Kadiyala, S. (2022). Systematic evidence and gap map of research linking food security and nutrition to mental health. *Nature Communications*, *13*(1), Article 4608. https://doi.org/10.1038/s41467-022-32116-3

Stainton, A., Chisholm, K., Kaiser, N., Rosen, M., Upthegrove, R., Ruhrmann, S., & Wood, S. J. (2019). Resilience as a multimodal dynamic process. *Early Intervention in Psychiatry*, *13*(4), 725–732. https://doi.org/10.1111/eip.12726

Starck, J. G., Riddle, T., Sinclair, S., & Warikoo, N. (2020). Teachers are people too: Examining the racial bias of teachers compared to other American adults. *Educational Researcher*, *49*(4), 273–284. https://doi.org/10.3102/0013189X20912758

Steare, T., Lewis, G., Evans-Lacko, S., Pitman, A., Rose-Clarke, K., & Patalay, P. (2024). Food insecurity, adolescent suicidal thoughts and behaviours, and country-level context: A multi-country cross-sectional analysis. *Journal of Adolescent Health*, *74*(3), 545–555. https://doi.org/10.1016/j.jadohealth.2023.10.018

Stevanovic, D., Bagheri, Z., Atilola, O., Vostanis, P., Stupar, D., Moreira, P., Franic, T., Davidovic, N., Knez, R., Nikšić, A., Dodig-Curković, K., Avicenna, M., Multazam Noor, I., Nussbaum, L., Deljkovic, A., Aziz Thabet, A., Petrov, P., Ubalde, D., Monteiro, L. A., & Ribas, R. (2016). Cross-cultural measurement invariance of the Revised Child Anxiety and Depression Scale across 11 world-wide societies. *Epidemiology and Psychiatric Sciences*, *26*(4), 430–440. https://doi.org/10.1017/s204579601600038x

Stevens, A. J. (2019). *Health needs assessment of adverse childhood experiences in Bradford*. Bradford Joint Strategic Needs Assessment. https://jsna.bradford.gov.uk/media/wfbjghiv/adverse-childhood-experiences-2019.pdf

Stewart, K. (2018). *Bradford integration / cohesion data*. City of Bradford Metropolitan District Council. https://bradfordforeveryone.co.uk/wp-content/uploads/2020/01/bradford_data_pack.pdf

Stickley, T. (2023). What a year that was: Some thoughts on health inequalities and publishing WEIRD articles. *Perspectives in Public Health*, *143*(1), 2–3. https://doi.org/10.1177/17579139221147717

Stopforth, S., Kapadia, D., Nazroo, J., & Bécares, L. (2022). The enduring effects of racism on health: Understanding direct and indirect effects over time. *SSM - Population Health*, *19*, Article 101217. https://doi.org/10.1016/j.ssmph.2022.101217

Struck, S., Stewart-Tufescu, A., Asmundson, A. J. N., Asmundson, G. G. J., & Afifi, T. O. (2021). Adverse childhood experiences (ACEs) research: A bibliometric analysis of publication trends over the first 20 years. *Child Abuse & Neglect*, *112*, Article 104895. https://doi.org/10.1016/j.chiabu.2020.104895

Suglia, S. F., Shelton, R. C., Factor-Litvak, P., Kezios, K., Batayeh, B., Cirillo, P., Cohn, B., & Link, B. (2025). Stress across the lifecourse and adult mental and physical health outcomes. *Annals of Behavioural Medicine*, *59*(1), Article kaaf001. https://doi.org/10.1093/abm/kaaf001

Tell MAMA. (2025). *The new norm of anti-Muslim hate: Tell MAMA report 2025*. Faith Matters. https://tellmamauk.org/wp-content/uploads/pdf/TheNewNormofAnti-MuslimHate-TellMAMAReport2025.pdf

Tetteh, J., Ekem-Ferguson, G., Nii-Boye Quarshie, E., Dwomoh, D., Swaray, M., Otchi, E., Adomako, I., Quansah, H., & Yawson, A. E. (2024). Food insecurity and its impact on substance use and suicidal behaviours among school-going adolescents in Africa: Evidence from the Global School-Based Student Health Survey. *European Child & Adolescent Psychiatry*, *33*(2), 467–480. https://doi.org/10.1007/s00787-023-02168-x

The Health Foundation. (2023). Map of healthy life expectancy at birth. *The Health Foundation Briefing.* https://www.health.org.uk/evidence-hub/health-inequalities/map-of-healthy-life-expectancy-at-birth

Thoits, P. A. (2010). Stress and health: Major findings and policy implications. *Journal of Health and Social Behaviour*, *51*(1_suppl), S41–S53. https://doi.org/10.1177/0022146510383499

Tingley, D., Yamamoto, T., Hirose, K., Keele, L., & Imai, K. (2014). mediation: R package for causal mediation analysis. *Journal of Statistical Software*, *59*(5), 1–38. http://www.jstatsoft.org/v59/i05/

Traviss, G. D., West, R. M., & House, A. O. (2012). Maternal mental health and its association with infant growth at 6 months in ethnic groups: Results from the Born-in-Bradford birth cohort study. *PLOS ONE*, *7*(2), Article e30707. https://doi.org/10.1371/journal.pone.0030707

Turner, R. J. (2010). Understanding health disparities: The promise of the stress process model. In W. Avison, C. Aneshensel, S. Schieman, & B. Wheaton (Eds.), *Advances in the conceptualization of the stress process: Essays in honour of Leonard I. Pearlin* (pp. 3–21). Springer. https://doi.org/10.1007/978-1-4419-1021-9_1

Turner, R. J. (2013). Understanding health disparities: The relevance of the stress process model. *Society and Mental Health*, *3*(3), 170–186. https://doi.org/10.1177/2156869313488121

Ungar, M. (2013). Resilience, trauma, context, and culture. *Trauma, Violence, & Abuse*, *14*(3), 255–266. https://doi.org/10.1177/1524838013487805

Ungar, M., & Theron, L. (2020). Resilience and mental health: How multisystemic processes contribute to positive outcomes. *The Lancet Psychiatry*, *7*(5), 441–448. https://doi.org/10.1016/s2215-0366(19)30434-1

UNICEF Office of Research – Innocenti. (2025). *Child wellbeing in an unpredictable world* (Report Card 19). UNICEF. https://www.unicef.org/innocenti/reports/child-well-being-unpredictable-world

United Nations. (1948). *Universal declaration of human rights*. https://digitallibrary.un.org/record/666853

Vaccarino, V., Prescott, E., Shah, A. J., Bremner, J. D., Raggi, P., Dobiliene, O., Gale, C. P., & Bugiardini, R. (2025). Mental health disorders and their impact on cardiovascular health disparities. *The Lancet Regional Health - Europe*, *56*, Article 101373. https://doi.org/10.1016/j.lanepe.2025.101373

Vaidya, N., Marquand, A. F., Nees, F., Siehl, S., & Schumann, G. (2024). The impact of psychosocial adversity on brain and behaviour: An overview of existing knowledge and directions for

future research. *Molecular Psychiatry*, *29*(10), 3245–3267. https://doi.org/10.1038/s41380-024-02556-y

van Zwieten, A., Dai, J., Blyth, F. M., Wong, G., & Khalatbari-Soltani, S. (2024). Overadjustment bias in systematic reviews and meta-analyses of socio-economic inequalities in health: A meta-research scoping review. *International Journal of Epidemiology*, *53*(1), Article 177. https://doi.org/10.1093/ije/dyad177

