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Deprivation, social capital and mental health: the influence of connection and its disruption through churn

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Deprivation, social capital and mental health:

the influence of connection and its disruption through churn

Claire Handley

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"If the misery of the poor be caused not by the laws of nature, but by our institutions, great is our sin."

- Charles Darwin

"If poverty is a disease that infects the entire community in the form of unemployment and violence, failing schools and broken homes, then we can't just treat those symptoms in isolation. We have to heal that entire community."

— Barack Obama

"We think sometimes that poverty is only being hungry, naked and homeless. The poverty of being unwanted, unloved and uncared for is the greatest poverty. We must start in our own homes to remedy this kind of poverty."

- Mother Teresa

Deprivation, social capital and mental health: the influence of connection and its disruption through churn

Socioeconomic deprivation is associated with worse mental health outcomes. However, less is known about the ways in which social capital, the bonds, norms and networks between people, moderates this relationship. This thesis explores the influence and interaction of deprivation and social capital on mental health and well-being across three chapters.

In Chapter one, a systematic review of the literature identifies 32 studies, with a pooled sample of 562,640 individuals. It examines the associations between social capital, measured at the individual and/or ecological level, socioeconomic status and mental health outcomes globally. Numerous studies suggested that social capital can provide a powerful buffer against the detrimental effects of deprivation on mental health outcomes. However, complexities existed. For example, strong connections between homogeneous members of deprived groups (bonding social capital) was linked to worse mental health outcomes for some individuals.

In Chapter two, an empirical study explores the association between economic deprivation and churn, population turnover measured at the neighbourhood level, and how these factors interact when predicting inpatient psychiatric admission levels across Wales. Churn, which was conceptualised as potentially disruptive to social capital, was independently associated with higher admission rates, as was deprivation. There was also a significant interaction effect between these factors as areas with both high churn and high deprivation were associated with higher admission rates overall. These relationships were found to be robust whether deprivation was modelled using low income or via the overall rank on the Welsh Index of Multiple Deprivation, and also when population density was controlled for.

Chapter three considers the results of the literature review and the empirical paper and outlines their theoretical and clinical implications. These are considered at the individual, community and national levels. Personal reflections are also discussed. Chapter one: Literature Review

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A systematic review: How socioeconomic status and inequality interact with social capital

to influence mental health and well-being.

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Abstract

Social capital and socioeconomic status, conceptualised as economic capital, have each been associated with mental health outcomes independently, but less is known about how they interact to influence mental health and well-being. This systematic review was conducted to identify processes by which these factors interact and explore how they impact mental health outcomes across varied populations. An electronic search was conducted using Medline, PsychNet, PubMed, and Web of Science with the aim of including all primary studies conducted at the subnational level published in English before December 2018. Of the 3807 articles retrieved, 32 articles were selected for the review. The majority of studies were crosssectional in design and there was substantial variation in the measures of social capital, economic capital and mental health used, preventing the calculation of pooled effect sizes. High social capital was found to buffer the adverse effects of deprivation and inequality in most studies. However, detrimental mental health consequences were also identified in relation to social capital for both high and low economic capital individuals. Limitations included the heterogeneity of the studies and that the tools used to study the constructs were seldom validated measures. These finding contribute to a greater understanding of the protective power of social capital overall, as well as indicating instances where it may be harmful for certain groups. This more nuanced perspective has policy implications which are discussed.

Research highlights

- Social capital can act as a buffer to the detrimental effects of deprivation and inequality.
- Deprived groups who have only homogeneous social connections may have worse mental health outcomes.
- Policy makers and professionals should consider the social contexts in which people exist, as well as their economic position, when working to improve mental health in the community.

1. Introduction

It is increasingly understood that mental health "is influenced not only by individual attributes, but also by the social circumstances in which persons find themselves and the environment in which they live." (pg. 2, World Health Organization, 2012). Mental illness constitutes an increasing proportion of the global burden of disease, with a recent analysis placing it as the most significant by far in terms of years lived with disability (Vigo, Thornicroft, & Atun, 2016). Therefore, it has become increasingly necessary to improve our understanding of how various factors interact with each other to threaten or protect an individual's wellbeing (Silva, Loureiro, & Cardoso, 2016) and how these factors can be influenced.

Individuals with greater social, economic and cultural capital have been found to have better health outcomes (Pinxten & Lievens, 2014). Although the relationship between socioeconomic status and health has been studied for some time (Adler et al., 1994), growing evidence suggests that the social connections between individuals are also of great importance. Social capital provides access to information, support, resources, physical assistance and opportunities which can predict improved physical and mental health outcomes (Yu, Sessions, Fu, & Wall, 2015). Specifically, as Folland (2008) outlined, health may be improved by: a high-trust environment; the socializing process or sympathetic relationships themselves; sharing information about the risks of behaviours or the effectiveness of health-care; individuals feeling more responsibility to themselves and others to improve and maintain health. In addition, supportive contact with others may provide a sense of meaning (Yu et al., 2015). The absence of problems is also significant: disadvantaged individuals who reported fewer neighbourhood conflicts have been found to have higher levels of mental well-being, independently of individual factors (Silva et al., 2016).

Economic, technological and socio-political changes have transformed cultures in advanced industrial societies in recent decades (Inglehart, 2018). Even by the turn of the millennium, Putnam (2000) was able to highlight several factors that have led to a decrease in social capital including: people spending more time engaging in solitary pursuits such as watching television; suburbanisation; increasing pressures on time and money necessitating dual-income families and consequences of cultural differences between generations. Since the turn of the century, the growth of the internet has meant that people can increasingly work, shop, find entertainment and use services without interacting with another person directly (HM Government, 2018). In response to evidence suggesting that enhancing community connectedness may improve a population's mental health (Silva et al., 2016), the UK (HM Government, 2018) and Welsh (Welsh Government, 2018) governments have released consultation and policy documents which reflect a growing awareness of the detrimental impact that a lack of social connections can have on the well-being of individuals. However, there was little discussion of the different needs or barriers that might exist for people of varying economic capital in these publications.

Previous reviews have explored the relationships between social capital and mental health (Ehsan & De Silva, 2015b; Flores et al., 2018), the impact of low socioeconomic status and income inequalities on mental illness (Ribeiro et al., 2017; Patel et al., 2018) and the combined role social capital and socioeconomic inequalities in physical health (Uphoff, Pickett, Cabieses, Small, & Wright, 2013; Vyncke et al., 2013). These studies suggest that there is an association between high social capital and lower incidence of common mental health disorders and that deprivation and inequality are damaging to physical health. However, to date, no systematic reviews have aimed to explicitly understand how the complex interactions between social capital and income inequalities affect mental health across

populations. It is important to explore processes associated with physical and mental health individually, as recent biometrical models (Garrison & Rodgers, 2018) indicate that the environment is a more significant factor in the etiology of the link between socioeconomic status and mental health than for physical heath, where genetic factors are more significant. This paper therefore intends to review and summarise current evidence to better understand the relationships between socioeconomic factors, how they influence individuals' access to and experience of social capital and how this affects, and is affected by, their mental health.

1.1. Definitions

Social Capital

Social capital is a broad and complex concept which can be defined as the "connections among individuals – social networks and the norms of reciprocity and trustworthiness that arise from them" (pg. 19, Putnam, 2000). These relate to numerous resources which become available to individuals and the wider society through social relationships (Silva et al., 2016). It also includes the exercise of sanctions when rules are violated (Villalonga-Olives, Wind, & Kawachi, 2018).

Numerous sub-conceptualisations of social capital have been delineated in the literature. Debate continues as to whether social capital is primarily a feature of individuals or groups: *social cohesion* is understood to be an attribute of the group as a whole, whereas the term *social network* describes the resources that arise from an individual's particular connections (Yu et al., 2015). Features of social capital can be measured on the *individual level*, which includes personal behaviours, group membership and experiences such of sense of community or trust, and on the *ecological level*, where these constructs are aggregated across a defined environment, such as per capita membership of voluntary organisations or voting rates (Ehsan & De Silva, 2015).

In addition, *structural* social capital, which relates to quantity of connectedness reflected in an individual's observable participation in community networks (Flores et al., 2018; Yu et al., 2015), has been differentiated from *cognitive* social capital, which consist of the subjective qualities of trust, a sense of belonging, and shared values (Silva et al., 2016). Both forms have been associated with better mental health outcomes (Silva et al., 2016).

Social ties serve different functions by connecting homogeneous or heterogeneous groups with varying levels of power and resources. *Bonding* ties relate to informal, horizontal close networks of family and friends, which is often the immediate support to an individual in times of stress (Browne-Yung, Ziersch, & Baum, 2013). *Bridging* social capital links heterogeneous groups, with differing ethnic groups, ages, income levels and so on. These bridging links can enable the generation of resources that may help people 'get ahead' by improving their socioeconomic status (Kawachi, Subramanian, & Kim, 2008). *Linking* connections involve people interacting across vertical institutionalised authority gradients, such as individuals with different levels of power in political or work environments (Poortinga, 2012).

Mental health

A growing awareness has developed around problems associated with the use of psychiatric diagnoses. Evidence suggests that there is extensive heterogeneity within diagnostic categories and overlap between them (British Psychological Society, 2018). The degree of co-morbidity that exists may render counterproductive an adherence to reified and potentially superficial delineations between states of mental distress. In light of these issues, a broad definition of mental health has been adopted for this review. The World Health Organization defines mental health as "a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and

fruitfully, and is able to make a contribution to his or her community" (pg.3, 2012). Therefore, included in the analysis are studies which include any of the following terms as a dependant variable: *mental illness*, relating to specific psychiatric diagnoses; *mental distress*, including states of anxiety and low mood and; *well-being*, referring to positive mental states.

Economic capital and inequality

Defining economic capital solely by individual household income may be problematic as there may be interaction effects between individuals and the characteristic of the neighbourhood in which they live, which could affect mental health. Socioeconomic status, like all forms of status, is intrinsically comparative – individuals triangulate their position via the position of others in the hierarchy (Wilkinson and Pickett, 2019). Therefore, this review included studies that looked at various measures of economic capital at both the individual and area levels, from the immediate neighbourhood to the national scales. Individual level indicators included objective measures such as equivalised monthly income and subjective measures like worrying about not having enough money to buy food. Ecological area-level indicators included average income, proportion of people who were unemployed or receiving welfare assistance. Some studies were also able to explore the effect of inequality of resources or status, as it interacted with social capital, on individual mental health.

1.2 Hypothesised interactions between social capital and socioeconomic measures

Despite the utility of these social capital constructs, they are not always clearly delineated in research. In particular, few multivariate analyses have explored how bonding, bridging and linking social capital are experienced by individuals of differing status, with divergent levels of education or numerous other characteristics. Without explicitly exploring this complexity in statistical models, divergent consequences may be aggregated, and important detail lost. In the literature, numerous possible ways social and economic capital

could potentially interact to affect health have been suggested. For example, social capital may permit the more rapid dissemination of health information thereby producing healthy norms leading to social control of deviant behaviours (Drukker, 2003). Low income, however, may restrain individuals' choice of fitness activities, social opportunities or organisational memberships. Low social capital may reduce job opportunities, thus exacerbating health issues directly though psychobiological pathways such as the impact of stress and indirectly by inhibiting desire to socialise, thereby removing access to social support mechanisms (Ahnquist, Wamala & Lindstrom, 2012). Low economic capital may also intensify these processes. Loneliness is not the same as social isolation but is rather the social equivalent of physical pain, which motivates individuals to seek out the connections they need to feel safe, secure, and content with life (Masi, 2011). Loneliness has been associated with worse physical and mental health (Beutel, et al., 2017) but group affiliations can reduce loneliness which can, in turn, increase well-being in times of stress (Haslam, O'Brien, Jetten, Vormedal, & Penna, 2005).

Kawachi and Kennedy (1999) set out three possible ways in which social capital and inequality may interact; the widening of the social distance between the "haves" and "havenots" could lead to latent social conflict between members of society; increased mistrust could lead to lower voter turnout at elections, inegalitarian patterns of political participation, and social policies that are detrimental to the poor and; the psychological effects of invidious upward social comparisons could shift what is considered an acceptable standard of living.

No consensus currently exists as to what factors are the most significant. Therefore, the scope of this review is relatively broad. It was hoped that by examining the combined effects of varying levels of social capital and economic capital/inequality on mental health outcomes for people of all ages, from children to older adults, across the world, key processes

may be identified. This may enable future research to study these processes in more detail as a result.

2. Method

2.1. Study selection

A literature search was conducted of PsycNET, PubMed, Web of Science and Medline, via ProQuest. Search terms covered the three domains relevant to this review in the title field:

 "socioeconomic status" OR "social class" OR poverty OR poor OR income OR disadvantaged OR deprivation OR deprived OR "socioeconomic factors" OR "socioeconomic position" OR inequality OR socioeconomic status

AND

 "social capital" OR "social cohesion" OR "social participation" OR "social network" OR "community capital" OR "neighbourhood cohesion" OR "informal social control" OR "collective efficacy" OR "neighbourhood disorder" OR "social disorganisation" OR "social disorganization"

AND

 "mental disorder" OR "psychology" OR psychiatry OR "mental illness" OR "mental health" OR "mental well-being" OR "emotional well-being" OR "psychological wellbeing".

The initial search was open to studies from any country, published before December 2018.

Each article was read to determine key elements to be considered and listed in the table. These included: when and where the study was conducted; the ages of the individuals included in the sample and each sample's size; the objective of each study, its design and the

analysis employed; the measures of social capital identified and whether these were structural or cognitive; on what levels the social capital was measured, the individual or ecological level; and the measures of economic capital and mental health. For each study, the main findings as described by the authors were listed separately from the findings relating the relationships between social and economic capital and mental health. With regard to the interactions, studies were analysed according to several themes:

- 1) Were there independent associations between social capital and economic capital on mental health (e.g. was high social capital linked to better or worse mental health outcomes?). The rationale for including this theme was to ascertain whether the social gradient of mental health outcomes, which has been extensively reported in previous research, was replicated and to explore if social capital was associated with a similar gradient.
- 2) Did relationships vary according to the types of social capital involved (e.g. were there different patterns found for structural social capital compared with cognitive social capital?). The rationale for including this theme was that previous research has indicated that there are many forms of social capital which don't always have the same effects on mental health.
- 3) Did social capital have a role mediating or moderating the effect of economic capital in relation to metal health outcome (e.g. was a buffer effect observed in which high social capital protected people from the harmful effects of low economic capital on mental health?) The rationale for including this theme was the focus of the literature review.

From the process of conducting this initial analysis, additional themes emerged, such as the ways social capital may be aversive for some groups or that homogenous and heterogenous links may have different effects.

A quality assessment tool was not used to rate the studies included in this review. This was because adhering to a formalised process to determine the methodological and reporting quality of studies was inhibited by the heterogeneity in the studies included. The use of a single tool that could equally be applied to all of the quantitive and qualitative research simultaneously was considered to lack the necessary specificity required to make the process sufficiently robust. In addition, concerns have been raised in relation to subjectivity and interrater reliability of such tools in this context (Harrison, Reid, Quinn and Shenkin, 2017). It was therefore decided to proceed with the caveat that the review was exploratory and further research would be required to determine the strength or generalisability of any relationships or processed identified.

3. Results



Fig 1. PRISMA diagram of literature review.

This search produced 6163 results. Duplicate and irrelevant studies were excluded through title screening. Of the 197 papers that remained, abstracts were then reviewed, and further exclusions were made if the paper was: related to physical rather than mental health; primarily addressing effects of a secondary characteristic such as gender, ethnicity or rurality of population; unavailable in English; focused on workplace social capital; an opinion paper or related to the validation of a questionnaire.

When abstracts were insufficiently detailed, 46 papers were read in full to ascertain applicability. At this stage, articles were also excluded if: the study explored processes on the international level; socioeconomic status/inequality and social capital were not a primary focus of the study and a mental health measure was not a dependent variable. After this process 32 studies were considered suitable for inclusion in the review – these have been

summarised in the table below (Table 1).

Table 1: Primary studies measuring socioeconomic status, social capital and mental health outcomes.

