Summary Report

Individual and local area factors associated with self-reported wellbeing, perceived social cohesion and sense of attachment to one's community: analysis of the Understanding Society Survey

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Acknowledgements

Key messages

The findings reported here are from an analysis of data from the *Understanding Society Survey* (USS) [1] which follows a large sample of people from across Britain over time. This study was undertaken to examine questions likely to be especially relevant for those working in the field of public health intelligence, using small area statistics to identify localities where interventions may particularly need to be targeted in order to reduce inequalities in wellbeing across England.

The **main research questions** were:

- **How did indicators measuring socio-economic conditions in the local areas where people lived relate to their perceptions of their neighbourhood and to their sense of wellbeing as it changed over time?**

- **Did individual's self-reported wellbeing (reported in USS Wave 4 and Wave 7) relate to their perceptions of neighbourhood social cohesion and attachment (reported in Wave 3)?**

The findings reported here relate to over 17,000 individuals living in England (a subset of people surveyed in USS), for whom we have complete data on the variables of interest, collected over time.

This research is <u>not</u> intended to provide descriptive statistics of the whole population in the USS or of the population in England. Nor is it designed to describe populations in specific small areas. This study aims to explore possible causal explanations for variation in wellbeing. In particular, we consider how the 'type' of area of residence relates to wellbeing outcomes for individual residents.

The USS data were linked to separately generated information describing the type of area where the sample members were living. The area descriptors are for Lower Super Output Areas (LSOAs). There are over 32,000 LSOAs in England with population size ranging from 1000-3000. The LSOA information was based on the Indices of Multiple Deprivation for 2010 and 2015 (distributed by the Department of Communities and Local Government) and the Social Fragmentation Index (derived by Peter Congdon using data published by the Office of National Statistics from the 2011 population census). We categorised LSOAs, according to these area indicators. For each indicator, we classified areas in quintile groups (5 groups, each including about 6400 LSOAs), ranging from LSOAs with the lowest levels of deprivation or fragmentation nationally to LSOAs with the highest (worst) levels of deprivation or fragmentation.

The analyses were carried out using multivariable regression methods to examine how the outcome variables of interest for individuals (wellbeing, social cohesion and community attachment) relate to conditions in the *places* where people lived, independently of their personal attributes[*]. We also examined the associations between individuals' self-reported wellbeing and their perceptions of social cohesion and community attachment in their neighbourhood.

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[*]The analyses test how the outcomes of interest (as reported in the USS) relate to independently measured socioeconomic aspects of place, after 'controlling' for variation in a number of individual attributes of the people in the sample (their sex, age group, socio-economic class, household income, housing tenure, employment status, whether they live with a partner, and which broadly defined ethnic group they identified with).

Our findings

We found that (allowing for the individual attributes of the individuals in the sample studied):

- Those living in areas with worse Index of Multiple Deprivation (IMD) scores, and in areas with higher Social Fragmentation (SFI) Scores reported lower levels of social cohesion in their area and weaker sense of attachment to their neighbourhoods. SFI scores significantly predict perceived cohesion and attachment, in addition to IMD Scores.

- Those living in areas with worse IMDs scores reported lower (worse) wellbeing scores in survey wave 4 and less positive rates of change in wellbeing by wave 7, when all of the individual attributes are taken into account. Some domains of the IMD2010 index are more relevant for predicting wellbeing than others.

- Perception of social cohesion and sense of attachment to one's neighbourhood were associated with sense of wellbeing (as reported in subsequent USS).

Main conclusions

For the USS sample members considered, self-reported wellbeing in wave 4 and change in wellbeing by wave 7 seems to have been associated with aspects of deprivation at the level of their neighbourhood, after allowing for their individual attributes. In particular, the global index of multiple deprivation (categorised in quintiles) seems to be associated with levels of individual wellbeing and how they change. Those in areas with the most advantaged socioeconomic conditions had better wellbeing in at wave 4 than those in the most disadvantaged areas. Also change in wellbeing from wave 4 to wave 7 was associated with levels of neighbourhood disadvantage, after allowing for personal circumstances.