VanderWeele, T. J. (2009). Commentary: On the relative nature of overadjustment and unnecessary adjustment. *Epidemiology*, *20*(4), 496–499. https://doi.org/10.1097/ede.0b013e3181a82f12

Vyas, A., Mitra, R., Shankaranarayana Rao, B. S., & Chattarji, S. (2002). Chronic stress induces contrasting patterns of dendritic remodelling in hippocampal and amygdaloid neurons. *Journal of Neuroscience*, *22*(15), 6810–6818. https://doi.org/10.1523/jneurosci.22-15-06810.2002

Walker, E. R., McGee, R. E., & Druss, B. G. (2015). Mortality in mental disorders and global disease burden implications: A systematic review and meta-analysis. *JAMA Psychiatry*, *72*(4), 334–341. https://doi.org/10.1001/jamapsychiatry.2014.2502

Wami, W., McCartney, G., Bartley, M., Buchanan, D., Dundas, R., Katikireddi, S. V., Mitchell, R., & Walsh, D. (2020). Theory driven analysis of social class and health outcomes using UK nationally representative longitudinal data. *International Journal for Equity in Health*, *19*, Article 193. https://doi.org/10.1186/s12939-020-01302-4

Webster, E. M. (2022). The impact of adverse childhood experiences on health and development in young children. *Global Paediatric Health*, *9*. https://doi.org/10.1177/2333794x221078708

Wilkinson, R., & Marmot, M. (2003). *Social determinants of health: The solid facts* (2nd ed.). World Health Organization Regional Office for Europe. https://iris.who.int/items/41fe3a4a-cd63-4ce9-a1bd-495f978e612c

Wilkinson, R. G., & Pickett, K. E. (2006). Income inequality and population health: A review and explanation of the evidence. *Social Science & Medicine*, *62*(7), 1768–1784. https://doi.org/10.1016/j.socscimed.2005.08.036

Wilkinson, R. G., & Pickett, K. E. (2009). *The spirit level: Why more equal societies almost always do better*. Penguin Books.

Wilkinson, R. G., & Pickett, K. E. (2015). Income inequality and health: A causal review. *Social Science & Medicine*, *128*, 316–326. https://doi.org/10.1016/j.socscimed.2014.12.031

Wilkinson, R. G., & Pickett, K. E. (2017). The enemy between us: The psychological and social costs of inequality. *European Journal of Social Psychology*, *47*(1), 11–24. https://doi.org/10.1002/ejsp.2275

Williams, D. R. (2018). Stress and the mental health of populations of colour: Advancing our understanding of race-related stressors. *Journal of Health and Social Behaviour*, *59*(4), 466–485. https://doi.org/10.1177/0022146518814251

Williams, D. R., Lawrence, J. A., & Davis, B. A. (2019). Racism and health: Evidence and needed research. *Annual Review of Public Health*, *40*(1), 105–130. https://doi.org/10.1146/annurev-publhealth-040218-043750

Williams, D. R., Lawrence, J. A., Davis, B. A., & Vu, C. (2019). Understanding how discrimination can affect health. *Health Services Research*, *54*(Suppl 2), 1374–1388. https://doi.org/10.1111/1475-6773.13222

Williams, D. R., & Mohammed, S. A. (2013). Racism and health I: Pathways and scientific evidence. *American Behavioural Scientist*, *57*(8), 1152–1173. https://doi.org/10.1177/0002764213487340

Williams, P., & Clarke, B. (2016). *Dangerous associations: Joint enterprise, gangs and racism*. Centre for Crime and Justice Studies. https://www.crimeandjustice.org.uk/sites/default/files/Dangerous%20assocations%20Joint%20Enterprise%20gangs%20and%20racism.pdf

Willner C.J., Hoffmann J.D., Bailey C.S., Harrison A.P., Garcia B., Ng Z.J., Cipriano C and Brackett M.A. (2022). The Development of Cognitive Reappraisal From Early Childhood Through Adolescence: A Systematic Review and Methodological Recommendations. *Front. Psychol. 13*:875964. https://doi.org/10.3389/fpsyg.2022.875964

Wirth, M. M. (2015). Hormones, stress, and cognition: The effects of glucocorticoids and oxytocin on memory. *Adaptive Human Behaviour and Physiology*, *1*(2), 177–201. https://doi.org/10.1007/s40750-014-0010-4

Wolke, D., Zhou, Y., Liu, Y., Eves, R., Mendonça, M., & Twilhaar, E. S. (2025). A systematic review of conceptualizations and statistical methods in longitudinal studies of resilience. *Nature Mental Health*, *3*(9), 1088–1099. https://doi.org/10.1038/s44220-025-00479-3

World Mental Health Organisation. (2022). World mental health report: Transforming mental health for all. *World Health Organization.* https://www.who.int/publications/i/item/9789240049338

World Health Organization. (2025, March 15). *Social determinants of health: Key concepts*. https://www.who.int/health-topics/social-determinants-of-health

Wright, J., McEachan, R., & Mathai, M. (2022). Why is the Born in Bradford cohort study important for child health? *Archives of Disease in Childhood*, *107*(8), 701–703. https://doi.org/10.1136/archdischild-2020-321231

Wright, J., Small, N., Raynor, P., Tuffnell, D., Bhopal, R., Cameron, N., Fairley, L., Lawlor, D. A., Parslow, R., Petherick, E. S., on behalf of the Born in Bradford Scientific Core Group. (2013). Cohort Profile: The Born in Bradford multi-ethnic family cohort study. *International Journal of Epidemiology*, *42*(4), 978–991. https://doi.org/10.1093/ije/dys112

Yehuda, R., & Lehrner, A. (2018). Intergenerational transmission of trauma effects: Putative role of epigenetic mechanisms. *World Psychiatry*, *17*(3), 243–257. https://doi.org/10.1002/wps.20568

Zachariadis, M., Scott, S., & Barrett, M. (2013). Methodological implications of critical realism for mixed-methods research. *MIS Quarterly*, *37*(3), 855–879. https://doi.org/10.25300/misq/2013/37.3.09

Zahidi, F., Daneshzad, E., Farahmand, M. A., Noori, A., Montazer, M., Ghosn, B., Surkan, P. J., & Azadbakht, L. (2024). Associations between food insecurity and common mental health problems: A systematic review and meta-analyses of observational studies. *Food Security*, *16*(6), 1555–1568. https://doi.org/10.1007/s12571-024-01496-3

Zhang, X., Mori, Y., Abio, A., Khorasani, Z. K., Gilbert, S., Grimland, M., Bezborodovs, N., Wan Mohd Yunus, W. M. A., Silwal, S., Westerlund, M., Praharaj, S. K., Ndetei, D. M., Kaneko, H., Heinonen, E., & Sourander, A. (2025). Cross-national research on adolescent mental health: A systematic review comparing research in low, middle and high-income countries. *BMJ Global Health*, *10*(7), Article e019267. https://doi.org/10.1136/bmjgh-2025-019267

Zhang, Y., Chen, S., Akintunde, T. Y., Okagbue, E. F., Isangha, S. O., & Musa, T. H. (2024). Life course and mental health: A thematic and systematic review. *Frontiers in Psychology*, *Volume 15*, Article 1329079. https://doi.org/10.3389/fpsyg.2024.1329079