Authors (Year)	Location	Study design	Population (years) N	Objective	Social capital indicator	Level	Economic capital /inequality indicator	Mental health indicator	Statistical analysis	Main finding	Interaction between social and economic capital	Limitations
Ahnquist, Wamala and Lindstrom (2012)	Sweden	Quantitative cross-sectional data derived from 2009 Swedish National Survey of Public Health.	Adult (18-84) 51414	To analyse the associations and interactions of economic capital and social capital on various health outcomes.	Structural: social participation. <i>Cognitive</i> : interpersonal and institutional/ political trust.	Ind.	Individual: household income, ability to meet expenses and cash reserves.	Mental distress: including sadness, indecisiveness, avoidance sleeplessness (General Health Questionnaire, 12 items)	Multivariate logistic regression	Low economic capital and low social capital were significantly associated with poor health status.	Synergistic effects existed when low economic capital existed with low social capital, particularly low interpersonal trust. If combined, the two elements were associated with a higher risk of psychological distress than if considered alone.	The data are cross sectional which prevents inference of causality. Other factors that were not assessed may have influenced the results – the 46.2% who did not respond to the survey may have systematically differed for responders.
Aminzadeh et al. (2013)	New Zealand	Quantitative cross-sectional data derived from 2007 health survey of high school students.	Adolescent (11-18) 5567	To examine the independent association between well-being and indicators of neighbourho od social capital measured by perceptions participation.	Structural: organisational membership, facilities, physical disintegration and residential stability. <i>Cognitive</i> : trust, reciprocity, sense of community and safety.	Eco.	Individual: worry about not having enough money to buy food, use of rooms as bedrooms, access to a working car, phone, computer etc., number of moves.	Well-being: (World Health Organisation - 5 items), general mood (1 item) life satisfaction (1 item)	Cross- classified random intercept multilevel models	Students living in neighbourhoods characterised by higher socioeconomic status, levels of social cohesion and membership in community organisations reported higher levels of well-being.	Neighbourhood membership in community organisations showed a stronger protective effect for students who were more socioeconomically deprived.	Large area measure (median 2000 people). Causality cannot be inferred. Data only from 'healthier' adolescents who were present at school on the day of the survey. Underrepresentation of rural areas.
Berry (2008)	Australia	<i>Quantitative</i> questionnaires	Adult (19-97) 963	To group members of a deprived rural region according to patterns social capital and identify	Structural: community participation (plus enjoyment). Cognitive: altruistic values, sense of belonging, social	Ind. Ind.	Area: census- based socioeconomi c deprivation index.	Mental distress: including nervousness, depression, tiredness, hopelessness, restlessness, worthlessness	Two-step cluster analysis. Chi-squared and factorial analyses	Four distinct groupings were identified: social capital elite; busy working parents; aging, participating less; and excluded participators.	Excluded participators, with the highest rates of poverty and distress, reported the lowest levels of sense of belonging, social trust, reciprocity and optimism. They did not enjoy	The measures of perceptions of participation exhibited mainly inadequate internal consistency. Focus on rural population only. Lack of qualitative data

				psychological distress.	trust and optimism Reciprocity			and sadness (Kessler, 10 items).			participation, being overwhelmed by family responsibilities and cut off from community life.	prevents deeper understanding of attitudes to participation.
Browne- Yung, Ziersch & Baum (2013)	Australia	Qualitative interviews Quantitative cross-sectional comparing survey data of most and least disadvantaged areas	Adult (18+) 24 Adult (18+) 601	To explore neighbourho od effects on health and social capital creation by looking at people living in contrasting socioeconom ic areas.	Structural: socialising with friends or family, group membership, links to people in prestigious professions.	Ind.	Individual: being in paid work at least six hours per week and having a means tested government benefit health care card.	Instances of mental health problems and distress (depression, anxiety, stress) measured by a self-rated survey and interview questions.	Interpretive thematic analysis Chi square/ Fishers exact or unpaired Student's t tests/Manne -Whitney U	The resources necessary to create social capital such as cultural capital and the ability to socially network, differed according to the socioeconomic status of the neighbourhood.	The economic capital contexts in which people live effect their capacity to create social capital. Low-income people living in low economic capital areas had less linking/bridging and more bonding social capital than low-income people living in more affluent areas but living in an advantaged area didn't guarantee access to social networks.	The qualitative interviews only included two males, therefore the data may represent a largely female perspective. No overall effect sizes for the various conditions were provided.
Buijs et al. (2016)	Czech Republic	Quantitative cross-sectional data derived from 2009–2010 Czech Health Behaviour in School-Aged Children survey	Adolescent (11-15) 4425	To investigate whether an individual perception of community social capital influences the association between economic capital and adolescent well-being.	Structural: participation in clubs or organizations. <i>Cognitive:</i> conviviality, trust and reciprocity.	Ind.	Area: equivalised household income.	Question on life satisfaction (1 item)	Multilevel modelling	Family affluence, perceived wealth and cognitive social capital positively related to life satisfaction.	The association between perceived wealth and life satisfaction was moderated by cognitive social capital, but not structural social capital. The social gradient in life satisfaction was flattened when pupils reported high levels of perceived community social capital.	Did not control for contextual factors such as individual and community characteristics. Limited generalizability given the specific cultural context of the Czech Republic.
Cattell (2001)	UK	<i>Qualitative</i> Semi-structured interviews	Adult (19+) 72	To explore the dynamics between poverty and exclusion by comparing	Structural: Levels and types of connections and participation (e.g. clubs,	Both	<i>Area:</i> level of ward deprivation	Subjective well- being, levels of hopeful/ hopelessness	Thematic analysis	Five different network typologies were identified, emerging from context (dense/weak ties, homo/	Perceptions of inequality and deprivation could create social capital or demoralisation. Stigma blocked trust formation. Heterogeneous	The period and context in which the interviews take place limit understanding of how contemporary social capital and poverty

				two communities	interaction with neighbours). <i>Cognitive</i> : trust, reciprocity and embeddedness of norms.	Both				heterogeneity) which affected social capital and well-being.	neighbourhoods require regenerated local work opportunities to develop bridging ties to form inclusive social capital.	interact to affect well- being and mental health.
Cozzolino (2011)	UK	Study 1 <i>Quantitative</i> RCT	Adult (18-42) 94	Testing the influence of resource distribution on trust and intentions to cooperate.	<i>Cognitive</i> : group identification, trust and cooperation.	Ind.	Individual: family affluence as an indicator of absolute wealth (the family affluence scale) and a relative wealth question	Positive or negative affect (PANAS, 20 items). Level of cognitive concerns (4 items)	One-way ANOVA	Individuals receiving a deficit of resources or a surplus of resources evidenced lower levels of social capital than did individuals receiving equal amounts.	The process was effective for deficit participants, meaning they felt negative emotions relating to those who had more than them, and cognitive for surplus participants, who calculated how much they might redistribute.	The social capital measure was not validated. Unclear how results generalise to longer term mental health conditions or structural social capital in real world environments. Impact of 'legitimacy' unclear.
	USA	Study 2 <i>Quantitative</i> cross-sectional data derived from the 2005/6 Flemish Health Behaviour among School-aged Children survey	Adult (18-89) 1872	To find further, non- experimental , support for some of the inferences derived from Study 1.	Structural: political participation and volunteering <i>Cognitive</i> : 'civic closeness' (from neighbourhood to country level) and willingness to move away.	Ind.	Area: Local area deprivation	Questionnaire measuring 19 affect items in past week (e.g. sad, ashamed, worried, happy, angry, lonely, restless).	Regression analysis	People who felt income differences need to be reduced experienced more negative affect and willingness to move. They had less positive effect, connection to their communities and likelihood of voting.	Support for a causal path of unequal resource distributions generating affective experiences and cognitive concerns of justice, which mediate disengagement and distrust of others.	Indirect measure of economic capital though it was significantly related to income (poorer respondents felt that income differences need to be reduced more than wealthier respondents). Causality unclear as data is correlational.
De Clercq et al. (2012)	Belgium	<i>Quantitative</i> cross-sectional data derived from the 1996 General Social Survey	Adolescent (9-18) 10915	To explore whether social capital at the community level is an independent determinant of	Structural: participation in clubs. Cognitive: general levels of safety, friendliness, reciprocity, trust, and if there were	Ind. Eco.	Individual: Equal or unequal (surplus or deficit) distribution of resources in experiment.	10 questions relating to feeling fit, energetic, sad, lonely, attention, fun with friends etc.	Multilevel regression	Individual level factors (such as family affluence and individual social capital) were positively related to perceived health and well-being. Community level social capital	The social gradient in health and well-being was flattened in communities with a high level of community social capital- this had a celling effect. Economic capital differences in health and well-being also narrowed in communities where a	Missing data on income variable. Lack of differentiation between individual/community and structural/cognitive demotions of social capital. No information of the quality of

			health after taking account of individual level factors.	good places to spend time.					predicted health better than individual social capital.	certain (average) level of community social capital was present.	participation or relationships. Cannot infer causation.
Drukker, Nether- Kaplan, lands Feron and Van Os (2003)	Quantitative cross-sectional data derived from the National Statistics Institute (CBS) and questionnaires	Child (11-12) and their families 539	To examine how socio- economic deprivation and social capital are associated and how they affect quality of life.	<i>Cognitive</i> : social cohesion, trust and informal social control - the willingness to intervene in hypothetical neighbourhood threatening situations.	Eco	Individual: Measure of the feeling that the Government ought to reduce income differences (significantly related to income).	Child Health Questionnaire – Child Form (CHQ-CF87, 87 items)	Multilevel regression	Neighbourhoods with higher socioeconomic deprivation, generally, had lower levels of informal social control, social cohesion and trust.	Children may require higher levels of informal social control, which corrects externalised deviant behaviour, for healthy psychological development. However, it seems harder for this to form in deprived areas which have less social capital or greater need for defensive aggression.	The response rate in the community survey measuring social capital was only 48%, and the response rate in neighbourhoods with higher socioeconomic deprivation scores was even lower which may have skewed the results.
Drukker, Nether- Krabbenda lands m, Driessen and van Os (2006)	Quantitative cross-sectional data derived from the Maastricht Statistics Netherlands, Psychiatric Case Register	Adult (20-65) 98	To explore the relationships between socioeconom ic status, social capital and treated incidence of psychosis.	Structural: residential instability. Cognitive: informal social control, social cohesion & trust.	Eco.	Individual: affluence (ownership of a vehicle or computer, child having own room, holidays)	A diagnosis of schizophrenia	Multilevel regression	Increase prevalence for individuals with low economic capital but no evidence that area level environmental factors impacts on incidence or duration of treatments.	Number of inpatient contacts was higher in neighbourhoods high in informal social control (after controlling for socioeconomic deprivation) and when the individual had higher educational levels, which may aid access to services.	Cannot disentangle specific reasons for inpatient admission. Low power due to small sample size. Socioeconomic and demographic variables had missing values.
Elgar, Trites Canada and Boyce (2010)	Quantitative cross-sectional data derived from the 2006 Health Behaviour of School-aged Children.	Adolescent (11-16) 9717	To examine whether exposure to neighbourho od social capital, reduces socio- economic differences in physical and	<i>Cognitive</i> : general levels of safety, friendliness, reciprocity, trust, and if there were good places to spend time	Ind.	Individual: car and computer ownership, number of vacations, if child had their own bedroom.	Feeling low, irritability bad temper, feeling nervous, difficulty sleeping, somatic symptoms (8 items). Life satisfaction (1 item). Recent fight (1 item).	Linear regression	High levels of social capital reduced or eliminated economic capital differences on all health outcomes. Social capital nullified economic capital effects on psycho- logical symptoms and life satisfaction and narrowed economic capital differences in	Areas of low social capital and high economic capital had fewer somatic or psychological symptoms, injuries and fights and had higher life satisfaction. In areas with high social capital, no economic capital effects were found on psychological symptoms or life satisfaction, but	Causality cannon be inferred. The measures of economic capital and social capital were brief and relied solely on child reports.

				psychological health outcomes.				Recent injury (1 item)		somatic symptoms, injuries and fighting.	high economic capital related to more somatisation, fights and injuries.	
Frank, Davis and Elgar (2014)	Canada	Quantitative longitudinal comparisons of data from self- completion surveys at three time points	Adult (18+) 355	Investigated whether perceptions of social capital moderate the relation between financial strain and health, both mental and physical.	Structural: participation in community, neighbourhood/ family and friends connections, <i>Cognitive:</i> social agency, feelings of trust and safety, tolerance of diversity and value of life.	Ind. Ind.	Area: average income	Perceived stress (14 items), general anxiety (20 items), depression (20 items)	Intercepts- only hierarchical linear model (nested data: assessment cycle (times 1, 2, and 3) within individuals, individuals within families)	Financial strain positively related to perceived stress and symptoms of anxiety and depression, whereas high social capital related to less stress and fewer symptoms of anxiety and depression.	The effects of financial strain on stress and depressive symptoms were stronger when social capital was lower – social capital moderated the effects of financial strain. People reporting higher social capital reported lower anxiety. Social withdrawal due to financial strain may exacerbate mental illness.	Exclusive reliance on self-report data, which presents the possibility of reporting bias or shared method variance influencing the associations between variables.
Ge (2017)	China	<i>Quantitative</i> cross-sectional data derived from 2013–2014 China Education Panel Survey	Adolescent (12-15) 19487	To examine the relationship between economic capital and children's' well-being and to investigate the mediating effect of family social capital.	Family social capital <i>Structural</i> : frequency of activities done with parents (e.g. eating dinner, watching movies, going out on trips) <i>Cognitive</i> : intimacy of relationships with each parent.	Ind. Ind.	Individual: occupation, education.	Questionnaire measuring frequency of depression, anxiety, unhappiness, meaninglessness , and sadness (5 items).	Structural equation modelling	Family social capital played a complete mediating role in the relationship between economic capital and children's psychological well- being. No direct association between economic capital and well-being was observed.	Higher economic capital was associated with enhanced parent-child relationship and more parental involvement, which predicted higher children's psychological well-being.	The cross-sectional method could not test the causal relationship between the variables. Narrow definition of social capital as only focused on family.
Greenhow and Burton (2011)	USA	Quantitative cross-sectional data derived from an original survey	Young adult (15-21) 607	To examine the relationship between use of online social network	Structural: Connection and involvement in school community Cognitive:	Ind. Ind.	Area: percentage unemployed, with high and low incomes, social	Life satisfaction (5 items). Self- esteem (7 items).	Regression analysis	Being part of a social network website primarily helped students deepen thein existing close relationships (bonding social capital) and, to	Students of low economic capital could improve social capital through information access, emotional gsupport, peer feedback and reinforcement of	Sample was not representative of low- income students generally. No exploration of the detrimental effects of social networking on