Key messages from findings

- Indices of Multiple Deprivation (IMDs published in 2010 and 2015) may be considered useful proxies of local conditions associated with variation in wellbeing at the local level in England. Also the Social Fragmentation Index relates to local variation in individual's sense of neighbourhood cohesion and attachment to their local community;

- Inequalities in wellbeing across England are associated with deprivation of local communities. Wellbeing of residents in local areas is likely to be influenced by local community conditions in ways which are independent of the individual attributes of the residents themselves. These area inequalities persisted over the period studied;

- Sense of social cohesion, attachment to one's neighbourhood and wellbeing are interrelated, so interventions to reduce inequalities in wellbeing might focus on this combination of social factors, especially in deprived and socially fragmented areas.

- These findings are consistent with other theoretical and qualitative studies indicating links between wellbeing, socioeconomic conditions and social cohesion (reviewed in other WWW Hub reports). The research reported here makes a new contribution to knowledge on this topic by providing statistical evidence from a large, longitudinal sample, showing that indicators such as the Index of Multiple Deprivation and the Social Fragmentation Index are useful for distinguishing types of places where residents had statistically different patterns of change in wellbeing in the period studied. These indicators are likely to be surrogate measures of complex causal factors operating at the local community level.

- Overall, our results emphasise that action at community level to promote greater equality of wellbeing needs to be focused on more deprived parts of England (as measured by the Index of Multiple Deprivation).

Further detail of the methods used and the findings are available in the detailed report below.

Detailed summary report

Aims of the research

The *What Works Centre for Wellbeing; Communities* (WWWC) project has focussed on evidence about conditions and processes in communities which relate to wellbeing. There is also particular interest in how community conditions may relate to *change* in wellbeing.
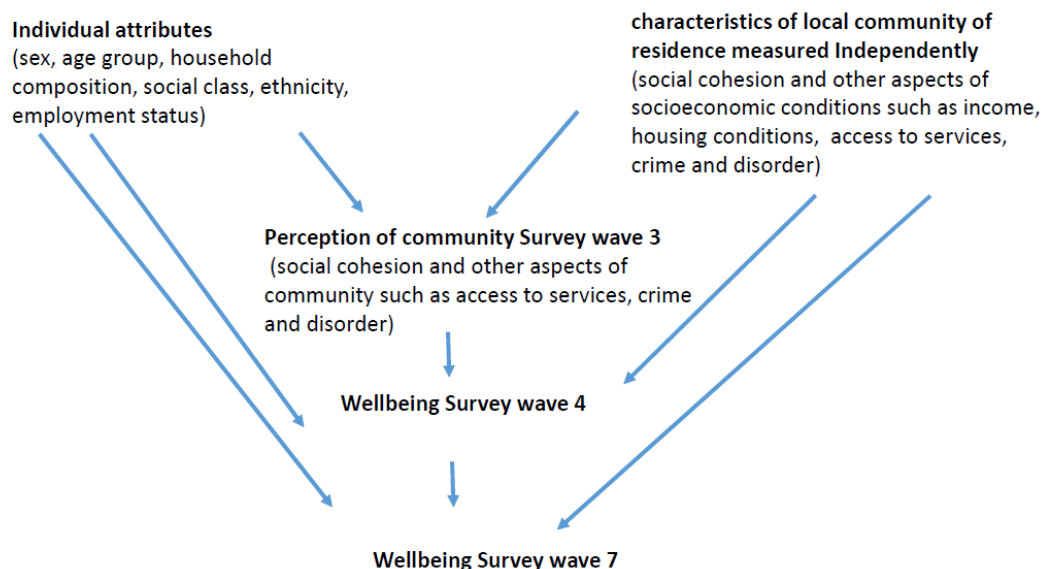
The analysis draws on evidence reviews presented in other reports from the WWWC project [2] [3], as well as the wide-ranging consultation with stakeholders which was undertaken to help us set the project agendas [4]. These suggest that, over time, wellbeing is likely to be associated with attributes of individuals, their families <u>and</u> the communities where they live.

Aspects of communities given special consideration in the WWWC project include socio-economic and environmental conditions such as: social cohesion, equality in decision making processes and resource distribution, housing conditions and aspects of the living environment such as service provision and heritage and green spaces. These aspects of *places* that may matter for wellbeing were also identified as being of particular interest through a preliminary process of engagement with a range of stakeholders.

The general aim of the research reported here is to use data from the *Understanding Society Survey* (USS) [1] and other sources to explore how self-reported wellbeing of individuals over time relates to area indicators describing these socio-economic and environmental conditions in the places where they were living.