Zwysen, W., Di Stasio, V., & Heath, A. (2021). Ethnic penalties and hiring discrimination: Comparing results from observational studies with field experiments in the UK. *Sociology*, *55*(2), 263–282. https://doi.org/10.1177/0038038520966947

Appendices

Appendix A - Ethical approval from the University of Leeds

UNIVERSITY OF LEEDS

31 July 2025

Dear Stephanie

Your research ethics application reference: SoMREC 2794

Your research project: DClinPsych Steph Dwyer thesis

I am pleased to inform you that the above research ethics application has been reviewed by the Research Ethics Committee for School of Medicine which has issued a favourable ethical opinion based on the application submitted. **Please retain this email in your project file as it is evidence of the Committee's approval.**

Matters you should note:

- Ethics approval does not infer you have the right of access to any member of staff or student or documents and the premises of the University of Leeds. Nor does it imply any right of access to the premises of any other organisation, including clinical areas. The Committee takes no responsibility for you gaining access to staff, students and/or premises prior to, during or following your research activities.
- It is your responsibility to comply with all relevant Health and Safety, Data Protection and other legal and professional requirements and guidelines.
- You are expected to keep a record of all your approved documentation, as well as documents such as sample consent forms, risk assessments and other documents relating to the research project. This should be kept in your project file.
- Audits are undertaken on approved ethics applications. Your project could be chosen for such an audit. You should therefore ensure your project files are kept up to date and readily available for audit purposes. You will be given a two week notice period if your project is selected.
- Please always include the above research ethics application reference in any correspondence with the Research Ethics team.

If you need to make **amendments** to the original submitted research project, you are expected to seek approval from the Committee before taking any further action. Changes could include (but are not limited to) the project end date, project design or recruitment methodology, or study documentation. Please go to https://secretariat.leeds.ac.uk/research-ethics/how-to-apply-for-research-ethics-amendment/ or contact the Research Ethics team for further information at Research Ethics.

I hope your research project goes well.

Yours sincerely,

Ms Sou Sit Chung, Research Ethics, Governance & Compliance (formerly Secretariat), University of Leeds

On behalf of Dr Klaus Witte, Chair, SoMREC

Appendix B - Comparison of original and altered questions from the ADDI

	Original Questions from ADDI	**Born in Bradford Alterations**
Q1	You were discouraged from joining an advanced level class	Omitted
Q2	You were wrongly disciplined or given after school detention	Omitted
Q3	You were given a lower grade than you deserved	Omitted
Q4	You were discouraged from joining a club	You were discouraged from joining a club or group
Q5	Others your age did not include you in their activities	No change
Q6	People expected more of you than they expected of others your age	Omitted
Q7	People expected less of you than they expected of others your age	No change
Q8	People assumed your English was poor	No change
Q9	You were hassled by police	No change
Q10	You were hassled by a store clerk or store guard	You were hassled by staff in a shop
Q11	You were called racially insulted names	You were called insulting names
Q12	You received poor service at a restaurant or store	You received poor service in a shop, restaurant, or similar place
Q13	People acted as if they thought you were not smart	People acted as though you were not intelligent
Q14	People acted as if they were afraid of you	No change
Q15	You were threatened	No change
	“If you had this experience, did it upset you?” The participant then chooses a rating from a 5-point specificity scale: 1 = Not at all, 2 = Slightly, 3 = Moderately, 4 = Considerably, 5 = Extremely.	Omitted from the end of every question
	Tick all that apply: 1. Ethnicity, 2. Sex/gender identity, 3. Disability, 4. Religion, 5. Class, 6. Neurodiversity (e.g. conditions such as Autism, Asperger’s, Dyslexia), 7. Sexuality, 8. Other	Added to the end of every question in this case

Appendix C - Comparison of the USDA household food security 6-item module with the questions used in the BiB Food Insecurity module

USDA household food security module questions	**BiB Food Insecurity questions**
The food that (I/we) bought just didn't last, and (I/we) didn't have money to get more.	We can't get the food we want because there is not enough money
(I/we) couldn't afford to eat balanced meals	I worry about not having enough to eat
In the last 12 months, since last (name of current month), did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food?	I try not to eat a lot so that our food will last
If yes above, how often did this happen, almost every month, some months but not every month, or in only 1 or 2 months?	I worry about how hard it is for my parents to get enough food for us
In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?	We can't get the food we want because there is not enough money
In the last 12 months, were you ever hungry but didn't eat because there wasn't enough money for food?	I feel hungry because there is not enough food to eat

Appendix D - Sample characteristics and missingness of BiB participants across the subsampling process

Variable category	Response category	Full sample		RCADS sample		Final sample	
		n	%	n	%	n	%
	Sample total	10684	-	7624	-	4863	-
Ethnicity	Missing	934	9	664	9	0	0
Ethnicity	White (ref)	3531	33	2229	29	1473	30
Ethnicity	Arab	166	2	116	2	80	2
Ethnicity	Asian	4898	46	3855	51	2785	57
Ethnicity	Black	416	4	279	4	181	4
Ethnicity	Mixed	482	5	306	4	206	4
Ethnicity	Other	257	2	175	2	138	3
Sex	Missing	869	8	613	8	0	0
Sex	Male	4479	42	3140	41	2238	46
Sex	Female	5127	48	3734	49	2535	52
Sex	Do not wish to answer	159	2	106	1	69	1
Sex	Wish to enter own response	50	1	31	0	21	0
IMD in quintiles	Missing	387	4	327	4	0	0
IMD in quintiles	IMD 1 - most deprived	6458	60	4646	61	3160	65
IMD in quintiles	IMD 2	2077	19	1371	18	889	18
IMD in quintiles	IMD 3	693	7	476	6	321	7
IMD in quintiles	IMD 4	464	4	329	4	220	5
IMD in quintiles	IMD 5 - least deprived	605	6	475	6	273	6
Age at survey	Missing	1	0	0	0	0	0
Age at survey	12	1944	18	1656	22	1306	27
Age at survey	13	3726	35	2469	32	2009	41
Age at survey	14	3372	32	2017	26	1014	21
Age at survey	15	1640	15	1481	19	534	11
Age at survey	16	1	0	1	0	-	-
Year Group	Missing	0	0	0	0	0	0
Year Group	10	2802	26	2552	33	850	17
Year Group	8	4372	41	3681	48	2952	61
Year Group	9	3510	33	1391	18	1061	22
Religion	Missing	898	8	637	8	0	0
Religion	No	2960	28	1919	25	1266	26
Religion	Yes	6826	64	5068	67	3597	74

Note. RCADS = Revised Children's Anxiety and Depression Scale; Full sample = original dataset including everyone who completed module 232, the questionnaire suite that included the RCADS; RCADS sample = subsample of participants with completed RCADS, cases with missing RCADS were excluded by R during filtering process; Final sample = complete case subsample of the RCADS sample, including participants with complete data for all included variables in the final regression model. % = the % of the given sample, IMD = Index of Multiple Deprivation; IMD 1–5 = deprivation quintiles created by aggregating IMD

deciles into five groups (1 = most deprived; 5 = least deprived); Age at survey = age of the participant at the time of survey completion.