		<i>Qualitative</i> semi-structured interviews	Adolescent (17-19) 11	website use, social capital and well- being in low income students.	trust, reciprocity, sense of social support		security, mean income.			lesser extent, initiate, develop, and sustain weaker relationships (bridging social capital).	identity on social networking sites. This increased opportunities, academic support and progression.	social capital (e.g. high screen time, online bulling). No control group of how higher economic capital students.
Haines, Beggs and Hurlbert (2011)	USA	<i>Quantitative</i> cross-sectional data derived from a 1995 telephone survey	Adult (18+) 497	To determine if network social capital mediates the relationship between neighbourho od disadvantage and mental health.	Structural: using individuals named by the participant to build a network map representing density, type of connections and the resources they could provide	Eco.	Individual: marital status, education, employment, living condition.	Depressive symptoms (CES- D, 7 items)	Hierarchical linear modelling	Network social capital mediates neighbourhood disadvantage on depressive symptoms even when perceived neighbourhood disorder (an established mediator of the association of disadvantage and depression) was controlled for.	The socioeconomic characteristics of neighbourhoods may influence health through network social capital and informal social control. Individuals whose networks offer better access to mainstream individuals (embedded education resources) and transportation resources experience fewer depressive symptoms.	The sample was small and contains a limited number of neighbourhoods which could not separate effect linked to racial composition. Correlational data cannot establish causality.
Han et al., (2018)	South Korea	Quantitative cross-sectional data derived from a 2012 Korea Welfare Panel Study survey.	Older adult (60+) 5969	To investigate the association of cognitive social capital, including interpersonal trust and reciprocity, with depressive symptoms in the elderly.	Cognitive: trust and reciprocity	Ind.	Area: postal code house- price registrations.	Depressive symptoms (Centre for Epidemiologic Studies Depression, 11 items).	Logistic regression	Low interpersonal trust and reciprocity levels were significantly associated with depressive symptoms in the elderly. No significant moderating effect of economic capital on the association between cognitive social capital and depressive symptoms.	Reciprocity level mediated the association between household income level and depressive symptoms. The association between trust and depression was significant for people who had low income levels but not those who had high levels of income.	Causality cannot be inferred. No structural measure of social capital and only two single-item unvalidated questionnaires used to measure trust and reciprocity.
Hanks (2008)	USA	<i>Qualitative</i> Focus groups.	Adult (18+) 55	To describe and analyse neighbourho od effects on	Structural: informal social control, neighbourhood	Both	Individual: Family Affluence Scale (FAS 22)	Purposelessness , hopelessness and externalising	Iterative content analysis	Parents' alienation from and distrust of public sources of formal social control,	In this culture, residents avoided enforcing behavioural norms for any children but their	The sample was small, and entirely non- European American so the separate effects

				children's mental health, focusing on the effects of social capital.	social cohesion, interaction barriers <i>Cognitive:</i> behavioural norms	Both	four items that address family assets or conditions indicating wealth.	behaviour such as juvenile delinquency and violence.		such as policemen, prevented the emergence of positive informal social control.	own due to fear of retaliation. Ambivalence around short-term vs long-term values clashed and childrens' relationships, prospects and mental health suffered.	linked to racial composition factors could not be identified. Nonspecific measures of mental health.
Haseda et al. (2017)	Japan	Quantitative cross-sectional data derived from the 2013 Japan Gerontological Evaluation Study survey.	Older Adult (65+) 104920	To screen the potential contextual factors associated with income- based inequality in older adults' depression.	Structural: social participation (clubs, volunteering, cultural groups etc) Cognitive: quality of social relationships (having friends, trust, reciprocity)	Eco.	Individual: Family income and perceived socio- economic status (self- rating their money, level of education, and relative respect level of their job).	Prevalence of depressive symptoms, Geriatric Depression Scale (GDS-15, 15 items)	Multiple linear regression	Inequalities in prevalence of depression in both genders increased with perceived increases in unemployment and economic inequalities and decreased with a higher prevalence of participation in local activities.	Factors associated with shallower gradients in depression for men included higher participation in local activities and reception or provision of social support, which did not show significant association among women.	Measures cannot indicate direction of causality between depression and social engagement. No incorporation of lagged associations. Repeated regression analyses with various independent variables, which increases the chances of type I error.
Haseda, Kondo, Takagi and Kondo (2018)	Japan	Quantitative cross-sectional data derived from the 2013 Japan Gerontological Evaluation Study survey	Older adult (65+) 87656	To evaluate the variable associations between individual income and depressive symptoms across communities with different levels of social capital.	Structural: participation (sports, culture, volunteering etc) Cognitive: social cohesion (trust, reciprocity and attachment to the residential area)	Eco.	Individual: a combination of household economic condition, parental education, and parental occupational status.	Prevalence of depressive symptoms (Geriatric Depression Scale (GDS-15))	Multilevel Poisson regression	Low-income was associated with higher depression. Higher community- level participation decreased depressive symptoms among middle- and higher- income people but increased symptoms in lower-income people, particularly in men.	Community civic participation might increase the risk of depressive symptoms among the poor. Privileged people can exploit their connections to reinforce their status, social pressure could exclude or stigmatise people of lower socioeconomic status.	Cannot infer causality. No strong support for the validity of using school district units to evaluate community social capital. Substantial amount of missing data. May not generalise to less collectivist Western countries.
Kabayama, Watanabe, Ryuno and Kamide (2017)	Japan	Quantitative cross-sectional data derived from a self-	Older adult (60-89) 1836	To determine the individual social capital subfactors in	Structural: participation (i.e. groups, volunteering,	Ind.	Individual: family incomes below the county	Mental Component Summary of the Medical Outcomes Study	Factor analysis and multiple linear regression	People who participated in more social activity groups were in better health. Three	The hierarchic aspect was significantly negatively associated with mental health, whereas the harmonious and, to a	Expectations of social engagement in Japan differ from the West which may limit generalisability. Cannot

		administered questionnaire		community- dwelling older adults, and to analyse links with physical and mental health.	religious association) <i>Cognitive:</i> attitudes about the quality of the relationships and interactions and how participants felt about these.	Ind.	median and participation in an after- school program aimed at improving college access for low- income youth.	Short Form-36 (36 items).		components of the individual social capital aspect were identified and termed harmonious (bonding), hierarchic (linking) and diversity (bridging).	lesser extent, diversity aspects were significantly positively associated. This may have been due to the restriction of personal freedoms or a sense of obligation or burden.	infer causal relationships. Self- reported health rather than diagnosis. Poor internal consistency for the diversity aspect. Purely urban and older population.
Kim and Kawachi (2007)	USA	Quantitative cross-sectional data derived the 2001 Behavioural Risk Factor Surveillance System survey and other data sources	Adults (18+) 173236	To investigate the relation between state-level social capital and adult health- related quality of life in the United States.	Structural: mean organisational participation, number of organisations/ non-profits per 1000 population, voting, volunteering, informal sociality. Cognitive: trust	Eco. Eco.	<i>Area:</i> state level mean income	Questions asking ' how many days during the past 30 days was your mental health (stress, depression, and problems with emotions) not good?" and about activity limitation.	Two-level, multivariable regression	Higher state-level social capital predicted fewer recent days of poor physical and mental health and activity limitation. Social capital appeared to mediate the effects of income inequality on health-related quality of life.	Intermediate and high state social capital appeared to reduce, and in some cases (particularly related to having authority in organisations or voting) reverse the direction of the beneficial associations of higher state mean household income with mental health outcomes.	Narrow measures of mental health and cognitive social capital. Omitted contextual factors and missing data may have led to bias. The state level modelling prevents inferences about neighbourhood level effects. Causality cannot be inferred.
Li, Liang, Yin and Zhang (2018)	China	Quantitative cross-sectional data derived from a school- based survey	Child and adolescent (9-15) 1314	To examine how family social capital mediates the relationship between poverty and children's anxiety and depression	Structural: behaviours children/parents should do for/with each other <i>Cognitive</i> : how should they feel, rules about how to behave	Ind. Ind.	Area: factors derived from the US Census including percent of people below the poverty line; receiving public assistance; with less than high school education	Anxiety (SACS, 10 items) Depression (CES-DC, 20 items)	Structural equation modelling	Family social capital partially mediated the influence of poverty on children's internalizing symptoms. Poverty had a direct effect on children's anxiety and depression and also impaired the formation and transmission of family social capital.	Low economic capital can undermine child development because it can reduce the quality and quantity of resources parents can invest in their children. Integrating family social capital into parent–child interaction, particularly for low economic capital families, may support child mental health.	Causality cannot be conclusively inferred. Excluded the effects of other important aspects of social capital, such as peer, school, and community social capital. China's cultural context may not readily generalise to Western countries.

Large Scale Research Project

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McAneney et al. (2015)	North Ireland	Quantitative Interview- administered questionnaires	Adults (16+) 1209	To examine how individual and area- level factors across different levels of neighbourho od deprivation.	Structural: civic and social participation Cognitive: trust, local area satisfaction, view of problems in the neighbourhood.	Ind. Ind.	Individual: household income and education level	Mental health: Short- Form 8 Health Survey (SF-8) and the EQ-5D-3 L (5 items, including anxiety and depression). Mental well- being (WEMWBS, 14 items).	Multi- variable linear regression	Variability in the measures (38 % for mental well-being and 30% for mental health) could be explained by individual and community characteristics. Only social connections and local area satisfaction were associated with well- being across all socioeconomic status groups and only associated with mental health in affluent areas.	Social capital interventions may not have equivalent impacts in rich and poor neighbourhoods. Trust and social participation did not predict mental health or mental well- being. Lower trust was associated with better mental health in the more affluent areas. Civic participation was associated negatively with mental well-being in the most deprived areas.	Measures do not distinguish mediators from moderators or cause and effect. No area-level measurement of social capital.
Nielsen et al. (2015)	Denmark	Quantitative cross-sectional data derived from Health Behaviour in School-aged Children Methodology Development Study 2012	Adolescent (11-15) 3549	To examine if the association between socioeconom ic position and emotional symptoms among adolescents is modified by school	<i>Cognitive:</i> trust, conviviality, belonging, and reciprocity at the school class level	Ind.	Area: percentage with income below the federal poverty level according to the 2000 US Census.	Feeling low, irritable/bad tempered and nervous (HBSC Symptom Check List, 3 items)	Multilevel logistic regression (three level random intercept model with students nested in school classes nested in schools	Children were more likely to have emotional problems in school classes with low level of trust. Economic capital did not independently predict emotional symptoms.	In classes with high and moderate trust, there were no significant differences in emotional symptoms between high and low economic capital groups. However, children, especially girls, in low trust environments were much more likely to have emotional symptoms if they had a low socioeconomic	Cannot infer causality. Levels of trust could be diminished by emotional symptoms. Non-participation rates may have skewed results. Narrow measure of economic capital and social capital. Unmeasured potential confounds (area socioeconomic status, parent mental

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			social capital.						status.	health etc.).
O'Donoghu Ireland e et al. (2016)	Quantitative cross-sectional data derived from interviews, questionnaires and the 2006 census of Ireland	Adult (16-65) 292	To determine <i>Structural:</i> whether the proportion incidence of individual first episode engaged in psychosis or voluntary v duration of (also measu untreated social psychosis is fragmentat	<i>Eco.</i> of vork ured ion	Individual: equalized household income.	First episode psychosis (not due to a general medical condition) (The Structured Clinical Interview for	Zero-inflated Poisson regression	The median duration of untreated psychosis was longer for the most deprived areas compared to the most affluent. Duration untreated	There was a 3.4-fold increase in first episode psychosis incidence in the most deprived areas compared with the most affluent. It was also higher in areas with less social capital or more	Did not measure potential confounders (i.e. individual – area level inequality, crime rates, the impact of childhood deprivation).

			associated with the level of social deprivation, social capital and other area level factors.	which may affect social capital)			DSM-IV (SCID)). Duration of untreated psychosis was established using the Beiser scale.		was significantly higher in more socially fragmented neighbourhoods.	social fragmentation (in the latter case, just with females).	Cannot determine causality (impact of social drift). Narrow measure of social capital.
Phongsava Australia n, Chey, Bauman, Brooks and Silove (2006)	Quantitative cross-sectional data derived from 1997 New South Wales Population Health Survey (telephone)	Adult (16+) 12879	To investigate whether if cognitive and structural social capital independentl y correlate with positive mental health and determine the impact socioeconom ic status.	Structural: community participation, neighbourhood connections and reciprocity. <i>Cognitive:</i> trust and feelings of safety.	Ind.	Area: socio- economic in dices for area including proportions of households with low income, high unemployme nt, rented dwellings and individuals not fluent in English	Symptoms of psychological distress such as nervousness, hopelessness, restlessness, worthlessness and depression. Kessler scale (K10, 10 items)	Multiple logistic regression	Neighbourhood connections and safety/trust were moderately associated with distress but a significant relationship between community participation and distress was not found.	Data suggested that individual level economic capital indicators have a role in moderating the relationships between community participation and distress as well as feelings of trust and safety and psychological distress- when economic capital was controlled for, social capital was no longer protective.	Excluded people without telephones. It did not measure the nature or quality of community participation. Causation cannot be inferred. It is possible that the links between social capital and distress may be mediated by the physical environment which was not measured.
Pinxten and Belgium Lievens (2014)	Quantitative cross-sectional data derived from the 2011/12 Sexual Health in Flanders Survey	Adolescent / adult (14-80) 1832	To determine to what extent the three forms of capital (economic, social and cultural) explain differences in health.	<i>Cognitive</i> : social cohesion and support.	Eco.	Area: Gini coefficient to evaluate within- community income inequality	Impact of emotional problems: short- form health survey (SF-12, 12 items)	ANOVA and stepwise regression	Indicators of each of the forms of social and economic capital had positive net effects on mental health but indicators of cultural capital did not.	Three pairwise interactions between different forms of capital showed statistically significant interaction effects but these were judged to be not consistently interpretable and so were no reported.	Not reporting findings. Low response rate may skew the results. Narrow measures of mental health and social capital. No measure of the relational aspect of social position. Causality cannot be inferred.
Scheffler, USA Brown and Rice (2007)	<i>Quantitative</i> cross-sectional data derived from the 1999, 2000, and 2001 US National	Adult (25+) 37172	To examine how the association between individual- level distress	<i>Structural:</i> proportion of volunteers in an area.	Eco.	Individual: family income Area: levels of people not in employment	Felt sad, restless, hopeless, worthless, nervous, and if everything was	Two-level multilevel linear model regression with a	Lagged area-level social capital was negatively related to distress among individuals	Results suggested that there may be diminishing returns to social capital depending on context. For people of lower income, distress was	No measure of informal structural social capital or cognitive social capital. Causation cannot be inferred. Individuals were not

	Health Interview Survey and additional data sources.	and lev cap wh tim om var wa cor	d area vel social pital varies nen non- ne-varying nitted riable bias as ntrolled.				an effort (K6, 6 items).	random intercept	whose family income is less than the median. These associations were much larger when non-time-varying area-level omitted variables were controlled for.	much more strongly associated with social capital than for richer people.	randomly allocated to area so migration occurred based on area and individual characteristics which may have also influenced levels of distress.
Song (2011) USA	Quantitative cross-sectional data derived from the 2004/5 the social capital: Its Origins and Consequences telephone survey	Adult To (21-64) the and 3000 effe soc on and inte effe the rela bet oth stru ant and	examine e direct d indirect fects of cial capital d istress d its rervening fects on e lationships tween her ructural tecedents d distress.	Structural: resources potentially available through network connections	Ind.	Individual: subjective social status, education, occupational prestige, and annual family income	Depression symptoms (CEDS Depression Scale, 13 items)	Path analysis model, ordinal logistic regression, ordinary least squares regression.	Social capital was more strongly inversely associated with distress than annual family income (both were significant). Social capital mediated the relationship between distress and other factors including, age, ethnicity, occupational prestige, annual family income and education.	Annual family income had both direct effects on mental illness and indirect, through social capital. Occupational prestige only significantly impacted mental health when mediated through social capital.	Limited measure of social capital (voluntary participation was modelled separately). Causation cannot be inferred. Sample excluded people who have never been employed or didn't have a telephone, thus skewing results.
Stafford, UK De Silva, Stansfeld and Marmot (2008)	Quantitative cross-sectional data derived from the Health Surveys for England and Scotland surveys (1994-1999) and a postal questionnaire.	Adult To (16+) ext 9082 nei od cap cor me dise	examine ternal easures of ighbourho social pital and mmon ental sorders.	Structural: contact with local family, contact with local friends, associational membership and integration into the wider community the local area. Cognitive: trust, attachment to neighbourhood, tolerance of	Eco. Eco.	Individual: equalized household income	Common mental disorders (General Health Questionnaire, 12 items).	Multilevel logistic regression models.	Support was found for the buffering hypothesis of social capital. The only significant association between social capital, and particularly greater friendship ties and high tolerance, and reduced mental disorders was for people living in deprived circumstances.	Higher levels of neighbourhood attachment were associated with higher odds ratio for common mental disorders in deprived households but not in non- deprived households. These individuals' relationships were mostly with people in the same deprived neighbourhood and rarely with people further afield.	Separate individuals reported on social capital and mental disorder, limiting measuring individual level effects. Insensitive measure of MH. There was not sufficient power to investigate household level variation in mental disorders which can result in over- estimation of neighbourhood level