We were particularly interested to explore how variation in *individual self-reported wellbeing*, measured in the USS using the Warwick Edinburgh Mental Wellbeing Scale [5], related to *aspects of place of residence*, measured using area indicators that make up the English Indices of Multiple Deprivation disseminated by Communities of Local Government [6], [7], and the Social Fragmentation Index developed by Peter Congdon [8]. We also aimed to explore how individual's perceptions of their local neighbourhoods related to these area indicators. Below is a diagram summarising aspects of these relationships being explored in this report. This diagram draws on other reports produced by the *What Works for Wellbeing Communities* Programme which explain the theoretical background to this research [2,3,4]. The arrows show the associations that were being tested in the analysis.

Relationships being explored using USS and linked information on characteristics of neighbourhood of residence

Individual attributes
(sex, age group, household composition, social class, ethnicity, employment status)

characteristics of local community of residence measured Independently
(social cohesion and other aspects of socioeconomic conditions such as income, housing conditions, access to services, crime and disorder)

Perception of community Survey wave 3
(social cohesion and other aspects of community such as access to services, crime and disorder)

Wellbeing Survey wave 4

Wellbeing Survey wave 7

The main research questions were:

- How did indicators measuring socio-economic conditions in the local areas where people lived relate to their perceptions of their neighbourhood and to their sense of wellbeing as it changed over time?

- Did individual's self-reported wellbeing relate to their perceptions of neighbourhood social cohesion and attachment?

Summary of analytical methods used

The individual level data used for the research are drawn from the *Understanding Society Survey* (USS) [1], the largest longitudinal study of its kind in the UK, which provides information over time on changing attributes of sample members over their lifecourse. It is a valuable source for research. USS collects data on the same respondents over an extended period in successive survey waves [9]. (For this study we used data collected in waves 3, 4 and 7). Data that will be reported here are anonymized information for over 17,000 USS sample members living in England, for whom relevant information was available from these three survey waves. This is a subset of the total USS sample in the full longitudinal study, so it includes people from the range of social and environmental settings across England but it is not exactly statistically representative of the whole population in the USS or in England as a whole. As compared with the total English population (recorded in the 2011 Population Census), the sample we have analysed probably includes somewhat smaller proportions of: men vs women; people in the youngest age groups vs older groups; people who were not living as part of a couple vs those living in partnerships; people who were not home owners vs home owners. Our sample shows a similar distribution in terms of quintiles on the IMD2010 indicators as for the population in England, but the proportion living in the most deprived quintile of areas is slightly less than would be expected on the basis of population census data.

We have not applied weightings to allow for the possible effects of the sample design of the USS. (We considered using standard weightings proposed by the USS survey designers, but these do not appear to be applicable to the statistical models and USS sub-samples we were using. Also, some analysts raise questions about the use of weightings in the kind of research reported here, which is concerned with exploring possible causal effects, rather than generating descriptive statistics [10] [11].)

Data were compiled and analysed to test the following statistical relationships which corresponded to our research questions:

Q 1(a) Allowing for individual characteristics, do measures of perception of neighbourhood social cohesion and of sense of attachment to one's community show an association with area indicators of deprivation and social fragmentation? (b) How does self-reported wellbeing relate to these perceptions of the community?

Q2 Allowing for individual characteristics associated with sense of wellbeing, do individuals report better wellbeing if they have been living in places where community conditions are theoretically likely to be more beneficial? (Here we focus on socio-economic indicators which aim to capture varying conditions including those relevant to: living environment; housing conditions and access to services; neighbourhood poverty levels and social cohesion, which have been identified as likely to be relevant in the reviews cited above.)

Q3 How did wellbeing change for the individuals in the USS between the two time points when information was collected on their self-reported wellbeing (USS waves 4 and 7)? Are these changes related to neighbourhood conditions, independently of individual attributes?

In exploring these questions, we aimed to identify aspects of places that may be important for the outcomes of interest, after controlling for a range of individual attributes that were expected to be relevant, based on other research. The models reported here have therefore controlled for sex, age group, socio-economic class and household income, whether the person lives with a partner, ethnic group, housing tenure, employment status. We used information from the USS to classify these individual attributes of the people in our study sample.

The outcomes of interest in this report are measured using data from USS survey respondents. They include separate measures of: individuals' <u>self-reported wellbeing</u> (derived from the Warwick Edinburgh Mental Wellbeing Scale) [5]; *perception of local social cohesion*; and <u>sense of attachment to their community</u> (See appendix 1 for details of these indicators).