Appendix E - Descriptive statistics for study variables across the full, RCADS, and final samples

Variable category	Response category	Full sample		RCADS sample		Final model sample	
		n	%	n	%	n	%
ADDI total	Missing	0	0	0	0	0	0
ADDI total	Present	10684	100	7624	100	4863	100
BRS total	Missing	4792	45	1792	24	0	0
BRS total	Present	5892	55	5832	77	4863	100
FIT	Missing	1035	10	732	10	0	0
FIT	Present	9649	90	6892	90	4863	100
FSM	Missing	0	0	0	0	0	0
FSM	No	7618	71	5519	72	3567	73
FSM	Yes	3066	29	2105	28	1296	27
RCADS total	Missing	3060	29	0	0	0	0
RCADS total	Present	7624	71	7624	100	4863	100

Note. RCADS = Revised Children's Anxiety and Depression Scale; Full sample = original dataset; RCADS sample = subset of participants with completed RCADS; Final sample = complete case subset of the RCADS sample containing no missing values for any variables included in the final regression model. % = the percentages are calculated within each sample, ADDI total = adolescence discrimination distress index total score; BRS total = brief resilience scale total; FIT = food insecurity questions total; FSM = ever accessed free school meals; RCADS total = results for the entire 25-item scale.

Appendix F - Interaction analysis - procedure and results

Step 1: Each pairwise interaction, e.g. ADDI total x FSM, were entered into the model individually to identify statistically significant interactions (indicating possible synergistic pairings of predictors) with the dependent variable and its subscales (RCADS total, GA and MD). The two-way interaction terms were examined to identify potential

synergistic effects between predictor variables and the dependant variable and its subscales; total internalising distress (RCADS total), anxiety (RCADS GA) and depression (RCADS MD) are as follows:

ADDI × FIT, ADDI × FSM, ADDI × IMD1&2, ADDI × IMD3&4, ADDI × IMD5&6, ADDI × IMD7&8, ADDI × Arab, ADDI × Asian, ADDI × Black, ADDI × Mixed, ADDI × Other ethnic groups, ADDI × Female, ADDI × Do not wish to answer, ADDI × Wish to enter own response; **FIT** × FSM, FIT × IMD1&2, FIT × IMD3&4, FIT × IMD5&6, FIT × IMD7&8, FIT × Arab, FIT × Asian, FIT × Black, FIT × Mixed, FIT × Other ethnic groups, FIT × Female, FIT × Do not wish to answer, FIT × Wish to enter own response; **FSM** × IMD1&2, FSM × IMD3&4, FSM × IMD5&6, FSM × IMD7&8, FSM × Arab, FSM × Asian, FSM × Black, FSM × Mixed, FSM × Other ethnic groups, FSM × Female, FSM × Do not wish to answer, FSM × Wish to enter own response; **IMD1&2** × Female, IMD1&2 × Do not wish to answer, IMD1&2 × Wish to enter own response; **IMD3&4** × Female, IMD3&4 × Do not wish to answer, IMD3&4 × Wish to enter own response; **IMD5&6** × Female, IMD5&6 × Do not wish to answer, IMD5&6 × Wish to enter own response; **IMD7&8** × Female, IMD7&8 × Do not wish to answer, IMD7&8 × Wish to enter own response; **Arab** × Female, Arab × Do not wish to answer, Arab × Wish to enter own response; **Asian** × Female, Asian × Do not wish to answer, Asian × Wish to enter own response; **Black** × Female, Black × Do not wish to answer, Black × Wish to enter own response; **Mixed** × Female, Mixed × Do not wish to answer, Mixed × Wish to enter own response; **Other ethnic groups** × Female, Other ethnic groups × Do not wish to answer, Other ethnic groups × Wish to enter own response.

The results for the initial interaction screening are as follows:

For RCADS Total, the significant interactions were; perceived discrimination × sex, perceived discrimination × ethnicity, food insecurity × sex, food insecurity × IMD, FSM eligibility × ethnicity, ethnicity × sex, IMD × sex, FSM eligibility × sex.

For RCADS GA, the significant interactions were; perceived discrimination × sex, perceived discrimination × IMD, FIT × sex, FIT × IMD, FSM × ethnicity, ethnicity × sex, IMD × sex.

For RCADS MD, the significant interactions were; perceived discrimination × sex, perceived discrimination × ethnicity, FIT × sex, ethnicity × sex, IMD × sex, FSM × sex.

Step 2: To improve the model stability, only significant and conceptually plausible interaction terms from the individual models were entered simultaneously into a combined model. This procedure was carried out for each RCADS variable, RCADS total, GA and MD