					others, and reciprocity.							variation in health functioning.
van der Linden, Drukker, Gunther, Feron and van Os (2003)	Nether- lands	Quantitative unmatched analyses of data from a matched case- control study with data on mental health service use, area social capital and socioeconomic deprivation.	Child (6-13) 56 (+ 206 controls)	To assess the interactive influence of neighbourho od measures of socioeconom ic deprivation and social capital on children's mental health service use, independent of confounders.	Structural: informal social control Cognitive: social cohesion and trust	Eco.	Individual: equivalent income	Number of 'episodes of care' (defined as the time interval between a first service contact for a mental health problem and a 'last' contact with the services.	Multilevel logistic regression analysis	Children living in more deprived areas had a higher risk of contact with mental health care services. Social capital did not exert main effects, but strong trust and social cohesion mitigated the risk- increasing effect of deprivation.	Some deprived neighbourhoods did not have low trust and some advantaged neighbourhoods do not have high trust. Clinical populations may be less sensitive to the effects of social capital than the general population but groups with strong social bonds tend to react to protect the mentally ill.	Mental health care use does not only depend on severity of symptoms but is also a result of referrals which may be less in deprived areas. The neighbourhood exposure variables were collected after identifying the cases and the controls. Therefore, causality cannot be inferred.
Vilhjalmsdo tti-r, Gardarsdot tir, Bernburg, and Sigfusdottir , (2016)	Iceland	Quantitative cross-sectional data derived from Statistics Iceland and a 2006 national population survey.	Adolescent (15-16) 5958	To examine whether income inequality within neighbourho ods is associated with emotional distress and the role of social capital in mediation.	Structural: social ties among parents in the neighbourhood Cognitive: reciprocity, contentment with the neighbourhood, feeling of security collective efficacy, institutional trust.	Ind. Ind.	Individual: educational attainment, income.	Symptoms of depression and anxiety (12 items).	Multilevel modelling	Income inequality increased adolescent emotional distress net of their household and neighbourhood deprivation. Cognitive but not structural, social capital (neighbourhood contentment, sense of security and social trust) reduced distress.	Inequality did not independently predict distress or mediate social capital but rather, social capital suppressed the effect of neighbourhood income inequality on emotional distress.	Rural schools with few respondents were deleted from the sample. Causality cannot be inferred. Most of the total variance was located at the individual level.
Wu et al. (2010)	China	<i>Quantitative</i> longitudinal data derived from the China Seven Cities Study	Adolescent (11-19) and their families	To understand the link between community	Structural: Interactions with parents and rules. Cognitive: safety,	Ind. Ind.	Area: mean household income.	Depressive symptoms (CES Depression Scale, 20 items).	Structural equation modelling.	Higher community social capital was the strongest predictor of lower level of adolescent	Higher family financial capital predicted increased depressive symptoms both directly and indirectly through its	As secondary analysis of data from a study not designed specifically to assess social capital, the items

prospectively test the effects of diverse factors.	5164	and family interconnectedn social capital, ess, friendships. human capital, financial capital, and depressive symptoms.	depressive symptoms. High poverty, low allowance and parental education were also significantly correlated with increased depressive	negative effect on family social capital. Too little financial capital restricts necessary resources but too much sacrifices the time that parents could spend with their children.	relevant to these constructs were not comprehensive. No measure of school social capital. High attrition rates may skew results.
			symptoms		
			symptoms.		

Level: Ind. = individual and Eco. = ecological level

4.1 Social capital as a buffer

Numerous studies reported that high social capital flattened the mental health gradient between people of differing economic capital (Aminzadeh et al., 2013; Buijs et al., 2016; De Clercq et al., 2012; Elgar, Trites, & Boyce, 2010; Frank, Davis, & Elgar, 2014). Poor outcomes tended to be much more strongly associated with low social capital for people with low economic capital than for more affluent people. (Scheffler, Brown & Rice, 2007; Stafford, De Silva, Stansfeld, & Marmot, 2008). The negative association between depression and trust was significant for people who had low economic capital but not for those with high economic capital, however, depression was significantly negatively correlated with reciprocity across all income levels (Han et al., 2018). The same was true in the microcosm of the classroom adolescents in low trust environments were much more likely to experience distressing emotions if they had low economic capital but this association disappeared in classes with moderate or high levels of trust. This provided support for the buffering effect of social capital (Nielsen et al., 2017). However, this process seemed to have a ceiling effect after which point further increases to social capital no longer corresponded to increases in mental health (De Clercq et al., 2012).

4.2 Interrelated processes

Phongsavan, Chey, Bauman, Brooks and Silove (2006) found evidence that economic capital mediates the relationships between structural social capital (participation), cognitive social capital (trust and safety) and mental health as, when economic capital was controlled for, social capital was no longer independently protective. It also seemed that social capital, in turn, mediates and mitigates the relationship between economic capital and mental health. Song (2011) found that family income had both direct effects on mental health, and indirect
through social capital. van der Linden, Drukker, Gunther, Feron, & van Os (2003) found trust and social cohesion reduced the impact of deprivation on mental health.

4.3 Forming social capital

Although inequality was shown to heighten the psychological distress associated with deprivation (Vilhjalmsdottir, Gardarsdottir, Bernburg, & Sigfusdottir, 2016), Cattell (2001) found that in some contexts people could be united by their difficulties and create social capital. However, if the community experienced significant heterogeneity or stigma, trust proved harder to create and demoralisation occurred. Communities with lower economic capital tended to have lower social capital (Drukker, Kaplan, Feron, & Van Os, 2003; Li et al., 2018).

4.4 Aversive social capital

Some groups, such as the Excluded Participators identified by Berry (2008) experienced low economic capital and low social capital. For them, community participation was experienced as aversive as they felt overwhelmed by their responsibilities and isolated. Financial strain may lead to people withdrawing which can further exacerbate mental health issues (Frank et al., 2014). Haseda et al. (2018) found that community participation decreased depressive symptoms among people of mid- and high-economic capital but increased them in those with low economic capital. The authors suggested that as privileged people can exploit their connections to reinforce their status, social pressure could exclude or stigmatise people of lower socioeconomic status. This may be particularly true for political contexts. Civic participation was negatively associated with well-being in deprived areas (McAneney et al., 2015). This supports previous research that showed political participation was associated with poor health in deprived areas but not in more affluent areas (Poortinga, 2012). Kabayama, Watanabe, Ryuno and Kamide (2017) found hierarchic interactions, typical of linking social capital, were associated with worse mental health, possibly due to restriction of freedom and feelings of obligation or burden experienced by individuals in these contacts.

4.5 Interactions with high economic capital

Some evidence suggested that high economic capital combined with high social capital could also have adverse consequences. For example, adolescents who had both showed more somatisation and physical injuries than those who had high economic capital but low social capital (Elgar, Trites, & Boyce, 2010). It was not clear if this was the result of conflict associated with greater sport participation, whether perhaps adolescents with strong social capital but comparatively poor economic capital felt more able to manifest aggression in these contexts or some other factor. Kim and Kawachi (2007) found that, although high social capital, having high economic capital seemed to increase mental health difficulties. McAneney et al. (2015) found that lower trust was associated with better mental health in affluent areas. Wu et al. (2010) found that both low and high economic capital. Low income restricted necessary resources but too much was associated with a decrease in the time that parents could spend with their children.

4.6 Bridging, bonding and linking social capital

Browne-Yung, Ziersch and Baum (2013) found that low economic capital individuals living in a deprived area had more bonding social capital but less bridging and linking social capital, which can confer opportunities to 'get ahead', than people with low economic capital living in more affluent areas. Although bonding was discovered to be a buffer against some of the problems associated with low economic capital (Vilhjalmsdottir et al., 2016) it could also increase mental health problems in areas of low economic capital as people only

connected to others in their deprived neighbourhood (Stafford, De Silva, Stansfeld, & Marmot, 2008). Low income people living in more affluent areas may have had greater access to linking social capital but lower access to bonding ties than low economic capital individuals living in deprived areas, seemingly due to their lower comparative status in relation to their neighbours (Browne-Yung, Ziersch, & Baum, 2013). Attachment to their community was associated with greater risks of mental health difficulties for deprived groups (Stafford, De Silva, Stansfeld, & Marmot, 2008). Students of low economic capital found that using social networking sites helped them strengthen bonding and bridging social capital (Greenhow & Burton, 2011).

4.7 Structural and cognitive social capital

Although not all the studies included measures of both constructs, those that did suggested that cognitive and structural social capital did not have the same effects on mental health. The association of perceived wealth and life satisfaction was moderated by cognitive, but not structural, social capital (Buijs et al., 2016). This was also found to be the case for neighbourhood contentment, sense of security and trust (Vilhjalmsdottir et al., 2016). Indeed, trust seemed to be an active ingredient in the operation of social capital across the studies that measured it. Although this in consistent with previous research (Ehsan & De Silva, 2015), the design of most studies prevents strong inference about causation or which processes were key to differences in mental health across different populations.

4.8 Level of effects and processes

Social capital worked on multiple levels simultaneously. Several studies suggested that community-level social capital was particularly influential for mental health outcomes (De Clercq et al., 2012; Haines, Beggs, & Hurlbert, 2011). In two studies, family social capital mediated the association between mental health and socioeconomic status, with higher

economic capital predicting increases in parental involvement, enhanced parent-child relationship and increased resources available for parents to invest in their children (Ge, 2017; Li et al., 2018). In addition, the associations between social capital, mental health and income seemed to present differently for men and women. Although studies that primarily explored gender differences were excluded from this review, Haseda et al., (2017) found social capital processes that reduced health gradients for men, such as participation, did not show the same protective effect for women.

4.9 Informal social control

Evidence did suggest that social capital affects how individuals influence each other's health-related behaviour. Informal social control which blends cohesive interactions and collective efficacy (Hanks, 2008) differed between deprived and affluent communities. In communities that struggled with deprivation and its sequelae, people were less willing or able to correct others' externalised deviant behaviour, which would have made the neighbourhood as a whole feel safer. Hanks (2008) also found that, in certain communities, alienation from and distrust of formal sources of control such as the police prevented the emergence of positive informal social control. Reduction in informal social control was associated with mental health outcomes. van der Linden, Drukker, Gunther, Feron, & van Os (2003) found that individuals from areas with higher informal social control, who were experiencing psychotic symptoms, were more likely to receive inpatient care, after controlling for socioeconomic deprivation. van der Linden et al. suggest people these neighbourhoods seek professional help to support members of their communities who are unwell. O'Donoghue et al. (2016) found that instances of first episode psychosis were much more common in areas of low economic capital and/or social capital, and people in these areas went untreated for longer than in areas with more resources.

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4. Discussion

The studies included in this review support previous findings that high economic capital and high social capital each tend to be positively associated with better mental health. However, the picture became more complicated when these two elements were considered simultaneously. Evidence supported the claim that social capital acted as a buffer against the detrimental impacts of deprivation on mental health. This effect could partially be explained by the fact that individuals who have less access to financial resources are more dependent on resources that could be provided by their community connections. The absence of both would mean they are vulnerable to numerous stressors.

However, there was also evidence that social capital can be harmful to mental health for groups with low or high economic capital. Low economic capital combined with low social capital seemed to produce synergistic effects which created more psychological distress than suggested by considering each individually (Ahnquist, Wamala, & Lindstrom, 2012). Some communities with both high economic and high social capital, such as trust, also seemed to have poor mental health outcomes. It may be that those with more resources and strong social connections felt more pressure to share with their community than did those in communities with low trust. In addition, evidence suggested that interactions between individual and community level social capital may also cause difficulties as a individuals may not be able to access the benefits of high community level social capital if there is a disconnect between their own and the wider community's level of economic capital (Browne-Yung et al., 2013). Alternatively, a community with high social capital for that person (Hanks, 2008). Conceptualisations that describe social capital as arising from only the individual or group level may be insensitive to such and interaction effect between these levels.

Early adverse life events can have long-term consequences for an individual's opportunities and capacity to gain acceptance and participate in resourceful social capital networks, thereby maintaining inequalities (Browne-Yung et al., 2013). Low economic capital may inhibit the desire to interact with others and thereby reduce the social support that may be received. Disconnection from one's community may therefore be both a consequence and a cause of low social capital. This suggests that the socioeconomic contexts in which people live affect their capacity to create social capital and may restrict opportunities. Therefore, it may be useful to understand which kinds of social capital are available to particular groups in practice, as some forms have been found to be more supportive of mental health then others.

It may be that, at either extreme, high economic capital can have adverse effects, although these may be caused by different processes. Experimental evidence helped elucidate how inequality may affect those with a greater or smaller share of the resources differently. Cozzolino (2011) found participants who were given less of a pool of resources experienced negative emotions which seemed to mediate the relationship between having less and experiencing distrust and disengagement, whereas the experience for those with more resources was largely cognitive. It seems that these emotions could give rise to latent social conflict between members of society as hypothesized by Kawachi and Kennedy (1999). However, no study that examined inequality explored the issue of unfairness which recent evidence suggests may be implicated in negative outcomes (Starmans, Sheskin & Bloom, 2017). Therefore, as these factors were confounded, it is unclear if the perceived injustice of socioeconomic resource distribution affected mental health outcomes. Nevertheless, as articulated by Haseda et al.(2018), in a highly segregated community, organisations for the rich and poor may be completely different and so may give rise to different implications for

social capital for each group. It is worth noting that undifferentiated averaged levels of structural social capital may fail to detect these differences.

5. Limitations and strengths

This review included diverse studies examining the interactions between socioeconomic status, social capital and mental health. Although its breadth helped to elucidate this complex field, the heterogeneity of the studies means strong conclusions are hard to draw about the impact on specific communities as processes may differ between them (for example, the differences between genders or countries).

There were several other limitations of this review that must be noted. Firstly, the measures of the constructs were not consistent or robust. Significant variation in kinds of social capital, economic capital and mental health measures were used. The various studies explored social capital via different levels of analysis from neighbourhood through to county and state levels. It may be that each measured different kinds of processes, ranging from daily interactions between neighbours through to the impact of socially focused organizational structures and state-level social policies, which may not be easily compared (Lochner, Kawachi & Kennedy, 1999). The areas studied may not have corresponded well to the areas over which networks of social capital operated, as they were often drawn through externally derived delineations such as administrative areas rather than corresponding to emergent boundaries. As a result of this, and the lack of consistent reporting on effect sizes, the statistical calculation of average effect sizes was not feasible. In addition, the validity and reliability of the measures used were assessed only in very few studies.

Secondly, the majority of the data were cross-sectional, so direction of causality could not be inferred. Thirdly, the variation in terms used to refer to the three major constructs

(social capital, socioeconomic status, and mental health) may mean that relevant papers were missed. Studies with a different primary focus may also have contained information about the interactions between these variables but were excluded. Fourthly, this review did not consider the impact of the built environment on how social capital and economic capital interact. Diminished public resources and amenities may have a considerable influence on how people form and utilise social capital in practice, such as a lack of access to affordable transport which can inhibit participation (Berry, 2008). Fifthly, many other factors may have confounded the results as they were not controlled for. For example, Nielsen et al. (2015) points out that body mass index (BMI) has been associated with socioeconomic status, social capital and mental health in past studies.

6. Conclusion

To understand whether individuals are willing to engage with other people, a fundamental prerequisite for social capital to develop, socioeconomic factors must be taken into account. The studies in this review have demonstrated the complexity with which social capital and economic capital interact. Numerous questions remain to be definitively answered. How does social capital affect people of varying economic capital in differing contexts? What roles do bonding, bridging and linking social capital play? Is structural or cognitive social capital more significant and how do they interact? On what level, individual or community, are processes taking place? What differences do factors such as gender, age, nationality and level of education make? Well-designed multivariate analyses, capable of controlling for population factors, are necessary to reveal these nuanced patterns of interaction, as are an alignment of consistent measures across future studies.

Nevertheless, whilst it is clear that although social capital can provide a buffer for mental health against deprivation, at times some forms of social capital can be detrimental. There were cases of this occurring for people of high socioeconomic status, but people with low incomes living in deprived areas appeared most vulnerable. Those with low-income report higher rates of mental illness and distress which was linked to some forms of social capital being too low and other forms too high. This may have been because the dominance of bonding social capital in low economic capital environments meant that individuals could not benefit from the opportunities associated with bridging social capital and, within these deprived communities, insufficient resources existed for individuals to support others in their networks. Interacting within political or community hierarchies may have served to make more salient the inferior position of people with low economic capital and the associated anxiety that this can produce. Therefore, efforts to improve social capital should be differentiated for the intended recipients. Accurate information is needed about what support underrepresented target groups require to best suit their circumstances and needs (Berry, 2008). However, evidence from this review suggests that focusing on deprived areas and seeking to build bridging social capital in a non-hierarchical way may be an effective strategy to reduce the mental health problems associated with deprivation.