These outcome variables were in the form of scales generated by adding together responses from sets of survey questions, measuring self-reported wellbeing, perception of social cohesion and sense of attachment to one's neighbourhood (see Appendix 1). Some responses from the original USS data have been 'reverse coded' for this analysis, so that each response has a higher value for more 'positive' assessments. Higher scores on these different scales indicate, respectively: a more positive sense of wellbeing, perception of stronger social cohesion; or stronger sense of attachment to one's neighbourhood.

The predictor variables of primary interest relate to attributes of the *places* where the individuals were living. The USS data were therefore linked to independently gathered geographical information (from open access sources detailed in Appendix 1) which describes the local areas where the USS members have being living over this period.

Areas of residence are defined for this research in terms of lower Level Super Output Areas (LSOAs) created in 2011. These are small geographical zones for which population data from the census in 2011 are published. Over 32,000 LSOAs across England have been classified into <u>types</u> of area. In order to protect the confidentiality of individuals in the USS our analysis, the linkage was carried out following strict security protocols. We identified the <u>type</u> of LSOA, but <u>not the specific</u> LSOA where the USS sample members were living.

The data used for this research included the following variables describing place of residence. (Appendix 1 provides further details).

1) Indices of Multiple Deprivation (IMD) for small geographical areas are statistical measures describing socio-economic conditions in local communities across England, constructed by the Social Disadvantage Research Centre at the University of Oxford. These were sourced from: Communities and Local Government [6] [7] (See details of the sources in Appendix 1). Here we report tests of the relevance of the IMD 2010 indicators for LSOAs in England as measures of local conditions prevailing around 2010-11, and likely to be associated with self-reported wellbeing of individuals, as reported in the USS waves 4 and 7. For this project we classified the published scores for local LSOAs into 5 categories (quintiles) according to their scores for IMD 2010 indicators. This means that each area 'type' (quintile category) includes about 6,400 small areas distributed across the country. It is important to note that in this study types of area labelled 1 are least disadvantaged and those labelled 5 are most disadvantaged. This ranking is the inverse of the decile ranks of the IMD in datasets distributed by Communities and Local Government. IMD2010 is most relevant to this research because it describes conditions that predate (so may have influenced) the outcomes of interest. We have also carried out some checks using IMD2015 in relation to the wellbeing score measured in USS wave 7.

2) The Social Fragmentation Index (SFI) developed by Congdon [8] is based for this research on census statistics for 2011 (see details in Appendix 1). It is made up of indicators of neighbourhood socio-demographic conditions which are proxies for greater levels of social isolation and residential transience, under an umbrella term 'social fragmentation'. In the analyses reported here LSOAs have been categorized in 5 area 'types' or 'quintile' groups, so that group 1 is least likely to be 'fragmented' and group 5 is most likely to be 'fragmented'.

The social fragmentation concept is not currently reflected in any IMD domains, so that the SFI is a useful alternative to capture this aspect of the social environment within small areas across Britain. Previous research has tested the SFI as a predictor of mortality, morbidity and health service use. Here we explore whether the SFI quintile grouping for LSOAs has relevance as a predictor of perceived neighbourhood cohesion and attachment to one's neighbourhood, and self-reported wellbeing as recorded for individuals in the USS.

Multivariable regression models were used for this analysis. The 'outcome' variables were modelled statistically to test their association with the 'predictor variables' representing individual and area factors likely to be associated with the outcomes. The analyses reported here were carried out using ordinal probit regression ('oprobit' in Stata) for the outcomes which are 'raw scores. This method was chosen because the scales do not necessarily correspond to a 'normal' statistical distribution assumed by other forms of regression analysis. We have also conducted ordinary least squares regression analyses ('regress' in Stata) of the metric version of the wellbeing score.

The results reported here focus especially on the 'coefficients' from the regression models, indicating the strength and direction of associations and their statistical significance. Associations were considered statistically 'significant' if there is a less than 5% likelihood (probability less than 0.05) that the association has occurred by chance in the sample considered. Statistically significant associations are likely to apply more widely in the population from which the sample was drawn. In most cases the predictor variables are defined in categories, so results compare people in a selected 'reference' category with those in other categories. For example, we report on statistically significant differences between people living in areas classed in quintile 1 and those in other quintile groups of areas.