Appendix G - Data Diagnostic results

Tests of linearity and homoscedasticity

Figure F1

Residuals versus fitted values for RCADS total score regression model

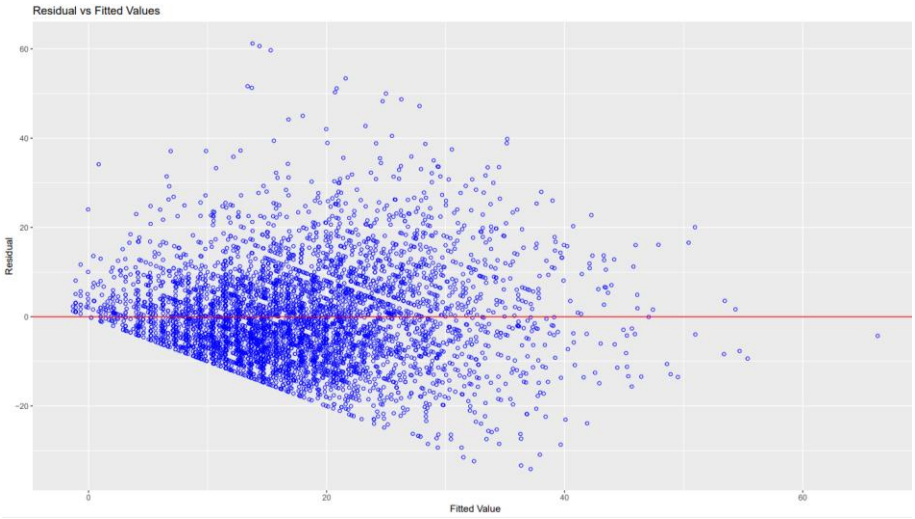


Figure F2

Residuals versus fitted values for RCADS generalized anxiety regression model

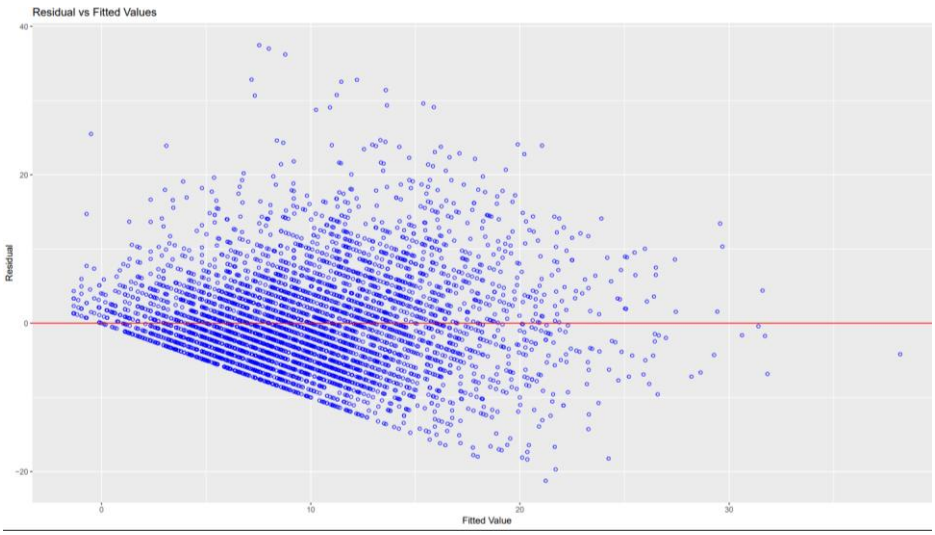
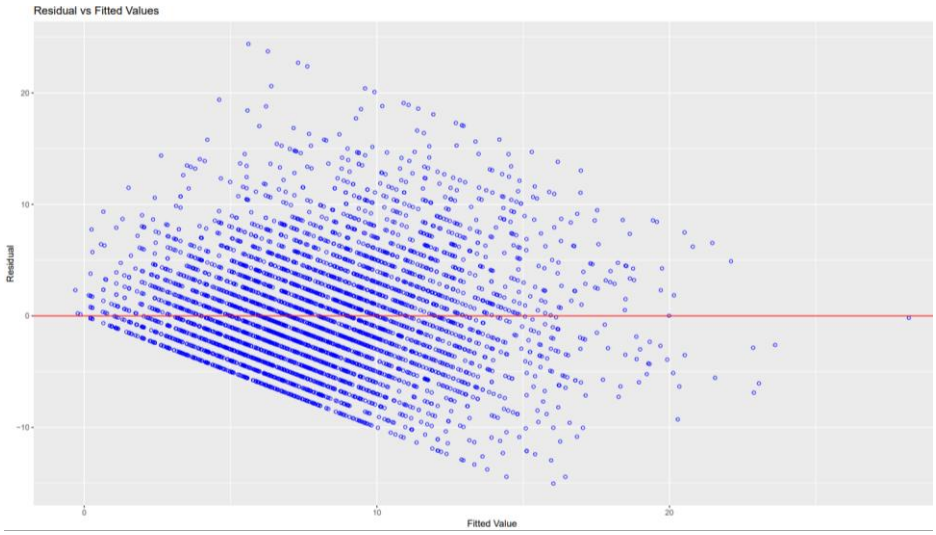


Figure F3

Residuals versus fitted values for RCADS major depression regression model



Tests of normality of residuals

Figure F4

Normal Q–Q plot of residuals for RCADS total score regression model

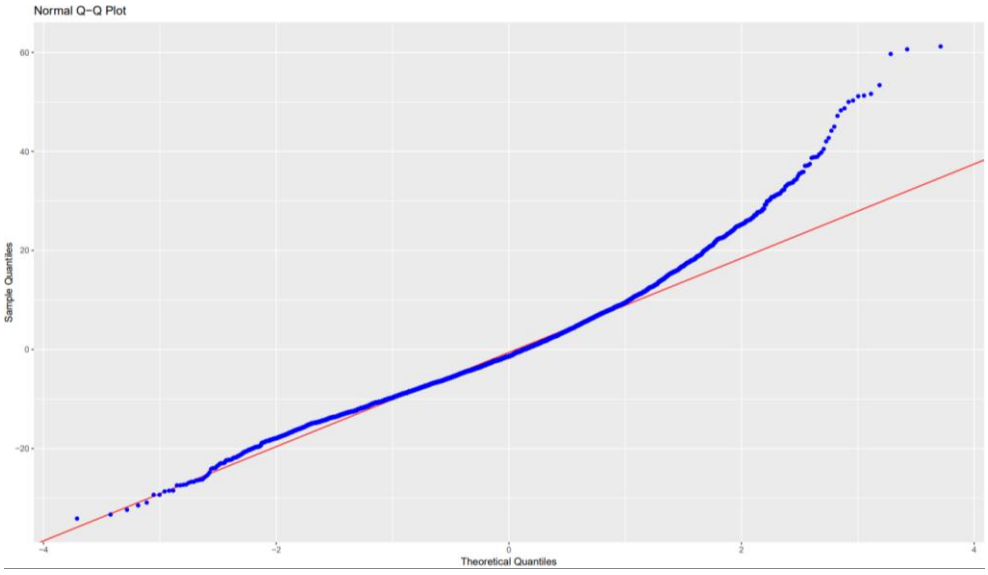


Figure F5

Normal Q–Q plot of residuals for RCADS generalized anxiety regression model

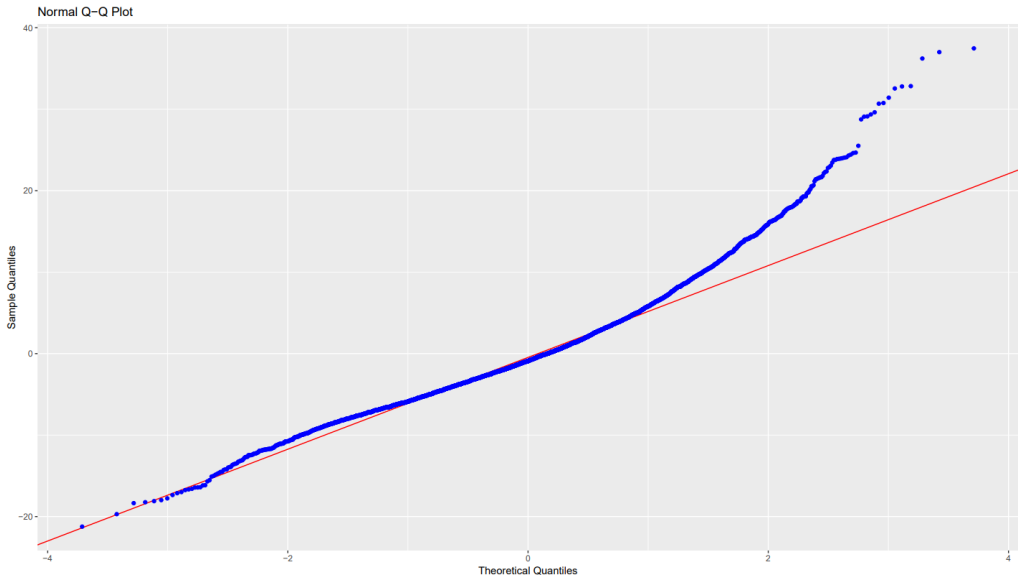
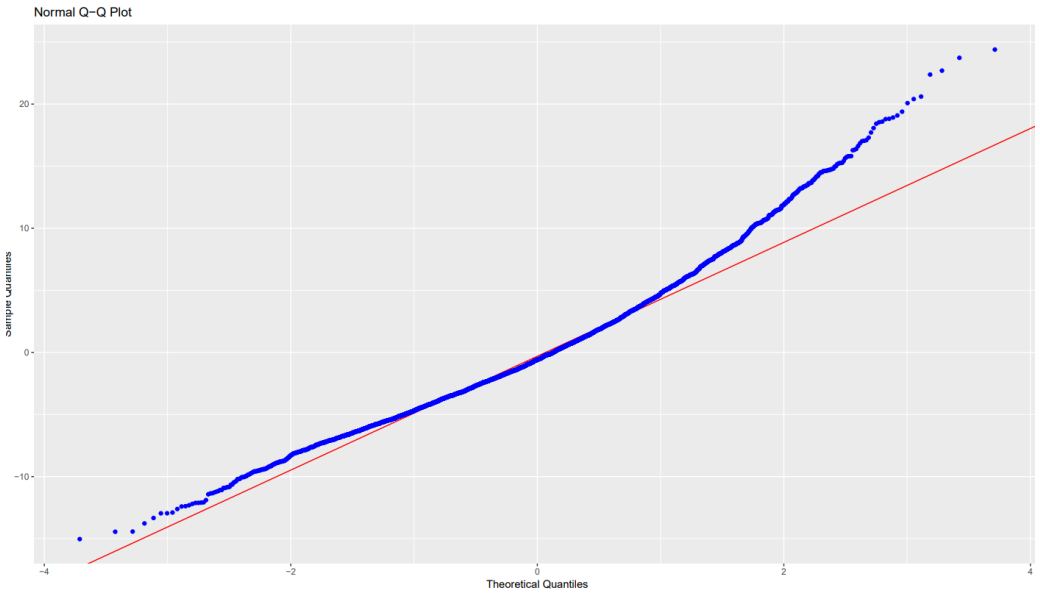