Governmental policies that only attempt to address the consequences of diminishing social capital without understanding or ameliorating their causes may do more harm than good. If, as these studies suggest, deprivation prevents people developing resilient social capital and inequality erodes trust, social isolation and all its associated physical and mental health problems may prove intractable without addressing these root causes.

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Chapter two: Empirical Paper

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Examining the relationships between population churn, economic deprivation and

inpatient admissions in Wales.

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Claire Handley was responsible for analysing the data and was the main author of the paper. Christopher Saville helped to design the data analyses, helped access the data, and helped write the paper.

David Oakley provided helpful comments on drafts of the paper.

Abstract

Background: There is a well-established link between socioeconomic deprivation and the prevalence of people receiving a psychiatric diagnosis. However, less is known about how population mobility can affect this relationship. Social capital can act as a buffer to the harmful effects of deprivation, but it may be disrupted in areas with high population turnover. This study aims to explore the association between population churn and levels of inpatient admissions and to determine if churn moderates the social gradient of psychiatric admissions.

Methods: Lower-layer Super Output Area (LSOA) data relating to population churn, low income rates and rates of inpatient admissions were analysed using Poisson generalised linear mixed-effects models. Additional analysis explored the impact of deprivation measured more generally and the potential confound of population density.

Results: Greater economic deprivation and churn were found to be independently associated with higher rates of psychiatric admissions. The model also found an interaction effect between churn and low income as areas with high churn and low income were associated with more admissions. These relationships were also significant when overall socioeconomic deprivation was modelled. This association survived adjusting for population density.

Conclusion: High churn may exacerbate the detrimental effects of economic deprivation on mental health as well as being an independent risk factor. Therefore, churn rates should be considered when designing and implementing policies which aim to understand, prevent and treat mental health problems in at-risk communities.

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Background

Socioeconomic deprivation has been shown to be a risk factor for negative mental and physical health outcomes (O'Donoghue, Roche and Lane, 2016; González et al., 2016). This association has long manifested as a social gradient in inpatient admission rates (Harrison, Barrow and Creed, 1995). However, numerous studies have shown that social capital can act as a buffer against some of the detrimental mental health effects of deprivation (Aminzadeh et al., 2013; Buijs et al., 2016; De Clercq et al., 2012; Elgar, Trites, & Boyce, 2010; Frank, Davis, & Elgar, 2014). In particular, high cognitive social capital has been shown to be protective against common mental health disorders (Ehsan and De Silva, 2015). However, social capital can become disrupted in areas with high population turnover because relationships cannot develop to the same degree as in more stable communities. (Lansley & Longley, 2019). The term "churn" describes not just this turnover between districts, but also movement within districts (Lansley & Longley, 2019). Putnam emphasised in his book exploring changes in levels of social capital, "Bowling Alone" (2000), residential stability was strongly associated with many forms of civic engagement: people who had recently arrived in an area were less likely to vote (Wolfinger and Rosenstone, 1980), to have a supportive network of friends and neighbours (Sampson, 1988), or belong to community organisations (McPherson and Lockwood, 1980). People who intend to move in the near future, or those who were renting, were less likely to take part in community life (Sampson, 1988). Communities with higher residential mobility were less well integrated, even for long-term residents, and had higher crime rates and poorer school performance (Crutchfield, Geerken and Gove, 1982).

However, much remains unclear about the relationships between mobility and social capital. It is possible that demographic and contextual factors such as which people were most likely to move, to what locations, for what purpose, under what economic, cultural and

political conditions are significant. Trends over time may strengthen or weaken social capital formation thus impacting mental health differently across generations. At the end of the twentieth century, levels of mobility were decreasing, but this trend has reversed. In 1990 there were 154 million people who moved from their home country to different countries. This increased to 175 million in 2000, 232 million in 2013 and, by 2018, they were 258 million international migrants worldwide (United Nations Population Division, 2013; International Organisation for Migration, 2018). Within the UK, data from the Office of National Statistics indicate that instances of migration in England and Wales rose by over 17% from 5,608,410 in 2012 to 6,575,368 in 2017 (Office for National Statistics, 2018). The effects of these examples of change may be influenced by issues of power, class and racism in both the country of origin and host nations (Cheong et al., 2007) and as such, may have differing effects on social capital and mental health across contexts.

Deprived areas do not generally have on average more population turnover, a measure of the intensity of migration into and out of a district, than non-deprived areas (Bailey and Livingstone, 2007). This may be because population turnover can be an indication of growth and buoyancy (Dennett and Stillwell, 2008) and is often linked to compositional (e.g. age) rather than contextual factors (Bailey and Livingstone, 2007). A 2007 report (Joseph Rowntree Foundation) based on the data from the 2001 UK census showed that areas with high concentrations of young adults (aged 19–29) and households with very young children (aged 0–4), predicted turnover more than deprivation. Deprived areas had only slightly higher turnover than the average, when these demographic factors were controlled for.

Although it has been suggested that churn may be more typically a characteristic of deprived areas (Bailey and Livingstone, 2007), further research is needed to establish if this is a consistent trend. It is also unclear whether high levels of churn could be a proxy for

urbanicity, the degree to which an area is built up, as population turnover can differ between rural and urban environments (Pateman, 2011). This is significant because living in urban areas has been linked to an increased risk of developing psychiatric conditions, psychosis in particular (Peen and Dekker, 2004), which can in turn lead to more admissions (Schoevers, Peen and Dekker, 2007).

This study aims to explore whether churn, considered to be a potential proxy for social capital, moderates the impact of economic deprivation on inpatient admissions generally. It is hypothesised that in areas with a high proportion of households that move frequently, the formation, maintenance and operation of social capital will differ from more stable regions. This is predicted to prevent the buffering effect of social capital and be associated with higher admissions rates in those areas.

Method

Ethics

Ethics was granted from the Bangor University School of Psychology Ethics and Research Committee and the local NHS Research and Ethics Committee. The Consumer Data Research Centre (CDRC) granted permission to access and use the safeguarded churn data. *Data Sources*

Data were analysed at the Lower-layer Super Output Area (LSOA) level, which are used to improve the reporting of small area statistics in England and Wales. These geographical areas, of which there were 1909 in Wales the 2011 census, have a mean population of 1500 individuals with no LSOA comprising of less than one thousand people (Office of National Statistics, 2011). Three anonymised data sets were included in the primary analysis exploring the effect of churn on the social gradient of inpatient admission cases across LSOAs in Wales.

Churn data (Lansley & Longley, 2019) were provided by the CDRC. The churn index is an estimate of the proportion of households that seemed to have changed occupancy between the end of 2016 and the start of each year going back to 1998, based on administrative and consumer data including consumer registers, land registry house sale data and electoral registers. The year 2012 was used as the baseline from which levels of churn were compared for this study. This year was chosen somewhat arbitrarily but sensitivity analyses were conducted to check any relationships were robust. Other years yielded similar results and 2012 had a high correlation coefficient with years 2007-2013 (correlations >0.9) (Appendix 1).

Admission data for each LSOA were derived from the 2017 data from the Patient Episode Database for Wales (PEDW). This includes data for all seven health boards in Wales. An admission was counted at the individual case level. Each person who was admitted was given a psychiatric treatment code under the Office of Population Censuses and Surveys Classification of Interventions and Procedures. Each admission was counted once at the LSOA level. This indicator was chosen over measures recording each separate admission or overall number of bed days to reduce the impact of specific individual case factors which might necessitate longer stays and/or multiple admissions. Differentiation was not made between diagnostic categories as this was not the focus of the current study. Each admission case belonged to one of six strata divided by sex (male or female) and age band (18-34, 35-65 and 65+ years) and was only counted once. Stratification prevented demographic confounding of the association of interest.

The measure for economic deprivation was the percentage of the population in each LSOA in receipt of low-income related benefits as measured by the Welsh Index of Multiple Deprivations (WIMD: Welsh Government, 2014). This is defined as those who are either: (a)

an adult, or dependent child of an adult, in receipt of income related benefits; (b) an adult, or dependent child of an adult, in receipt of Working and Child Tax Credits, with income less than 60 per cent of the Wales median; or (c) an Asylum Seeker as defined by section 95 (UK Government, 1999). The overall deprivation rating from the WIMD (Welsh Government, 2014) for each was LSOA used to assess the impact of relative deprivation more generally. Each LSOA was ranked in terms of their level of deprivation from most- to least- deprived according to a weighted sum of eight domains: access to services, education, employment, health, housing, income, physical environment and safety. Within this ranking, income rating was weighted at 25.3%.

Analysis

To explore the interaction of economic deprivation and churn on the cases of admission across LSOAs in Wales, stratified count data of admissions for each LSOA was the dependent variable. The assumption of independence was not met because the six nested strata within each of the 1909 LSOAs produced 11454 individual but related observations. Therefore, a linear mixed-effects model was used to analyse the data. The percentage of the LSOA population on low-pay, level of churn, and their interaction were modelled as fixed effects as it was predicted that these factors would produce a systematic difference in levels of admissions. Sex, Age, Local Authority and LSOA were random effects. LSOA, Age and Sex were included to account for non-independence of data. Random intercepts for each of the 22 Local Authorities in Wales were included in the model to control for more widely dispersed effects which may also effect admission rates such as local government policies or other geographically related factors.

For the primary Poisson general linear mixed-effects analysis, the *glmer* function in the *lme4* package (Bates, Maechler, Bolker & Walker (2015) for R (R Core Team, 2013) was

used. To test for significance, *p*-values of the slopes were compared to an alpha of .05. The fixed effects were the z-scored deprivation rank data, z-scored churn data between 2012 and 2017, and their interaction. As the population of each LSOA varied, the count level data was modelled as a rate by including logged population at the relevant stratum as an offset.

Control Analyses

To explore whether a higher rate of admissions could be an artefact of higher churn in urban areas, a further analysis was run to control for population density. Density was included as a fixed effect in the model, along with the percent of the LSOA population on lowpay and level of churn, and its interactions with these variables were analysed. Sex, Age, Local Authority and LSOA were included as random effects. A second analysis substituted the percent on low-pay data with the WIMD rank of deprivation to isolate the effect of economic capital from deprivation measured widely. Density data was derived from the most recent census data (Office for National Statistics, 2011).

Results

Descriptive analysis

There were 10454 cases of individuals from the 1909 LSOAs admitted to inpatient wards in 2017. The range of admissions for each LSOA ranged between 0 and 15 and was highly skewed towards the lower end, as would be expected, and the median rate was one admission per LSOA in 2017. The percentage of households in receipt of low-pay related benefits ranged from 1% to 63% across the LSOAs with a median of 14% and a mean of 16.09%. Overall deprivation was rank level data.

Figure 1: Maps of a) percent on low-pay, b) churn and c) admission cases per head of population across the LSOAs in Wales. Darker colours indicate higher rates.



Social gradient of admissions

The association between low-pay rate and cases of admissions showed an overall social gradient effect with individuals from more deprived LSOAs being more likely to experience an admission. The tendency for LSOAs with more people in receipt of low-pay related benefits to have higher rates of admissions was present across all strata but the groups differed in the steepness of this effect.

Churn

Churn, measuring the percentage of households that have changed occupier since 2016/17 was cumulative so increased over time. There was good correlation between years, with each year having correlation coefficient >0.88 with the years immediately preceding and following it (Appendix 1).

Regression analysis

Both main effects were significant. LSOAs with a high percentage of individuals in receipt of low-income related benefits tended to have a higher prevalence of admission cases (risk ratio [RR]=1.325 [Cl^{95%}:1.290-.1.361]). High churn was also associated with higher admission rates, albeit less strongly (RR=1.064 [Cl^{95%}:1.033-1.097]). The interaction between these two factors was also significant as areas with high churn and high percent on low-pay had higher admission rates (RR=1.057 [Cl^{95%}:1.029-1.086]) (Table 1).

Effect	Variance	SD	SE	Z value	<i>p</i> -value
Random effects					
LSOA	0.145	0.380			
Local Authority	0.017	0.129			
Age	0.024	0.154			
Sex	0.006	0.077			
Fixed effects					
Intercept	-5.576		0.109	-51.173	<0.001
Percentage on low-pay	0.281		0.014	20.597	<0.001
Churn since 2012	0.062		0.015	4.077	<0.001
Interaction between income	0.056		0.014	4.107	<0.001
and churn					

Table 1. Mixed models results of the data sets. Percentage on low-pay, churn and the interaction between the two showed significant associations with admission rates.

Exploring the effect of deprivation more widely using the WIMD rank showed similar results. LSOAs of higher deprivation rank, which indicated more deprivation, had a high prevalence of admission rates (RR=.743 [Cl^{95%}:721-.764], *Z*= -20.639, *p*=.001). The RR is below 1 as high rank in the WIMD indicated greater deprivation. High churn was also significantly associated with admissions in this model but to a lesser degree (RR=1.041 [Cl^{95%}:1.011-1.073], *Z*= 2.292, *p*=.01). The interaction between these two factors was again significant (RR=.943 [Cl^{95%}:.918-.970], *Z*= -4.099, *p*=.001). Correlations between all fixed effects showed no evidence of multicollinearity. The DHARMa package for R (Hartig, 2019) was used to check for over/under-dispersion of residuals and zero inflation, neither of which were problematic (Appendix 2). However, exploring the scaled residuals suggested that the model systematically underestimates at the high values. This may be due to outlying LSOAs which are being influenced by non-modelled factors.

To help visualise the relationships between levels of churn, deprivation and admissions across the varying strata, churn was split into quartiles.

Figure 2. Admission cases by percent of LSOA on low-pay split by churn quartiles. LSOAs with higher percentages of people with low-pay had higher admission rates and were more vulnerable to the impact of high churn.



There is clear evidence of a moderation of the association between deprivation and admission rates by churn. There are very few admissions in areas where close-to-zero percent of the population receive some form of income related benefit. However, the number is far higher in LSOAs with the highest economic deprivation and, at this point, the impact of churn becomes more pronounced. Figure 3. Admission cases by percent of LSOA on low-pay split by churn quintiles displayed with data points. Some LSOAs had far higher admission rates then would be expected from the model alone.



Figure 4. Admission cases by percent of the population on low-pay-related benefits split by churn quartiles displayed by age and sex. The LSOAs with the highest levels of churn tended to have the most admission cases per population strata, particularly in deprived areas.



Overall, higher levels of churn were associated with more admission per LSOA. A similar relationship is shown in each of the strata suggesting it is not an association limited to a single group. The areas with the highest levels of churn appeared to be particularly susceptible to the effects of deprivation, a trend which seemed to be particularly apparent for males. The significant interaction suggested that this relationship was interactive rather than just additive (Table 1).

Density

As it was hypothesised that high churn might be associated with urban environments, which itself is a risk factor for admissions, an analysis was run to determine if churn was still significant when population density was controlled for. The model explored both the association of density on admissions and interactions with the other constructs including percent on low-pay related benefits and churn. A second model was also run using the wider measure of deprivation, WIMD rank.

The analysis using the percent low-pay model data found that high density was associated with higher admission rates (RR=1.056 [Cl^{95%}:1.016 – 1.096], *Z*= 2.735, *p*=.01) and that high churn was still predictive of admissions, even when population density was controlled for (RR=1.061 [Cl^{95%}:1.027 – 1.095], *Z*= 3.593, *p*=.001). Percent low-pay also remained significant (RR=1.312 [Cl^{95%}:1.274 – 1.350], *Z*= 18.363, *p*=.001). The interaction effect between churn and pay was significant - having both high churn and high percent low-pay was linked to higher admissions (RR=1.049 [Cl^{95%}:1.0180 – 1.081], *Z*= 3.121, *p*=.01). This was also true for high percent low-pay and high density (RR=.936 [Cl^{95%}:.967 – .999], *Z*= -2.034, *p*=.05), however, the combination of these factors appeared less than the sum of its parts. In addition, the three-way interaction between high percent low-pay, high churn and

high density was linked with higher admission rates (RR=1.023 [Cl^{95%}: 1.046 – 1.046], Z= of 2.042, p=.05). There was no significant interaction effect between churn and density in this model (RR=.985 [Cl^{95%}: .964 – 1.008], Z= of -1.276, p=.1) but there was when the wider measure of deprivation, the WIMD rank, was modelled rather than the single component of percent low-pay (RR=.969 [Cl^{95%}: .950 – .989], Z= of -3.073, p=.01). Using the rank of deprivation found similar overall results for the other main effects which remained significant, as did the high churn and high deprivation interaction effect.