Findings

As noted above, our analyses have taken into account a number of individual characteristics reported in the USS which are theoretically likely to be associated with wellbeing: sex; age (in 10 year age groups); socio-economic class (in 6 categories); whether the person was living with a partner; the person's employment status; their reported income in the month prior to interview; household tenure (owner occupiers, tenants, other tenures); and their self-identified ethnicity. When these variables are included in the models they serve to adjust the findings to take account of various individual attributes relevant to wellbeing. In some models the relationship with sex and employment status was less important, but generally speaking, wellbeing scores were higher (better) for those who were:

- Aged under 29 or over 49 (as compared with those aged 30-39) in at wave 4;
- Living with a partner (either a spouse or unmarried) (as compared to not living with a partner);
- In social class 1 (most privileged) as compared to other socioeconomic groups.
- In receipt of a higher household income in the month prior to interview;
- Owner occupiers (either with a mortgage, or outright owners) in survey waves 4 and 7, as compared with those who were tenants in rented properties at both time points;
- Identifying as a member of a 'black African or Caribbean' ethnic group as opposed to 'White British' or other 'White' ethnic groups. (NB ethnicity is coded in very broad categories for this analysis).

These relationships with individual attributes have been accounted for in the findings reported below. Thus the research results shown here are focussed on aspects of places of residence which may relate to the outcomes, independently of the person's own attributes.

Our findings with respect to our research questions (as listed on p7) were as follows:

Q 1 (a) Do measures of perception of neighbourhood social cohesion and of sense of attachment to one's community show an association with area indicators of deprivation and social fragmentation?

Perception of more positive (stronger) attachment to one's neighbourhood at wave 3 was associated with living in 'types' of LSOAs with lower values of the Social Fragmentation Index (proxy for more cohesive conditions), than in areas where the SFI index is higher (more likely to be socially fragmented). Also, those living in 'types' of areas with lower (less disadvantaged) levels of the IMD2010 felt more attached to their neighbourhood than people in areas with worse deprivation scores. This finding persists in models which include both SFI and IMD2010, suggesting that both measures have an independent association with the outcome. (**See Appendix 2: Diagrams 1a, 1b**).

Perception of higher (stronger) social cohesion in at wave 3 was associated with living in 'types' of LSOAs with lower values of the social fragmentation score (proxy for more cohesive conditions), than in areas where the SFI index is higher (more likely to be socially fragmented). Also, those living in areas with lower levels of the IMD2010 perceived cohesion in their neighbourhood to be stronger, compared with people in areas with worse deprivation scores. This finding persists in models which include both SFI and IMD2010, suggesting that both measures have an independent association with the outcome. (**See Appendix 2: Diagrams 2a, 2b**).

Q 1(b) How does self-reported wellbeing relate to these perceptions of the community?

The measures of individuals' perception of social cohesion and attachment to their neighbourhood showed a significant positive association with wellbeing, controlling for other individual variables in the model.

Q2 Allowing for individual characteristics associated with sense of wellbeing, do individuals report better wellbeing if they have been living in places where community conditions are theoretically likely to be more beneficial

Wellbeing at wave 4 was significantly associated with 'types' of LSOAs categorized by IMD2010 **(See Appendix 2: Diagram 3).** This relationship was apparent after taking into consideration individuals' personal characteristics (sex, age, household composition, social class, household income, housing tenure, employment status and ethnicity), The clearest results show that wellbeing was better for people living in areas with the lowest (least disadvantaged) scores, as compared to those in areas with the highest (most disadvantaged) scores.

The Social Fragmentation Index did not show a clear direct relationship with wellbeing in our analysis. However, controlling for other individual variables in our regression models, we find that there was a significant positive correlation between relative change in the USS measure of self-reported wellbeing between USS waves 4 and 7 and the scales measuring person's sense of attachment to one's neighbourhood (e.g. correlation coefficient = .05; probability = 0.00) and perception of neighbourhood social cohesion (e.g. correlation coefficient = .03; probability = 0.02). As reported above, these scales of perceived neighbourhood attachment and social cohesion are associated with the area index of Social Fragmentation for place of residence. This suggests that the SFI may help to identify areas where social relations are likely to be perceived more positively, and that this may, in turn, be a factor relating to wellbeing.

Q3 How did wellbeing change for the individuals in the USS between the two time points when information was collected on their self-reported wellbeing? Are these changes related to neighbourhood conditions, independently of individual attributes?