Figure F6

Normal Q–Q plot of residuals for RCADS major depression regression model



Multicollinearity & Tolerance Statistics

Figure F7

Multicollinearity using generalized variance inflation factors (GVIF)

Predictor	RCADS total			RCADS GA			RCADS MD		
	GVIF	Df	Adj GVIF	GVIF	Df	Adj GVIF	GVIF	Df	Adj GVIF
Ethnicity	2.54	5	1.10	2.54	5	1.10	2.54	5	1.10
Sex	1.10	3	1.02	1.10	3	1.02	1.10	3	1.02
IMD	1.34	4	1.04	1.34	4	1.04	1.34	4	1.04
Religion	2.29	1	1.51	2.30	1	1.52	2.29	1	1.51
ADDI total	1.06	1	1.03	1.05	1	1.03	1.06	1	1.03
FIT	1.06	1	1.03	1.06	1	1.03	1.06	1	1.03
FSM	1.10	1	1.05	1.10	1	1.05	1.10	1	1.05
BRS	1.14	1	1.07	1.14	1	1.07	1.14	1	1.07

Note. RCADS total = results for the entire 25-item scale; RCADS GA = results for the anxiety subscale; RCADS MD = results for the depression subscale; IMD = deprivation quintiles; ADDI total = adolescence discrimination distress index total score; FIT = food insecurity questions total; FSM = ever accessed free school meals; BRS total = brief resilience scale total;; GVIF = Generalized Variance Inflation Factor; Df = degrees of freedom; Adj GVIF = GVIF adjusted for model dimensionality (i.e., GVIF^(1/(2·Df))).

Figure F8

Tolerance statistics for predictors

Predictor	RCADS total			RCADS GA			RCADS MD		
	GVIF	Df	Adj GVIF	GVIF	Df	Adj GVIF	GVIF	Df	Adj GVIF
Ethnicity	2.54	5	1.10	2.54	5	1.10	2.53	5	1.10
Sex	1.10	3	1.02	1.10	3	1.02	1.10	3	1.02
IMD	1.34	4	1.04	1.34	4	1.04	1.34	4	1.04
Religion	2.29	1	1.51	2.30	1	1.52	2.29	1	1.51
ADDI total	1.06	1	1.03	1.05	1	1.03	1.05	1	1.03
FIT	1.06	1	1.03	1.06	1	1.03	1.06	1	1.03
FSM	1.10	1	1.05	1.10	1	1.05	1.10	1	1.05
BRS	1.14	1	1.07	1.14	1	1.07	1.14	1	1.07

Note. Tolerance = inverse of variance inflation factor (1/VIF), indicating the proportion of variance in a predictor not explained by other predictors. RCADS total = results for the entire 25-item scale; RCADS GA = results for the anxiety subscale; RCADS MD = results for the depression subscale; IMD = deprivation quintiles; ADDI total = adolescence discrimination distress index total score; FIT = food insecurity questions total; FSM = ever

accessed free school meals; BRS total = brief resilience scale total; GVIF = Generalized Variance Inflation Factor; Df = degrees of freedom; Adj GVIF = GVIF adjusted for model dimensionality (i.e., GVIF^(1/(2·Df))).

Appendix H- Supplementary descriptives

Figure H1

Mean RCADS scores by age in final analytic sample

Age	n	RCADS total		RCADS GA		RCADS MD	
		M	SD	M	SD	M	SD
12	1306	17.4	13.4	9.8	8.1	7.6	6.0
13	2009	17.5	13.8	9.7	8.3	7.9	6.1
14	1014	18.3	13.4	10.0	8.0	8.3	6.1
15	534	19.4	14.1	10.5	8.56	8.94	6.25

Note. RCADS total mean = mean results for the entire 25-item scale; RCADS GA mean = mean results for the anxiety subscale; RCADS MD = mean results for the depression subscale. Statistics are based on the final analytic (complete case) sample.

Figure H2

RCADS scores by ethnicity in the final sample

Ethnicity	n	RCADS Total		RCADS GA		RCADS MD	
		M	SD	M	SD	M	SD
Arab	80	20.7	14.4	11.5	8.4	9.2	6.8
Asian	2785	16.3	12.9	8.9	7.7	7.5	5.9
Black	181	19.9	16.0	11.4	9.7	8.5	7.0
Mixed	206	19.8	15.2	10.9	9.1	8.9	6.7
Other	138	20.7	13.9	11.5	8.5	9.2	6.2
White	1473	19.7	14.0	11.2	8.6	8.6	6.1
Sample	4863	17.8	13.6	9.9	8.2	7.9	6.1

Note. RCADS = Revised Children's Anxiety and Depression Scale; RCADS total mean = mean results for the entire 25-item scale; RCADS GA mean = mean results for the anxiety subscale; RCADS MD = mean results for the depression subscale. Ethnicity categories are abbreviated as follows: Asian = Asian or Asian British; Black = Black, Black British, Caribbean or African; Mixed = Mixed or Multiple ethnic groups; Other = Other ethnic groups; Sample = final analytic (complete case) sample.

Figure H3

Distribution of participants by IMD in final analytic sample

Quintile	n(%)
IMD 1	3160(65.0)
IMD 2	889(18.3)
IMD 3	321(6.6)
IMD 4	220(4.5)
IMD 5	273(5.6)

Note. IMD = Index of Multiple Deprivation. IMD quintiles 1–5 = deprivation quintiles created by aggregating IMD deciles into five groups (IMD 1 = most deprived; IMD 5 = least deprived); Percentages are calculated within IMD quintiles; Percentages are calculated within the final analytic (complete cases) sample.