Discussion

This study found that there was an interaction effect between economic status and churn on the rate of admissions. High churn was also independently significantly associated with high rates of inpatient admissions measured at the LSOA level in Wales, as was high arealevel deprivation measured by receipt of low-pay related benefits. This suggests that in areas with both high deprivation and churn, there are more inpatient admissions than would be expected from the levels of deprivation and churn individually.

The implication of this finding is that deprived communities that have less churn may be more resilient, and therefore have fewer inpatient admissions, because social capital may exert a greater protective influence on the lives of people in these areas. This supports the hypothesis that churn may be disruptive to social capital as it can inhibit its formation and maintenance if people do not have time to form bonds with their neighbours. Over time this may also influence the culture of an areas as group norms are not developed and shared and so social capital may weaken over time. Trust may not be able to be established if people do not really get to know each other. People may be less incentivised to make connections and volunteer locally if they are not able to stay long-term.

High churn's potentially disruptive effect on social capital seemed to be particularly detrimental to deprived communities. A possible reason for this may be they lack the economic resources which can help maintain resilience in the face of difficulties. These factors were significant both when deprivation was measured as the percentage of the population in receipt of low-pay related benefits, and when measured via an overall LSOA WIMD deprivation rank. These finding provide further support for the theory of a social gradient in mental health. Churn was positively correlated with admission but to a lower degree and with less significance than the aggregate deprivation model, but with equal significance in the percentage low-pay income model. This may suggest that other components used in the calculation of the WIMD rank may be correlated with churn and so explain more of the variance in the model then the purely economic percentage of low-pay measure.

The results from the density analysis suggested that density too was independently associated with admissions. The interaction effect between churn and deprivation continued to be significant in this model. There was a difference between churn and density in the percent low-pay analysis and the wider WIMD deprivation rank analysis. In the model that explored the effect of economic capital as measured by percent low-pay, the interaction between churn and density was not significantly linked to higher admission rates. However, when the model included other measures of deprivation including access to services, education, employment, health, housing, physical environment and safety, as well as income, the interaction between high churn and low density did become significant. It may be that, if churn is indeed an indicator of social capital, rural areas that lack the non-monetary resources, as measured in the WIMD, may be particularly vulnerable to its disruption as they may not have the social and economic infrastructure of urban areas. For example, poorer

transport links may inhibit opportunities to socialize, limited internet connections may restrict sharing of information and reduced public spaces could diminish transmission of collective norms. These differences may therefore make it harder for new relationships to form and be maintained in rural environments with high churn. These findings show that the interaction of churn and established risk factors such as deprivation may have been underestimated previously and requires further investigation. It may be useful therefore to conceptually differentiate individuals that have low incomes in areas with supportive infrastructure and those with low incomes and inefficient infrastructure.

Strengths and limitations

Although churn was hypothesized to relate to social capital, it should be noted that we did not measure social capital directly. It may be that churn is a proxy for unidentified processes other than those associated with social capital. The large size of the data sets used in the analysis make it less likely that the relationships identified are due to chance. Using two measures of deprivation, both overall derivation rank as rated by the WIMD and the percent of the LSOA population on low-pay, helped to clarify the associations involved. In particular, the WIMD is a more suitable measure than some designed to detect urban deprivation, for example, by measuring things such as car ownership as this is considered essential in rural areas. The secondary analysis ruled out the potential confound of population density, a measure of urbanicity, thus bolstering the claim that churn itself is significant. However, as the study was cross-sectional, the direction of causality cannot be inferred. It could be hypothesized that people with mental health or financial difficulties may need to move more often, thereby leading to higher levels of churn. As individual-level churn and deprivation measures were not studied directly it is not possible to ascertain whether those who were

admitted were exposed to the neighbourhood-level risks identified. Without this level of data, the specific processes involved cannot be determined. Longitudinal studies may be helpful to ascertain which processes may be primary. In addition, more research is needed to clarify how the provision in social infrastructure, such as meeting places, can help social capital form in high churn areas. Despite these limitations, this paper indicates that churn is a process requiring further investigation and that sufficient evidence already exists to begin considering these factors when planning the provision of services.

Conclusions

This study aimed to explore the relationships between population churn, economic deprivation and inpatient admissions in Wales. Large data sets analysed at the LSOA level revealed a striking association between high churn and increased inpatient admission rates. This relationship also interacted with economic deprivation such that areas with higher proportions of people experiencing financial hardship, tended to be more vulnerable to the effects of high churn than areas in which people were better off financially. This finding has implications for agencies who aim to ameliorate the risk factors associated with mental health difficulties and admissions, as areas with both high churn and high deprivation may require additional resources. Research suggests that social capital can support well-being independently and act as a buffer against deprivation to protect mental health. Therefore, by helping individuals create social networks in high churn environments, such interventions may reduce the detrimental impacts of deprivation and have far reaching psychological benefits.

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Conflict of interest:

None.

Ethical standards

The authors assert that all procedures contributing to this work comply with the

ethical standards of the relevant national and institutional committees on human

experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

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Chapter three: Contributions to Theory and Clinical Practice

Contributions to Theory and Clinical Practice

This thesis has explored the relationships between deprivation, social capital and mental health. Chapter one, a systematic review of the literature, described findings relating to the effects of various kinds of social capital on people with differing levels of economic capital, and the association of these factors on mental health outcomes. Chapter two detailed an epidemiological study exploring Lower-layer Super Output Area (LSOA) level deprivation, population churn and psychiatric admissions across Wales. In Chapter three, I will summarise the main findings, discuss contributions to theory and clinical practice, and make recommendations for future research.

Summary of thesis findings

The systematic review of the literature presented in chapter one examined 32 papers at the subnational level from Europe, America, Canada, South Korea, China, Japan, Australia and New Zealand, published before December 2018. These papers had a pooled data set of over half a million individuals and were predominantly of a quantitively descriptive crosssectional design, though some qualitative papers and randomised controlled trials were also included. Three main elements were studied: social capital, economic capital and mental health. Several kinds of social capital were identified. These categories included: social capital described at the individual or ecological level; differentiated cognitive and structural elements such as trust and volunteering respectively; and homogeneous and heterogeneous links delineated as bonding, bridging or linking social capital. Mental health and economic capital were also broadly defined to allow for an exploratory analysis of interactions within a wide field of research. The systematic review found support for the theory that social capital can act as a buffer to the detrimental effects of deprivation to mental health. Numerous studies found that communities that had higher levels of social capital, and cognitive social capital in particular, had less mental illness and higher well-being. The benefit of social capital was particularly pronounced for people in the most deprived areas as they tended to have less economic resources to fall back on but for some people in this situation, interacting with other people felt aversive. There seemed to be a ceiling effect after which more social capital was no longer linked to improved mental health outcomes. In addition, there were contexts in which high social capital seemed to be harmful. In some communities with high social capital, high economic capital was associated with worse mental health outcomes. There was also a link to mental health difficulties for those who lived in very deprived areas and had only close homogeneous connections with people in the same situation.

The empirical paper explored trends on the neighbourhood level by comparing deprivation as measured by the Welsh Index of Multiple Deprivation (WIMD), churn and inpatient admissions on the LSOA level. Linear mixed-effects analysis of the data found several significant associations. The previously observed social gradient of admissions (Harrison, Barrow and Creed, 1995) was replicated for admissions in Wales in 2017. Churn was independently predictive of admissions, in that areas with high churn also had high admission rates. A striking interaction effect was also identified. The impact of churn was more pronounced the more deprived the LSOA was. High churn and high deprivation were linked to higher admission rates and the inverse was also true. Areas with low churn were less likely to be affected by deprivation, suggesting low churn may be a protective factor. However, this paper suggests that population churn may not affect all groups equally. The impact of population density was also considered as a potential confound. Although the relationships

previously outlined continued to be significant when density was controlled for, there was also an interaction effect as high churn and low density were associated with higher admission rates. These findings are of particular importance for Wales with its comparably rural population in which approximately one in three live in an area classed as rural, compared to one in five in England (Wales Centre for Health, 2007). As the study was cross-sectional it is not possible to infer the direction of causality, but the findings were in line with what would be predicted from the results of the literature review.

Contributions to theory

Although many researchers have long attempted to understand antecedents to mental health difficulties that arise from the contexts in which individuals live, there seems to be a growing focus on these factors. The World Health Organisation's report on the social determinants of mental health (2014) advocates a life-course approach in order to study how exposure to risk factors can predispose people towards developing mental health problems later on. The publication of the Power Threat Meaning Framework by the British Psychological Society (2018) is an additional example of a conceptual move away from a diagnostic model that can view mental disorders as a product of malfunctioning bodies towards a transdiagnostic, person-centred biopsychosocial model in which difficulties are understood as reactions to specific social and relational environments. However, this paper advances the argument by including community stability as an important extrinsic factor that can impact mental health.

The literature review and the empirical paper both lend support to the argument that social capital is a significant factor in mental health outcomes and adds that it is particularly important for those who have less economic capital. This is an important finding as the

interactions between social and economic capital remain an under-researched area of study with potentially far-reaching implications for understanding the causes of mental health difficulties and identifying effective ways to treat them. Each paper also more precisely identified additional groups that may be particularly vulnerable to poor mental health outcomes. In the literature review these were found to be individuals living in areas with low economic capital and high bonding social capital. In the empirical paper, those living in areas with low population density and high churn were identified to be more likely to have inpatient admissions.

Other complexities in the interaction between social capital, socioeconomic status and mental health outcomes were identified. These included findings that low economic capital can make social interactions aversive, that hierarchical interactions can lead to worse mental health and extreme levels of economic capital, at both the high and low ranges, is linked to lower social capital. As this thesis has highlighted the potential importance of these factors it should therefore be seen as a first step towards a more comprehensive understanding of them rather than providing a complete picture at this point.

Implications for future research and theory development

Future studies are needed that build on this initial step to understand individual factors and their processes in more detail. These should include longitudinal studies which are able to determine directions of causality between social capital, its formation or disruption, deprivation and mental health. It is also clear that a consensus in the terms used to study these areas would facilitate clearer exploration of this topic and enable findings to be compared more reliably. This would improve concurrent and construct validity which may increase the strength of the conclusions that can be drawn from research in this area. For

example, few researchers who explicitly identified their measures of social capital as bonding, bridging or linking, stated whether it was as operating at the individual or ecological level and clarified whether it was cognitive or structural. Making such delineations clear may facilitate comparisons between studies.

The evidence indicated that social capital can buffer the detrimental effects of deprivation on mental health. However, social support opportunities may be unlikely to work if people find socialising aversive. Evidence suggests this to be the case from the Masi (2011) review on onwards. In this review Masi stated that loneliness, which motivates individuals to alleviate this social pain by seeking out the connections they need to feel safe, secure and content, is more likely to be effective if individuals live within a rich and forgiving social environment. For those that don't, however, loneliness may become inescapable. Inequality and hierarchy were identified as possible factors which may act as a barrier to socialising and lead people to enjoy it less, but more research in this area my help to show what else is of importance and how such factors may be amenable to change.

In addition, a better understanding of how churn operates in relation to complex social systems is necessary to design effective strategies to reduce its detrimental impacts. Some evidence indicates the existence of potential tipping points that, when passed, lead to a marked increase of population turnover in a community (Joseph Rowntree Foundation, 2007). A better understanding of this process and what makes a community resilient up to and beyond any tipping point is needed. For example, does it make a difference to have a core stable group of people who can link with new members, shape norms, lend support and help individuals integrate? However, if demographic factors are key, interventions may need to be introduced at the societal level. These may include addressing far-reaching issues such as social housing provision, first-time buyers being priced out of their communities, and effective

public transport infrastructure enabling connection to be maintained over distances. Difference between age groups should also be considered. For example, it may be that some older people remain in a particular area but become more isolated due to the churn around them, and as such could be particularly vulnerable.

The literature review and empirical paper presented in this thesis did not highlight specific mental health problems or psychiatric diagnoses. Future research could explore whether the impact of churn and deprivation differ for different people and what factors determine whether people go on to develop a specific mental health problem.

This research suggests that social connection is important in shaping individual experiences and journeys but there are likely numerous other elements that work to support or undermine thriving. For example, developing a better understanding of where individuals start in life, the impact of adverse childhood experiences (Felitti, 1998) and additional challenges prior to contact with inpatient services may guide efforts to help people at risk of developing mental health problems. It may be that all these factors are ultimately responsible for creating additional barriers to connection, which may be a key pathway to the development of mental health difficulties, as the need to belong is a powerful, fundamental, and extremely pervasive motivation (Baumeister and Leary, 1995).

Heterogeneity of social contacts can be beneficial, in the form of bridging social capital, but it is not clear what risks are associated with diverse connections. Cattell (2001) found communities that were to heterogeneous struggled to develop trust and people from minority groups may face additional challenges which can have negative effects on mental health including racism, discrimination and a mismatch between their cultures and the norms and systems of the majority (Gopalkrishnan, 2018). What determines whether diverse groups

establishing heterogenous connections are positive or negative, and how can the beneficial effects be strengthened?

There is an argument that many initiatives fail to reduce the concentration of deprivation in an area because 'those who get on, get out'. As those who move away tend to be replaced by people with higher levels of need, the composition of the area remains the same (Joseph Rowntree Foundation, 2007) but less stable. As a result, it is possible that governmental programmes may have unintended consequences which may actually maintain or worsen systemic problems. Therefore, proactive research is critical to investigate these possible dynamics to avoid costly mistakes, and to strengthen interventions at the community level. To ensure these benefits are realised, it is important that this increasing understanding translates into practical and achievable support at the individual, community and national levels. Without this vital step, all research may remain theoretical.

Implications for clinical practice

The implications of this research are far reaching and stretch from the homes of individuals and their families to local and national government. As more social determinants of mental health are identified, focused efforts may be able to act in accordance with findings to help individuals build social connections. These initiatives may be conceived or delivered by international organizations, governments, nongovernmental organizations, social institutions and service providers, community and voluntary groups, the private sector and individuals themselves. It is conceivable that interventions that work with others across levels may be more efficient, resilient and effective. Long-term national level policy commitments that empower and support local committees themselves to lead on positive changes may be

particularly well suited to adapt to their particular needs. Ultimately, the ways in which groups work together will vary depending on the contexts, resources and needs of each community.

Individual level

Understanding how social capital and deprivation interact can inform formulations with clients by considering how these factors may have led to the precipitation and perpetuation of problems. Such formulations can be shared with teams working with clients to help them provide support and reduce risks of the fundamental attribution error leading to unhelpful assumptions about the causes of difficulties (Ross, 1977). It can also lead to effective strategies to bolster protective factors such as strengthening social connections. Studies have found that individuals who are lonely are more likely to have mental and physical health problems (Beutel, 2017) and individuals with more social connections have a reduced risk of mortality (Holt-Lunstad, 2015). As this is an issue that crosses the divide between physical and mental health, services that have been traditionally divided along health and social lines need to work together to provide care teams and services that unite expertise from what have traditionally been separate teams. Similarly, when working with individuals, it may be beneficial to acknowledge that no one can be fully understood or helped without appreciating the links that exist with their friends, families and wider support networks. If these can be well conceptualised and strengthened, this thesis suggests, individuals may have a better chance of recovery. However, some individuals, such as those who have social anxiety or have experienced trauma may need additional help to connect with others (Kuo, 2011). Therefore, services need to be designed with the understanding and capacity to help those facing emotional barriers to social connection. It is important, therefore, that people are supported and empowered to express their needs and given choice and control over services where possible as solely "top down" interventions are not capable of modelling each individual's situation or conceptualising what the greatest barriers to connection are for each person.

Community level

This paper supports the view that psychologists and mental health professionals cannot solely work with individuals in the therapy room to be effective. Although there is growing interest in approaches that increase access to psychological therapies (Department of Health, 2007), the research reviewed in this thesis contributes to the argument that people are significantly affected by factors that operate on societal level, of which they have little control. Individual-level work is therefore unlikely to be able to keep up with demand for services if root problems within society are side-lined. Therefore, engagement with the wider system is necessary to address these problems.