Wellbeing scores at wave 7 had improved less (relative to scores in wave 4) for those in the most deprived places (with higher IMD2010 scores), as compared with people living in the least deprived areas (**See Appendix 2: Diagram 4).** This relationship is apparent after controlling for the person's sex, age group, whether they lived with a partner (and if their cohabitation status changed), their social class and income, their employment status and whether it changed, their housing tenure, their ethnic group and whether they had lived in different LSOAs at USS waves 4 and 7.

The SFI for area of residence also shows some negative association with change in wellbeing, however, the relationship is probably not independent of socio-economic deprivation, as measured by the IMD2010 indicators.

Conclusions and implications of this study

A particular strength of this research is the inclusion of variables relating to individuals' perception of wellbeing at different time points, considered in relation to the 'type' of place where they were living. We also include information on a number of socio-demographic attributes of individuals, as well as their sense of social cohesion and attachment to their neighbourhood. This reflects the unique advantages of the *Understanding Society Survey*, which is an essential resource for research of this kind in the British context.

There are some caveats to our conclusions. In particular:
- Area conditions are measured in quintile categories to protect anonymity of the USS sample members. These are rather crude summaries of varying conditions across neighbourhoods. The LSOA area zoning which we have used here may not correspond very closely to the boundaries of local 'neighbourhoods' as perceived by people in the USS sample.
- Our analysis does not completely control for residential migration, though we have included variables in the models which 'flag' migration to different LSOAs between the different USS survey waves considered.
- The statistical relationships we report here are for a large sample (over 17,000 people), but they may not accurately reflect the pattern in the whole population of England.
- We are reporting on outcomes which are self-reported, not independently measured.
- The associations we report here do not necessarily reflect direct causal links; they may be proxy measures for more complex causal pathways.

Our **main conclusions** are that self-reported wellbeing in USS survey wave 4 and change in wellbeing between waves 4 and 7, for the USS sample members considered, were associated with aspects of deprivation at the level of their neighbourhood, in addition to their individual attributes. In particular, the global Index of Multiple Deprivation for Lower Super Output Areas (categorised in quintiles) seems to be associated with levels of individual wellbeing and how they change. Those in areas with the most advantaged socioeconomic conditions have better wellbeing at wave 4 than those in the most disadvantaged areas. Also change in wellbeing by wave 7 is associated with levels of neighbourhood disadvantage, as well as with personal circumstances.

Self-reported wellbeing is positively associated with perceptions of local social cohesion and attachment to one's neighbourhood. This would be consistent with the idea that stronger social cohesion and neighbourhood attachment help to promote positive wellbeing. It should be noted, however, that the relationship may be reciprocal (better wellbeing may also promote a better sense of social cohesion and neighbourhood attachment). Our research suggests that the SFI as well as the IMD2010 at neighbourhood level show significant associations with perception of cohesion and neighbourhood attachment.

Plans for further research

We are carrying out further research to explore how the outcomes considered here relate to the subdomains of the global IMD scores. The IMD2010 domains measuring local disadvantage in terms of income, employment and crime and living environment appear to be associated with wellbeing change between USS waves 4 –7 (results not reported in detail here), and this will be the subject of a subsequent report.

Implications for practice

The index of multiple deprivation seems suitable to be used by public and independent sector agencies to identify neighbourhoods that should be prioritised for intervention in order to improve equality of wellbeing. Action that effectively improves wellbeing in the most deprived areas could help to make wellbeing more equal across the country.

It seems likely that, in the USS sample recorded in England, disparities in self-reported wellbeing associated with socioeconomic conditions in places persisted between survey waves 4 and 7. This further emphasises the importance of prioritizing measures to reduce inequality across neighbourhoods.

Interventions to promote social cohesion might help to improve wellbeing (and/or *vice versa)*. Work being carried out on social cohesion by researchers at Nat Cen [13] is clearly of relevance to knowledge about wellbeing in communities. Area indicators at local neighbourhood level such as the indices of deprivation and social fragmentation considered here may help to identify local areas where efforts to promote stronger social cohesion and neighbourhood support processes should be prioritised.

Appendix 1 Methodological details

Information from the Understanding Society Survey included information from waves 3,4 and 7 of the Understanding Survey. (For details of the timing of data collection for each survey wave see the USS user guide [9] p. 15.)

1. Warwick Edinburgh Mental Wellbeing Scale (WEMWBS)

We used data from the USS on the Warwick Edinburgh Mental Wellbeing Scale, which is widely used in research as a measure of self-reported wellbeing: https://warwick.ac.uk/fac/med/research/platform/wemwbs/ .