Figure H4

Distribution of Ethnic Groups by IMD Quintile in the final sample

Ethnicity	IMD 1	IMD 2	IMD 3	IMD 4	IMD 5	n
	n(%)	n(%)	n(%)	n(%)	n(%)	
Arab	64 (80%)	12 (15%)	3 (3.8%)	1 (1.2%)	0 (0%)	80
Asian	2095 (75.2%)	525 (18.9%)	89 (3.2%)	58 (2.1%)	18 (0.6%)	2785
Black	140 (77.3%)	26 (14.4%)	8 (4.4%)	4 (2.2%)	3 (1.7%)	181
Mixed	123 (59.7%)	42 (20.4%)	19 (9.2%)	16 (7.8%)	6 (2.9%)	206
Other	106 (76.8%)	20 (14.5%)	7 (5.1%)	4 (2.9%)	1 (0.7%)	138
White	632 (42.9%)	264 (17.9%)	195 (13.2%)	137 (9.3%)	245 (16.6%)	1473

Note. IMD = Index of Multiple Deprivation. IMD quintiles 1–5 = deprivation quintiles created by aggregating IMD deciles into five groups (IMD 1 = most deprived; IMD 5 = least deprived); Ethnicity categories are abbreviated as follows: Asian = Asian or Asian British; Black = Black, Black British, Caribbean or African; Mixed = Mixed or Multiple ethnic groups; Other = Other ethnic groups; Percentages are calculated within each ethnic group (row percentages). Statistics are based on the final analytic (complete case) sample.

Figure H5

Free school meals receipt by Ethnicity in the final sample

Ethnicity	n	FSM
		n(%)
Arab	80	52 (65.0%)
Other	138	58 (42.0%)
Mixed	206	79 (38.3%)
Black	181	57 (31.5%)
White	1473	368 (25.0%)
Asian	2785	682 (24.5%)

Note. FSM = access to free school meals (yes); Ethnicity categories are abbreviated as follows: Asian = Asian or Asian British; Black = Black, Black British, Caribbean or African; Mixed = Mixed or Multiple ethnic groups; Other = Other ethnic groups; Percentages are calculated within ethnic groups; n = total number of participants in each ethnic group; Statistics are based on the final analytic (complete case) sample.

Figure H6

Food Insecurity (FIT) Scores by Ethnicity in the final sample

Ethnicity	Food Insecurity		
	n	M	SD
Arab	80	0.62	1.21
Black	181	0.45	0.93
White	1473	0.31	0.74
Asian	2785	0.24	0.66
Other	138	0.22	0.57
Mixed	206	0.30	0.86
Sample mean	4863	0.28	0.72

Note. FIT = food insecurity total score; Food insecurity = results from food insecurity questionnaire total; Ethnicity categories are abbreviated as follows: Asian = Asian or Asian British; Black = Black, Black British, Caribbean or African; Mixed = Mixed or Multiple ethnic groups; Other = Other ethnic groups; Sample mean = mean and standard deviation for the final analytic sample; Statistics are based on the final analytic (complete case) sample.

Figure H7

Food Insecurity by Ethnicity in the Final Sample

Ethnicity	n	Food Insecure
Arab	80	23 (28.8%)
Black	181	49 (27.1%)
White	1473	291 (19.8%)
Other	138	24 (17.4%)
Asian	2785	456 (16.4%)
Mixed	206	31 (15%)

Note. Food insecurity was defined as a score greater than 0 on the food availability (FIT) questionnaire. Percentages are calculated within ethnic groups; n = total number of participants in each ethnic group; Statistics are based on the final analytic (complete case) sample.

Figure H8

Distribution of Food Insecurity by IMD Quintile in the final sample

IMD	n	Food Insecure	Food Secure
IMD 1	3160	624 (19.7%)	2536 (80.3%)
IMD 2	889	142 (16%)	747 (84%)
IMD 3	321	53 (16.5%)	268 (83.5%)
IMD 4	220	30 (13.6%)	190 (86.4%)
IMD 5	273	25 (9.2%)	248 (90.8%)

Note. FIT = food insecurity total score; Food insecurity was defined as a score greater than 0 on the FIT. Percentages are calculated within IMD quintiles. IMD quintiles 1–5 = deprivation quintiles created by aggregating IMD deciles into five groups (IMD 1 = most deprived; IMD 5 = least deprived). Statistics are based on the final analytic (complete case) sample.

Figure H9

Descriptive Statistics for ADDI Scores by Ethnicity in the Final Sample

Ethnicity	n	M	SD
Arab	80	0.81	1.74
Black	181	1.04	1.96
White	1473	0.64	1.35
Asian	2785	0.62	1.40
Other	138	0.74	1.76
Mixed	206	0.93	1.77
Sample mean	4863	0.68	1.47

Note. ADDI = Adolescence Discrimination Distress Index; Ethnicity categories are abbreviated as follows: Asian = Asian or Asian British; Black = Black, Black British, Caribbean or African; Mixed = Mixed or Multiple ethnic groups; Other = Other ethnic groups. Sample mean = mean and standard deviation for the final analytic sample; Statistics are based on the final analytic (complete case) sample.

Figure H10

Descriptive Statistics for ADDI Scores by Sex in the Final Sample

Sex	n	M	SD
Female	2535	0.71	1.48
Male	2238	0.59	1.38
Wish to enter own response	21	1.10	1.92
Do not wish to answer	69	1.04	1.89
Sample mean	4863	0.68	1.47

Note. ADDI = Adolescence Discrimination Distress Index; Sample mean = mean and standard deviation for the final analytic sample; Statistics are based on the final analytic (complete case) sample

Figure H11

Descriptive Statistics for BRS Scores by Ethnicity in the Final Sample

Ethnicity	n	M	SD
Arab	80	18.20	4.39
Black	181	19.20	5.12
White	1473	17.80	4.88
Asian	2785	18.60	4.76
Other	138	18.70	4.60
Mixed	206	18.10	5.02
Sample mean	4863	18.34	4.83

Note. BRS = Brief Resilience Scale; Ethnicity categories are abbreviated as follows: Asian = Asian or Asian British; Black = Black, Black British, Caribbean or African; Mixed = Mixed or Multiple ethnic groups; Other = Other ethnic groups; Sample mean = mean and standard deviation for the final analytic sample; Statistics are based on the final analytic (complete case) sample

Figure H12

Descriptive Statistics for BRS Scores by Sex in the Final Sample

Sex	n	M	SD
Female	2535	17.10	4.51
Male	2238	19.70	4.78
Wish to enter own response	21	20.80	6.02
Do not wish to answer	69	18.70	5.29
Sample mean	4863	18.34	4.83

Note. BRS = Brief Resilience Scale; Sample mean = mean and standard deviation for the total analytic sample; Sample mean = mean and standard deviation for the final analytic sample; Statistics are based on the final analytic (complete case) sample

Appendix I

Figure IA

Regression based Mediation Analysis, examining BRS as a mediator between predictors and RCADS, following Baron & Kenny (1986)