Numerous socially regenerative initiatives have been developed which can foster the development of social capital in communities. Three such projects are outlined below. The *Transition Towns* movement (Barry and Quilley, 2008) promotes the development of resilient local communities to deal with global challenges such as peak oil and climate change. Such groups may support a community by making it less vulnerable to disruptions in the wider system. For example, by increasing local food production through community allotments and orchards individuals may be protected from the worst consequences of climate change related food shocks (Jones, Mattiacci and Braumoeller, 2017). Research also suggests that having more social connections can make people less likely to die due to natural disasters (Klinenberg, 2018) and able to better recover in the aftermath (Kaniasty, 2012). The *Meanwhile Foundation* (2012) supports the use of vacant properties for projects that deliver

economic development and social or environmentally led regeneration. Similar projects may be particularly powerful in the early stages of social regeneration. This is because social infrastructure, the physical conditions that determine whether social capital can develop in the first place, needs to be prioritized for communities to develop the meeting places in which connections can be formed and maintained (Klinenberg, 2018). If such spaces are free it may remove financial obstacles which could prevent poorer people accessing shared spaced which are run for profit. The Compassionate Communities Project (Able et al., 2018) utilises social prescribing (King's Fund, 2017) which aims to directly tackle the connection between loneliness and ill health. The project has so far decreased unplanned hospital admissions by 14% over four years where it was trialled in Frome, Somerset in comparison to rising rates in neighbouring areas. These initiatives may help to reduce social exclusion and dependence on external forces which might not be responsive to each communities' needs (Scott-Cato & Hillier, 2010). Such local projects may also help foster a communities' sense of self-efficacy, as each voice is more likely to be heard and have influence on this smaller scale. This may be particularly useful for those wanting in making positive change but who find their individual actions insignificant. Lack of political efficacy has been linked with worse mental health (Poortinga, 2012). This research supports the argument that such initiatives can support mental health.

Insights from the literature review and empirical paper may also be helpful in shaping services and creating psychologically informed environments. Understanding how repeatedly moving vulnerable people away from their communities can create and exacerbate mental health problems could lead to greater efforts to build stability and connection. Initiatives to link different groups may be particularly helpful to create opportunities and resilience.

It is important that initiatives aimed at strengthening social capital in high churn environments, such as community hubs, are accessible because poor transport links can make it hard for people to connect with others (Berry, 2008). This factor may contribute to the higher rates of inpatient admissions in areas with low population density and high churn. For some groups, it may be particularly helpful to have services run by positive role models rather than experts, as they can model adaptive behaviours, represent of what is possible, and shape aspirations (Morgenroth, Ryan and Peters, 2015).

As the stability of deprived areas varies greatly as a result of other factors, such as social composition (Joseph Rowntree Foundation, 2007), these can also be considered to determine which areas may be most vulnerable. In addition, findings from Cattell (2001) suggest that heterogeneous neighbourhoods may benefit from regenerated local work opportunities to develop bridging ties which can then help communities build inclusive social capital.

National level

Putting extra resources into the high-risk areas identified by this research, that is those with high deprivation and high churn, may have far-reaching benefits for individuals and communities across Wales. Although individual- and community-level factors are important, national-level processes may restrict the impact of localised interventions as it is the national level context that determines what local circumstances are able to exist. For example, it may be that higher levels of inequality inexorably lead to less social capital. As the studies outlined in this thesis hypothesize, this may be through the erosion of trust or because individuals lower down in the hierarchy have less efficacy, in which case, this too may need to be addressed before changes are able to take effect. Evidence indicates that interventions just at the level of the individual or at-risk group may be ineffective as they fail to reduce inequalities across groups and that policies which are universal, yet proportionate to need, may be more effective (World Health Organisation, 2014). It may be that national organisations able to act on this larger scale and have the power to initiate the co-ordinated programmes across levels that will be able to be most effective. However, if government level interventions remove any barriers that do exist, individual and community level programmes may be able to be the drivers of change. This could include: helping groups to overcome a lack of resources by providing funding; investing in social infrastructure; requiring the training of GPs and other professionals to include modules on the social determinant of health such as the impact of communities and; including an exploration of social connections in government funded research on connected topics such as loneliness. In addition, bottom-up processes can shape national level structures. If the importance of community resources is discussed with voters individuals may then be able to elect political representatives to implement effective evidence-based policy in line with their interests.

The British Psychological Society (2019) have stated that governments must ensure their policies and interventions are based on in-depth understanding of human behaviour. However, the people making decisions may not have access to the latest scientific findings. An example of this is the government's use of sanctions against benefit claimants which are both ineffective, increasing stress and reducing their capacity to perform the behaviours desired by those implementing the approach, such as seeking work, and causes profound psychological and emotional suffering (BPA, 2019). Therefore, it may be helpful if evidencebased information is directly shared with those in power. In line with the need to communicate scientific findings to those making policy decisions, the authors of this paper responded to the Welsh Governments consultation paper Connected Communities (2018)

which acted as a parallel to the UK government's *A connected society: a strategy for tackling loneliness* (UK Government, 2018). Both documents recognised the growing awareness of the detrimental effect lack of social connections can have on the well-being of individuals. However, there was no discussion of the different needs or barriers that might exist for people of varying economic capital in the UK or how different forms of social capital may influence the mental health of varying groups differently. Their summary of responses (Welsh Government, 2019) indicated that points made by the authors of this paper were noted but it is yet to be seen how they will translate into policy as the final strategy has not been published at time of writing. As with all initiatives discussed in this section, beneficial change will only be achieved by connecting with individuals and communities to translate scientifically informed policy in to programmes that are practical and fundamentally linked to, and driven by, their needs.

Insights derived from research inform effective preventative measures, which can reduce the incidence of mental health problems in the future. Within a resource-scarce environment, it may be left to reflective scientist-practitioners to make the case for forward thinking evidence-based planning who can highlight how this may save resources in the medium and long-term. For example, people leaving inpatient services who are moved to places of high deprivation and churn may be at higher risk of relapse than individuals placed in a more protective environment. The money saved in lower housing costs of these areas may be lost to inpatient bed days or even within the justice system if people struggle to reintegrate into society. Changing the narrative from people being unwell to people reacting and trying to cope with difficult circumstances can lead to destigmatisation at all levels, from the individual to the national, and enable more effective service provision for vulnerable individuals and communities. Initiatives that bring together colleagues, organisations including the British Psychological Society, groups such as Psychologists for Social Change (2015) and other stakeholders to identify clear, well-communicated priorities for policy development may be instrumental to effective influence.

Reflections

The process of conducting the literature review presented in chapter one posed dilemmas regarding the breadth of studies that should be included in the analysis. Research exploring the impact of social capital or deprivation individually on mental health have reached the point where sufficient evidence exists to enable a better understanding of practical process and application so that research translates into benefits for the communities themselves. However, the interactions between social capital and deprivation on mental health remains a relatively under-researched area. Therefore, the decision was made to include all suitable studies available that examined this relationship at the subnational level. There are issues associated with including such a broad collection of papers. These include difficulties separating the impact of differing cultural contexts, such as being individualist or collectivist for example, which complicates any inferences about causality or generalisability. However, it was felt that there are likely to be significant overlaps between cultures and that insights gained from one area of study may help to better understand other areas. This seemed to be the case as the buffering effect of social capital was found both in Europe and Asia and across age groups, and more narrowly focused studies helped to shed light on processes identified in other broader studies. Although some trends were robust, considerable complexity of the observed interaction effects were also apparent. It is hoped that this will prove useful to highlight areas for future research which can ask more focused questions in future, and that it justifies research investment in this area.

The process of carrying out this project made salient the complexity of the factors that can influence a person's life beyond their immediate control and lead to suffering. Increasing evidence, included that provided by contemporary neuroscience, undermines the notion that individuals can simply choose different paths and should be held morally responsible for their difficulties (Focquaert, Glenn and Raine, 2018). Nevertheless, narratives presented in the mainstream media, including some of the most read newspapers in the UK, often present people who are forced to leave their communities and have very little economic resources, such as refugees and migrants, in a hostile light (Berry, Garcia-Blanco and Moore, 2018). It is hoped that communicating research findings such as those presented in this thesis can lead to a shift in public understanding of how risk factors that diminish an individual's access to social or economic capital can be associated with significant mental health problems. This may, in turn, facilitate a more compassionate discussion as to how individuals and communities can be supported in future. However, the discussion will need to be followed with appropriate action to be of benefit.

I also found myself contextualising trends explored in this thesis from an evolutionary perspective. Homo sapiens have existed on earth for 200,000, and possibly up to 350,000, years (Hublin et al., 2017). Behavioural modern humans have existed for around 45,000 years (Powell, Shennan and Thomas, 2009). Throughout this time the community or tribe in which an individual lived was fundamental to its survival (Harari, 2017). It is to protect these vital bonds that social emotions such as shame and guilt evolved (Pinker, 2002). The suggested process of co-evolution, where brains shape cultures and cultures shape brains (Sapolsky, 2017), has led to human cultures becoming incredibly diverse and human beings seemingly infinitely able to adapt. In many modern cultures today, individuals are able to meet their basic needs for food, housing and so on without needing to depend on their neighbours. However, it is also becoming increasingly clear that the nature of the relationships we have can have life changing consequences (Van der Kolk, 1994). The evidence presented in this thesis, which links poor social capital with worse mental health outcomes, agrees with the view that humans may not be able to lose the social connectedness our species has depended upon for hundreds of thousands of years without experiencing negative psychological, emotional and health consequences.

Personally, completing this thesis as I come to the end of my doctoral training has made me consider my role as a clinical psychologist in my community. The past few years have seemed to be a turbulent period in recent geopolitical history, and I have the sense that we may be heading into an uncertain future both nationally and internationally (IPCC, 2018). What role should a clinical psychologist have in this context? Learning about the buffering effect of social capital, particularly for those who lack other resources, is significant at a time of increasing resource scarcity (European Union, 2012). Using my personal and professional experience to help foster an greater understanding of these issues and develop links between people who may be isolated, by advocating for and working with local groups such as those outlined above, could be a to way work towards improving mental health as well as potentially strengthen community resilience. It is therefore something I hope to be able to work towards in the coming years.

Conclusions

The findings detailed in this thesis have important implications, both theoretically and clinically. It has highlighted the protective effect social capital can have on the mental health outcome of people living with economic deprivation, as well as revealing complexities that must be considered by those aiming to help those at risk. Interventions need to work across

levels, from the individual and community to the national, joining up services, such as those traditionally delineated and mental and physical health. A better understanding of the factors that make communities vulnerable, and the ways in which they interact with each other, may help to develop targeted interventions that meet the needs communities have themselves identified and have the potential to save money in the long-term, as well as reducing the suffering of those experiencing mental health problems.

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Appendices

Appendix 1: churn

Appendix 2: model residuals, zero-inflation and dispersion

Appendix 3: IRAS permission for original study

Appendix 4: first amendment

Appendix 6: second amendment

Appendix 6: progress report

Appendix 7: word counts

Appendix 8: glossary

Appendix 1: churn

J			- ,				·) ·			
Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
2007	-									
2008	0.995	-								
2009	0.989	0.906	-							
2010	0.978	0.996	0.991	-						
2011	0.945	0.952	0.960	0.974	-					
2012	0.906	0.914	0.922	0.942	0.972	-				
2013	0.864	0.871	0.879	0.900	0.931	0.969	-			
2014	0.774	0.779	0.787	0.807	0.837	0.883	0.920	-		
2015	0.756	0.762	0.769	0.789	0.817	0.859	0.899	0.972	-	
2016	0.685	0.693	0.702	0.720	0.747	0.788	0.830	0.890	.0924	-

Figure 1. Correlation matrix of churn data for 10-year period from 2007 to 2016.

Figure 2. Levels of churn across the 1909 LSOAs as measured from 2016/17. Numbers indicate the percentage of household that appear to have changed occupier. Min and Max indicate the level of churn in the LSOAs with the lowest and highest rates.

Year	Min	Max	Range	Median	Mean
2005	0.2973	0.9841	0.6868	0.4985	0.5121
2006	0.2778	0.9766	0.6988	0.4755	0.4903
2007	0.2628	0.9901	0.7273	0.4493	0.4649
2008	0.2417	0.9548	0.7131	0.4245	0.4396
2009	0.2237	0.8969	0.6732	0.4059	0.4205
2010	0.1937	0.8362	0.6425	0.3695	0.3840
2011	0.1742	0.7605	0.5863	0.3307	0.3436
2012	0.1486	0.7162	0.5676	0.2938	0.3035
2013	0.1156	0.6302	0.5146	0.2422	0.2513
2014	0.0812	0.4938	0.4126	0.1708	0.1767
2015	0.0580	0.4427	0.3847	0.1329	0.1375
2016	0.0317	0.2588	0.2271	0.7704	0.0797

Figure 3. Percentage of household that have changed occupier by year. The mean score indicates a steady cumulative increase of levels of churn whereas the range between higher and lowest LSOAs is more variable from 2005 to 2016.



Appendix 2: model residuals, zero-inflation and dispersion

Figure 1. Scaled residuals of the model. This suggest that the model systematically under estimate at the high values.



Figure 2. Zero-inflation was not problematic with this model.







DHARMa nonparametric dispersion test via sd of residuals fitted vs. simulated

Simulated values, red line = fitted model. p-value (two.sided) = 0.542

Appendix 3: IRAS permission

Permission document for original project exploring admissions to psychiatric units in North Wales (associations with geographical area and levels of multiple deprivation).

Date: 23rd January 2017



Bwrdd Iechyd Prifysgol Betsi Cadwaladr University Health Board

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Dear Dr Leah Jones

23rd January 2017

Re: Confirmation that R&D governance checks are complete / R&D approval granted

Study Title	Admissions to psychiatric units in North Wales: associations with geographical area and levels of multiple deprivation.
IRAS reference	218773
REC reference	16/WA/0393

Thank you for submitting your R&D application and supporting documents. The above research project was reviewed at the meeting of the BCUHB R&D Internal Review Panel

The Panel is satisfied with the scientific validity of the project, the risk assessment, the review of the NHS cost and resource implications and all other research management issues pertaining to the revised application.

The R&D Office, on behalf of the Internal Review Panel, is pleased to confirm that all governance checks are now complete and to grant approval to proceed at Betsi Cadwaladr University Health Board sites as described in the application.

Document:	Version:	Date:
R&D form	V5.3.2	16/12/2016
SSI form	V5.3.2	04/01/2017
Protocol	V1	03/11/2016
Data Collection form	V1	04/11/2016
Summary CV: Saville		04/11/2016
Summary CV: Jackson		04/11/2016
Summary CV: Jones		04/11/2016
Evidence of Insurance (UMAL)		Expires 31/07/2017
Risk assessment		03/01/2017
REC favourable opinion letter		12/12/2016

The documents reviewed and approved are listed below:

All research conducted at the Betsi Cadwaladr University Health Board sites must comply with the Research Governance Framework for Health and Social Care in Wales (2009). An electronic link to this document is provided on the BCUHB R&D WebPages. Alternatively, you may obtain a paper copy of this document via the R&D Office.





Attached you will find a set of approval conditions outlining your responsibilities during the course of this research. Failure to comply with the approval conditions will result in the withdrawal of the approval to conduct this research in the Betsi Cadwaladr University Health Board.

If your study is adopted onto the NISCHR Clinical Research Portfolio (CRP), it will be a condition of this NHS research permission, that the Chief Investigator will be required to regularly upload recruitment data onto the portfolio database. To apply for adoption onto the NISCHR CRP, please go to: http://www.wales.nhs.uk/sites3/page.cfm?orgid=580&pid=31979.

Once adopted, NISCHR CRP studies may be eligible for additional support through the NISCHR Clinical Research Centre. Further information can be found at: http://www.wales.nhs.uk/sites3/page.cfm?orgid=580&pid=28571 and/or from your NHS R&D office colleagues.

To upload recruitment data, please follow this link:

http://www.crncc.nihr.ac.uk/about us/processes/portfolio/p recruitment.

Uploading recruitment data will enable NISCHR to monitor research activity within NHS organizations, leading to NHS R&D allocations which are activity driven. Uploading of recruitment data will be monitored by your colleagues in the R&D office. If you need any support in uploading this data, please contact debra.slater@wales.nhs.uk or sion.lewis@wales.nhs.uk

If you would like further information on any other points covered by this letter please do not hesitate to contact me.