This indicator comprises a scale ranging from 7 – 35 which is made up of the sum of scores from a series of 7 questions. Higher scores indicate a more positive sense of wellbeing. This measure was of particular interest as it is also being used in the *Annual Population Survey* in Britain, which provides information on changing conditions in the population. We have tested our results using the raw scores and also a 'metric' version developed for use with ordinary linear regression methods. Here we report results using the 'metric' version, which is described at: (https://warwick.ac.uk/fac/med/research/platform/wemwbs/development/swemwbs/.)

WEMWBS data were collected in two waves of the USS (wave 4, 2012-13 and wave 7, 2015-16) [9]. This provides the opportunity to examine how wellbeing is perceived over time by people in the survey who completed both of these survey waves.

2. USS questions and variables used to compile a score for perception of neighbourhood cohesion

These were asked in wave 3 (2011-12), so the information predates the measures of wellbeing collected in later waves.

I am going to read out a set of statements that could be true about your neighbourhood. Please tell me how much you agree or disagree that each statement describes your neighbourhood.

> *First, this is a close-knit neighbourhood*
> > Associated variable: c_nbrcoh1 (c_indresp) close-knit neighbourhood
>
> *People around here are willing to help their neighbours.*
> > Associated variable: c_nbrcoh2 (c_indresp) people willing to help their neighbours
>
> *People in this neighbourhood can be trusted.*
> > Associated variable: c_nbrcoh3 (c_indresp) people in this neighbourhood can be trusted
>
> *People in this neighbourhood generally don't get along with each other.*
> > Associated variable: c_nbrcoh4 (c_indresp) people in this neighbourhood don't get along with each other (coding was inverted for the analysis reported here, to give a measure of positive neighbourhood cohesion.)

Responses to these questions were coded in 5 categories ranging from strongly disagree to strongly agree. Where appropriate the response scores were inverted to give higher values for more positive responses. The response values were added together to generate a crude score ranging from 1 to 20 and relatively infrequent values at the extremes of the range have been 'truncated' to avoid any risks of disclosure about small numbers of people.

A rather similar, but less focussed, measure of social cohesion based on USS data, was proposed by Li [14]. Li's measure included items relating to reported fear of crime and feeling safe in one's neighbourhood, as well as questions relating to sense of mutual support and trust which we have used in the research reported here. The broader indicator used by Li also related to self-reported wellbeing.

3. **USS questions and variables used to compile a score for sense of attachment to one's neighbourhood:**

From wave 3 (2011-12) of the USS we used a series of variables labelled c_scopngbha - c_scopngbhh: based on questions on aspects of neighbourhood relating to the person's sense of attachment to their area, and their access to 'resource based' social capital in their community:

- belong to neighbourhood;
- local friends mean a lot;
- advice obtainable;
- can borrow things;
- willing to improve neighbourhood;
- plan to stay in neighbourhood;
- similar to others in neighbourhood;
- talk regularly to neighbours.

Responses to these questions were coded in 5 categories ranging from strongly disagree to strongly agree. The response values were added together to generate a crude score ranging from 1 (weak sense of attachment to the neighbourhood) to 40 (strong positive sense of attachment to the neighbourhood). Relatively infrequent values at the extremes of the range have been 'truncated' to avoid any risks of disclosure about small numbers of people.

Small area data linked to the USS survey variables were as follows:

[1] Social Fragmentation Index components:

The Social Fragmentation Index (developed by Peter Congdon [8] is based for this study on population data from the 2011 census aggregated to LSOAs. The components are proxy indicators for factors in local communities likely to be associated with greater social isolation and lack of residential stability that may contribute to social fragmentation.