Predictor	Model no BRS				Model BRS as DV				Model with BRS			
	B	95% CI		*p*	*B*	95% CI		*p*	*B*	95% CI		*p*
		LL	*UL*			*LL*	*UL*			*LL*	*UL*	
Ethnicity												
White (ref)	-	-	-	-	-	-	-	-	-	-	-	-
Arab	-0.23	-3.03	2.56	0.870	0.62	-0.46	1.70	0.263	0.42	-2.14	2.97	0.750
Asian	-2.64	-3.77	-1.50	0.000	0.85	0.41	1.29	0.000	-1.74	-2.78	-0.70	0.001
Black	-1.28	-3.25	0.69	0.204	1.81	1.04	2.57	0.000	0.62	-1.19	2.42	0.502
Mixed	-0.87	-2.63	0.89	0.332	0.59	-0.09	1.27	0.088	-0.25	-1.85	1.36	0.764
Other	1.42	-0.77	3.61	0.203	0.96	0.11	1.81	0.026	2.43	0.43	4.43	0.017
Sex												
Male (ref)	-	-	-	-	-	-	-	-	-	-	-	-
Female	8.00	7.33	8.67	0.000	-2.58	-2.83	-2.32	0.000	5.30	4.67	5.93	0.000
Do not wish to answer	3.82	1.01	6.63	0.008	-0.56	-1.65	0.53	0.312	3.23	0.67	5.80	0.014
Wish to enter own response	7.35	2.30	12.39	0.004	1.53	-0.43	3.48	0.126	8.95	4.34	13.55	0.000
IMD in quintiles												
IMD 5 - least deprived (ref)	-	-	-	-	-	-	-	-	-	-	-	-
IMD 1 - most deprived	1.45	-0.14	3.03	0.074	-0.68	-1.30	-0.07	0.029	0.73	-0.72	2.18	0.324
IMD 2	1.80	0.13	3.47	0.035	-0.62	-1.27	0.03	0.060	1.15	-0.39	2.68	0.143
IMD 3	1.76	-0.15	3.66	0.071	-1.18	-1.92	-0.44	0.002	0.52	-1.22	2.27	0.558
IMD 4	0.59	-1.50	2.68	0.578	-0.08	-0.89	0.73	0.851	0.51	-1.40	2.42	0.599
Religion = No (ref)	-	-	-	-	-	-	-	-	-	-	-	-
Religion = Yes	-1.33	-2.46	-0.20	0.022	0.16	-0.28	0.59	0.488	-1.17	-2.20	-0.13	0.027
ADDI total	2.73	2.50	2.96	0.000	-0.50	-0.59	-0.41	0.000	2.21	1.99	2.42	0.000
FIT	4.34	3.87	4.80	0.000	-0.74	-0.92	-0.56	0.000	3.56	3.13	3.99	0.000
FSM = no (ref)	-	-	-	-	-	-	-	-	-	-	-	-
FSM = yes	1.19	0.41	1.97	0.003	-0.29	-0.59	0.01	0.062	0.89	0.18	1.60	0.014
BRS total	-	-	-	-	-	-	-	-	-1.05	-1.12	-0.98	0.000

Note. Model no BRS = regression model predicting RCADS without inclusion of resilience, results for Step 1; Model BRS as DV = regression model predicting resilience (BRS total score), results for Step 2; Model with BRS = regression model predicting RCADS with resilience included as a predictor, results for Step 3; B = unstandardised regression coefficient; CI = confidence interval; LL = lower limit; UL = upper limit; (ref) = reference category for categorical predictors. RCADS = Revised Children's Anxiety and Depression Scale; ADDI total = Adolescent Discrimination Distress Index total score; FIT = food insecurity total score; FSM = ever accessed free school meals (0 = no, 1 = yes); BRS total = Brief Resilience Scale total score. IMD 1–5 = Index of Multiple Deprivation quintiles derived from aggregated deciles (1 = most deprived; 5 = least deprived, reference category). Ethnicity categories are coded as follows: White = reference category; Asian = Asian or

Asian British; Black = Black, Black British, Caribbean, or African; Mixed = Mixed or multiple ethnic groups; Other = other ethnic groups.

Appendix J

Fixed effects from the combined regression model predicting RCADS, relating to Table 5

Predictor	RCADS total				RCADS GA				RCADS MD			
	B	95% CI		*p*	*B*	95% CI		*p*	*B*	95% CI		*p*
		LL	*UL*			*LL*	*UL*			*LL*	*UL*	
	Fixed effects											
Ethnicity												
White (ref)	-	-	-	-	-	-	-	-	-	-	-	-
Arab	0.23	-4.7	5.15	0.928	0.83	-1.87	3.54	0.546	-0.45	-2.18	1.29	0.616
Asian	-1.1	-2.5	0.29	0.121	-0.73	-1.56	0.1	0.085	-0.34	-0.96	0.28	0.284
Black	0.06	-2.94	3.05	0.971	0.4	-1.33	2.12	0.652	-0.24	-1.5	1.03	0.713
Mixed	0.61	-1.97	3.2	0.641	-0.1	-1.66	1.45	0.895	0.69	-0.43	1.8	0.225
Other	0.86	-2.39	4.1	0.605	-0.15	-2.06	1.77	0.879	1.12	-0.24	2.49	0.107
Sex												
Male (ref)	-	-	-	-	-	-	-	-	-	-	-	-
Female	2.51	-0.08	5.09	0.057	2.47	0.9	4.05	0.002	0.17	-1.04	1.38	0.779
Do not wish	5.13	-5.84	16.11	0.359	3.8	-2.88	10.48	0.265	0.77	-4.3	5.84	0.765
Wish to enter	19.56	4.44	34.68	0.011	12.11	2.89	21.33	0.010	8.12	1.04	15.2	0.025
IMD in quintiles												
IMD 5 (ref)	-	-	-	-	-	-	-	-	-	-	-	-
IMD 1	-0.76	-2.99	1.47	0.502	-1.04	-2.44	0.35	0.143	0.1	-0.92	1.11	0.851
IMD 2	-0.43	-2.77	1.91	0.720	-0.87	-2.34	0.6	0.245	0.16	-0.9	1.22	0.767
IMD 3	-1.07	-3.67	1.54	0.421	-0.94	-2.58	0.71	0.264	0.04	-1.15	1.23	0.948
IMD 4	-0.47	-3.38	2.44	0.750	-0.63	-2.45	1.19	0.495	0.01	-1.3	1.33	0.983
Religion = No (ref	-	-	-	-	-	-	-	-	-	-	-	-
Religion = Yes	-1.34	-2.37	-0.3	0.011	-0.46	-1.09	0.17	0.151	-0.84	-1.32	-0.36	0.001
ADDI total	2.02	1.54	2.5	< .001	0.64	0.04	1.25	0.037	0.78	0.56	1.01	< .001
FIT	0.24	-2.87	3.36	0.879	0.36	-1.55	2.26	0.714	1.03	0.72	1.33	< .001
FSM = no (ref)	-	-	-	-	-	-	-	-	-	-	-	-
FSM = yes	-0.38	-1.89	1.12	0.616	-0.47	-1.28	0.34	0.256	0.35	-0.13	0.83	0.158
BRS total	-1.05	-1.12	-0.98	< .001	-0.61	-0.66	-0.57	< .001	-0.44	-0.47	-0.41	< .001

Note. RCADS total = results for the full 25-item scale; RCADS GA = anxiety subscale; RCADS MD = depression subscale. B = unstandardised regression coefficient; CI = confidence interval; LL = lower limit; UL = upper limit; (ref) = reference category for categorical predictors. ADDI total = Adolescent Discrimination Distress Index total score; FIT = food insecurity total score; FSM = ever accessed free school meals (0 = no, 1 = yes); BRS total = Brief Resilience Scale total score. IMD 1–5 = Index of Multiple Deprivation quintiles derived from aggregated deciles (1 = most deprived; 5 = least deprived, reference category). “Do not wish” = do not wish to answer; “Wish to enter” = wish to enter own response. Ethnicity categories are coded as follows: White = reference category; Asian = Asian or Asian British; Black = Black, Black British, Caribbean, or African; Mixed = Mixed or multiple ethnic groups;

Other = other ethnic groups. All predictors shown represent fixed effects from the combined regression model corresponding to Table 5. N = 4,863.