On behalf of the Panel, I would like to take this opportunity to wish you every success with your research.

Yours sincerely,

Allan

Dr Nefyn Williams PhD, FRCGP Associate Director of R&D Chairman Internal Review Panel

Copy to:

Sponsor:

Hefin Francis School of Psychology, Bangor University Brigantia Building Bangor Gwynedd LL57 2AS h.francis@bangor.ac.uk Academic Supervisor: Dr Mike Jackson School of Psychology, Bangor University Brigantia Building

Bangor Gwynedd LL57 2AS

mike.jackson@bangor.ac.uk

Chris Saville School of Psychology, Bangor University **Brigantia Building** Bangor Gwynedd LL57 2AS c.saville@bangor.ac.uk



Cyfeiriad Gohebiaeth ar gyfer y Cadeirydd a'r Prif Weithredwr / Correspondence address for Chairman and Chief Executive: Swyddfa'r Gweithredwyr / Executives' Office, Ysbyty Gwynedd, Penrhosgarnedd, Bangor, Gwynedd LL57 2PW Gwefan: www.pbc.cymru.nhs.uk / Web: www.bcu.wales.nhs.uk



Appendix 4: first amendment

Permission document for first amendment to explore admissions to psychiatric units across the rest of Wales (associations with geographical area and levels of multiple deprivation).

Date: 18th January 2018



Ymchwil Iechyd a Gofal Cymru Health and Care Research Wales

Gwasanaeth Moeseg Ymchwil Research Ethics Service



Ariennir gan Lywodraeth Cymru Funded by Welsh Government

Pwyllgor Moeseg Ymchwil Cymru 4 Wales Research Ethics Committee 4 Wrexham

Mailing address: Health and Care Research Wales Support Centre Castlebridge 4 15-19 Cowbridge Road East Cardiff CF11 9AB

> Telephone: 02920 785736 Email: <u>tracy.biggs@wales.nhs.uk</u> norbert.ciumageanu@wales.nhs.uk Website : <u>www.hra.nhs.uk</u>

18 January 2018

Dr Leah Jones North Wales Clinical Psychology Programme 43 College Road Bangor LL57 2DG

Dear Dr Jones,

Study title:Admissions to psychiatric units in North Wales: associations
with geographical area and levels of multiple deprivationREC reference:16/WA/0393Amendment number:AM01Amendment date:04 January 2018IRAS project ID:218773

The above amendment was reviewed on 18 January 2018 by the Sub-Committee in correspondence.

Ethical opinion

The members of the Committee taking part in the review gave a favourable ethical opinion of the amendment on the basis described in the notice of amendment form and supporting documentation.

The Sub-Committee noted that the amendment pertains to a request to obtain similar admission data for all other Health Boards in Wales from NHS Wales Informatics Service

On the basis of the submitted documentation the Sub-Committee decided that this amendment raises no ethical issues.

Approved documents

The documents reviewed and approved at the meeting were:

Document	Version	Date
Notice of Substantial Amendment (non-CTIMP)	AM01	04 January 2018
Research protocol or project proposal	2	03 January 2018

Membership of the Committee

The members of the Committee who took part in the review are listed on the attached sheet. No declarations of interest were made in relation to this amendment.

Working with NHS Care Organisations

Sponsors should ensure that they notify the R&D office for the relevant NHS care organisation of this amendment in line with the terms detailed in the categorisation email issued by the lead nation for the study.

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

We are pleased to welcome researchers and R & D staff at our Research Ethics Committee members' training days – see details at <u>http://www.hra.nhs.uk/hra-training/</u>

16/WA/0393: Please quote this number on all correspondence

Yolioursesincerely,

Dr Kathryn Ann Clarke ci**Gh**air, Wales REC 4

Email: Tracy.Biggs@Wales.nhs.uk

e-mail: tracy.biggs@wales.nhs.uk

Enclosures:

List of names and professions of members who took part in the review

Copy to:

Debra Slater, Betsi Cadwaladr University Health Board

Wales REC 4

Attendance at Sub-Committee of the REC meeting on 18 January 2018 (in correspondence)

Committee Members:

Name	Profession	Present
Dr Kathryn Ann Clarke	Head of Concerns (Chair)	Yes
Mr John A Gittins	Senior Coroner (Vice-Chair)	Yes

Also in attendance:

Name	Position (or reason for attending)
Mrs Tracy Biggs	Research Ethics Committee Manager
Mr Norbert Leon Ciumageanu	REC Assistant

Appendix 5: second amendment

Permission document for second amendment, for the study presented in this thesis to include the impact of churn with data of admissions to psychiatric units across Wales (associations with geographical area, levels of multiple deprivation and churn).

Date: 30th November 2018

Notification of Non-Substantial/Minor Amendments(s) for NHS Studies

This template **must only** be used to notify NHS/HSC R&D office(s) of amendments, which are **NOT** categorised as Substantial Amendments.

If you need to notify a Substantial Amendment to your study then you MUST use the appropriate Substantial Amendment form in IRAS.

Instructions for using this template

- For guidance on amendments refer to <u>http://www.hra.nhs.uk/research-community/during-your-research-project/amendments/</u>
- This template should be completed by the CI and optionally authorised by Sponsor, if required by sponsor guidelines.
- This form should be submitted according to the instructions provided for NHS/HSC R&D at http://www.hra.nhs.uk/research-community/during-your-research-project/amendments/which-reviewbodies-need-to-approve-or-be-notified-of-which-types-of-amendments/
 If you do not submit your notification in accordance with these instructions then processing of your submission may be significantly delayed.

1. Study Information

Full title of study:	Admissions to psychiatric units in North Wales			
IRAS Project ID:	218773			
Sponsor Amendment Notification number:	1			
Sponsor Amendment Notification date:	30/11/2018			
Details of Chief Investigator:				
Name [first name and surname]	Christopher Saville			
Address:	North Wales Clinical Psychology Programme School of Psychology Brigantia Building Penrallt Road Bangor Gwynedd			
Postcode:	LL57 2AS			
Contact telephone number:	01248 388740			
Email address:	c.saville@bangor.ac.uk			
Details of Lead Sponsor:				

Partner Organisations:				
Health Research Authority, England	NIHR Clinical Research Network, England			
NHS Research Scotland	NISCHR Permissions Co-ordinating Unit, Wales			
HSC Research & Development, Public Hea	Ith Agency, Northern Ireland			
Name:				
	Bangor University			
Contact email address:	huw.ellis@bangor.ac.uk			
Details of Lead Nation:	Wales			
Name of lead nation delete as appropriate	England / Northern Ireland / Scotland / <u>Wales</u>			
If England led is the study going through CSP? delete as appropriate	Yes / No N/A			
Name of lead R&D office:	BCUHB R&D Department			

Partner Organisations:

Health Research Authority, EnglandNIHR Clinical Research Network, EnglandNHS Research ScotlandNISCHR Permissions Co-ordinating Unit, WalesHSC Research & Development, Public Health Agency, Northern Ireland

2. Summary of amendment(s)

This template must only be used to notify NHS/HSC R&D office(s) of amendments, which are NOT categorised as Substantial Amendments. If you need to notify a Substantial Amendment to your study then you MUST use the appropriate Substantial Amendment form in IRAS.

No.	Brief description of amendment (please enter each separate amendment in a new row)	Amendment applies to (delete/ list as appropriate)		List relevant supporting document(s), including version numbers (please ensure all referenced supporting documents are submitted with this form)		R&D category of amendment (category A, B, C) For office use only
		Nation	Sites	Document	Version	
1	Adding Claire Handley (trainee clinical psychologist, based in BCUHB and Bangor University, email: <u>sep83e@bangor.ac.uk</u>) as an investigator.	England Northern Ireland	All sites or list affected sites All sites or list affected sites	N/A		
		Scotland <u>Wales</u>	All sites or list affected sites All sites or list affected sites	-		
2	Look at whether the predictive validity of socioeconomic deprivation varies as a function of turnover in residents using 'churn' data from the Consumer Data Research Centre (see <u>https://maps.cdrc.ac.uk/#/indicators/churn/default/B</u> TTTFFT/10/-4.1309/53.2285/)			N/A		
3						
4						
5				,		

[Add further rows as required]
3. Declaration(s)

Dec	Declaration by Chief Investigator	
•	I confirm that the information in this form is accurate to the best of my knowledge and I take full responsibility for it.	
•	l consider that it would be reasonable for the proposed amendment(s) to be implemented.	
Signature of Chief Investigator:		
Prin	t name: Chris Saville	
Date	e: 30/11/2018	

Optional Declaration by the Sponsor's Representative (as per Sponsor Guidelines)
The sponsor of an approved study is responsible for all amendments made during its conduct.
The person authorising the declaration should be authorised to do so. There is no requirement for a particular level of seniority; the sponsor's rules on delegated authority should be adhered to.
 I confirm the sponsor's support for the amendment(s) in this notification.
Signature of sponsor's representative:
Print name: 1. H ELCIS
Post: College Manager
Organisation: Bargor Unitraily
Date: 30 NUCMEN 2018
I confirm the sponsor's support for the amendment(s) in this notification. Signature of sponsor's representative: Print name: 1. H ELCTS Post: College Manager Organisation: 30 NWCMBN 2018'

Appendix 6: progress report

Progress report for the empirical study presented in this paper (associations with geographical area, levels of multiple deprivation and churn).

Date: 29th April 2019

ANNUAL PROGRESS REPORT TO MAIN RESEARCH ETHICS COMMITTEE (For all studies except clinical trials of investigational medicinal products)

To be completed in typescript and submitted to the main REC by the Chief Investigator. For questions with Yes/No options please indicate answer in bold type.

1. Details of Chief Investigator

Name:	Dr Christopher W N Saville
Address:	North Wales Clinical Psychology Programme Brigantia Building Penrallt Road Bangor Gwynedd LL57 2AS
Telephone:	01248 388740
E-mail:	c.saville@bangor.ac.uk
Fax:	

2. Details of study

Full title of study:	Admissions to psychiatric units in North Wales
Name of main REC:	Wales REC 4 (Wrexham)
REC reference number:	
Date of favourable ethical opinion:	
Sponsor:	Bangor University

3. Commencement and termination dates

Has the study started?	<u>Yes</u> / No
If yes, what was the actual start date?	14/2/17
If no, what are the reasons for the study not commencing?	
What is the expected start date?	
Has the study finished?	Yes / <u>No</u>
If yes, complete and submit "Declaration of end of study" form, available at <u>http://www.nres.npsa.nhs.uk/applications/after-</u> ethical-review/endofstudy/	

If no, what is the expected completion date?	1/3/2020
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Annual progress report (non-CTIMP), version 4.4, dated November 2014

If you expect the study to overrun the planned completion date this should be notified to the main REC for information.	
If you do not expect the study to be completed, give reason(s)	An amendment was made for two follow up analyses to the original analyses, conducted by two trainee clinical psychologists, Mark Golightly and Claire Handley. We are keeping the study open in order to give these studies, and the original, time to undergo peer review at academic journals – if reviewers have comments we want to have access to the data to be able to address them.

4. Registration

Is the study a 'clinical trial'? (Defined as first 4 categories on the IRAS filter page)	Yes / <u>No</u>	
(For CTIMP please use CTIMP progress reporting template)	Vos / No	
database? (Registration of clinical trials is a condition of approval for studies approved after 30 September 2013)		
If yes, please provide the name of the database and the	ne registration number	
Database: Registration number:		
If no: a. What is the reason for non-registration? It was originally not pre-registered as the project was a last minute change of educational project for a student, and we didn't find time. If our amendment is approved, we will look if we can pre-register that before using the data, but pre-registration can be an issue if you have already seen some of the data, as we have.		
b. What are your intentions for registration? If our amendment is approved, we will look if we can pre-register that before using the data, but pre-registration can be an issue if you have already seen some of the data, as we have.		

5. Site information

Do you plan to increase the total number of sites proposed for the study?	Yes / No
If yes, how many sites do you plan to recruit?	

6. Recruitment of participants

In this section, "participants" includes those who will not be approached but whose samples/data will be studied.

Number of participants recruited:	Proposed in original application:	
	Actual number recruited to date:	
	N/A – secondary data project	
Number of participants completing trial:	Actual number completed to date	
	N/A accordant data projecti	
	N/A – secondary data project:	
Number of withdrawals from study to date due to:		
(a) withdrawal of consent		
(b) loss to follow-up		
(c) death (where not the primary outcome)		
Total study withdrawals:		
N/A – secondary data project		
*Number of treatment failures to date (prior to reaching	primary outcome) due to:	
(a) adverse events		
(b) lack of efficacy		
Total treatment failures:		
* Applies to studies involving clinical treatment only		
N/A – Secondary data project.		
Have there been any serious difficulties in recruiting	Yes / No	
participants?		
If Yes, give details:		
Do you plan to increase the planned recruitment of		
participants into the study?		
······································	N/A – secondary data project:	
Any increase in planned recruitment should be notified to the		
main REC as a substantial amendment for ethical review.		

7. Safety of participants

Have there been any related and unexpected serious adverse events (SAEs) in this study?	Yes / No
Have these SAEs been notified to the Committee?	Yes / No / Not applicable
If no, please submit details with this report and give reasons	

for late notification.	
Have any concerns arisen about the safety of participants in this study?	Yes / No
If yes, give details and say how the concerns have been addressed.	

8. Amendments

Have any substantial amendments been made to the trial during the year?	Yes / No
If yes, please give the date and amendment number for each substantial amendment made.	4/1/18 (AM01)

9. Serious breaches of the protocol

Have any serious breaches of the protocol occurred during the year?	Yes / No
If Yes, please enclose a report of any serious breaches not already notified to the REC.	Yes / No

10. Other issues

Are there any other developments in the study that you wish to report to the Committee?	Yes / No
Are there any ethical issues on which further advice is required?	Yes / No
If yes to either, please attach separate statement with details.	

11. Declaration

Signature of Chief Investigator:	Jon Spor
Print name:	Chris Saville
Date of submission:	29.4.19

Appendix 7: Word counts

Main substance of thesis

Thesis abstract:	292
Chapter one:	5,287
Chapter two:	4,296
Chapter three:	4,860

Total of the main substance of the thesis: 14,735

Tables, figures, references and appendices:

Chapter one references:	1,895
Tables, figures and appendices:	6,178

Chapter two references:	685
Tables, figures and appendices:	3,379

Chapter three references: 1,007

Total of the tables, figures, references and appendices: 13,144

Overall total: 27,879

Appendix 8: Glossary

- Bonding Social Capital: homogenous links that connect people with similar characteristics, such as socioeconomic status.
- *Bridging Social Capital:* heterogenous links that connect people with differing characteristic, such as socioeconomic status.
- *Cognitive Social Capital:* subjective experience including sense of trust, belonging and shared values.
- *Ecological Level Social Capital:* in which measures of social capital are aggregated across a defined environment, such as per capital membership of voluntary organisations.
- *Economic Capital:* resources associated with money, such as annual income, and wealth, such as property.
- Individual Level Social Capital: measures of personal behaviours, group memberships and experiences, such as trust.
- *Linking Social Capital:* connections involving people interacting across vertical institutionalised authority gradients, such as political originations.
- *Mental Disorder:* any disorder or disability of the mind, usually defined through diagnostic categories.
- *Mental Distress:* a range of symptoms and experiences of a person's internal life that are commonly held to be troubling including anxiety and low mood.
- *Metal Health:* a person's condition regarding their psychological functioning and emotional well-being.
- *Mental Well-Being:* the level to which an individual is able to realize his or her own potential, including having the capacity to cope with the normal stresses of life, and work productively.

- Social Capital: the social connections between individuals the social networks and the norms of reciprocity and trustworthiness that arise from them.
- *Social Cohesion:* the willingness within a community for members to support each other, as well as how these behaviours manifest, measured on the ecological level.
- *Social Networks:* the resources that arise from a person's connection to others, measured on the individual level.
- Socioeconomic Status: an individual's or group's position within a hierarchical social structure. Socioeconomic status depends on a combination of variables including occupation, education, income, wealth, and place of residence.
- *Structural Social Capital:* observable participation in community networks through behaviours such as volunteering.