These are: % living alone, % adults unmarried, % in private rented accommodation, % who moved in previous year

[2] Documents describing the Index of Multiple Deprivation (IMD) 2010 components:

IMD2010 data for LSOAs, constructed by the Social Disadvantage Research Centre at the University of Oxford, were sourced from: Communities and Local Government 2011 *The English Indices of Deprivation 2010: Neighbourhoods statistical release*:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/6871/1871208.pdf

See also: https://www.gov.uk/government/statistics/english-indices-of-deprivation-2010

The IMD is available as a 'global' index, combining measures of several different 'domains' of deprivation. Indices relating to the separate domains are also available, including measures relating to disadvantage in terms of:
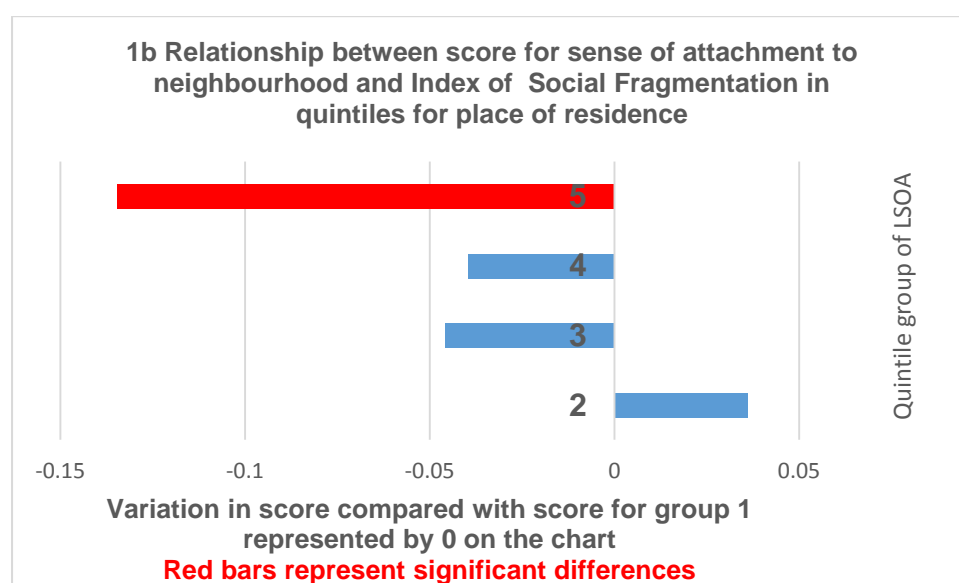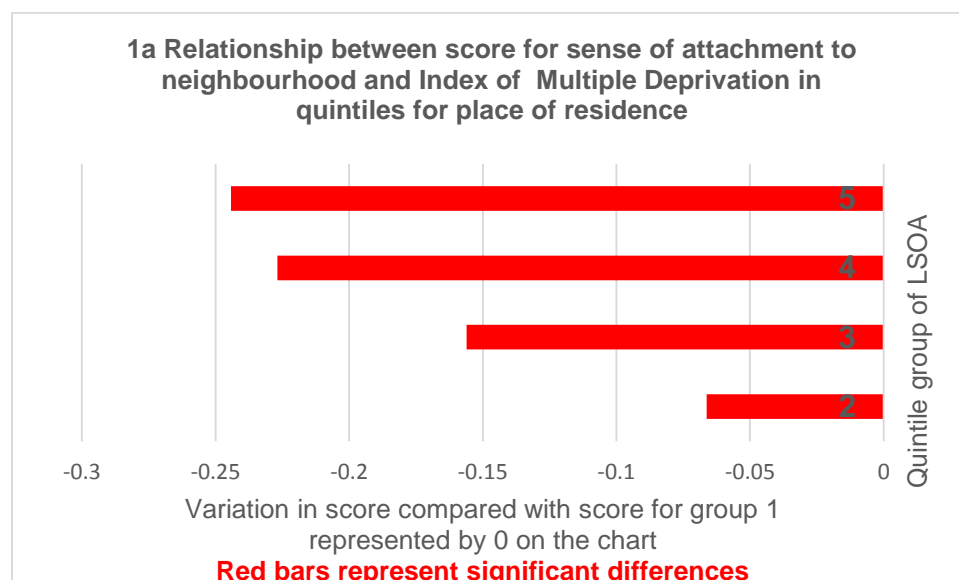
- income
- employment
- housing (including sub-domains relating to geographical barriers of access to services and to wider barriers including cost)
- crime
- living environment

Appendix 2 Diagrams summarising results

1) Diagrams 1a and 1b showing how the measure of individuals' perceived neighbourhood attachment (recorded in the USS in wave 3 related to area characteristics: quintile groupings for IMD2010 and SFI for the person's place of residence (LSOA) at wave 4.

The analysis relates to over 17,000 members of the USS living in England. The analysis controlled for individual characteristics: sex, age group, whether lived with a partner, socio-economic class, whether employed, broadly defined ethnic group, whether the person moved between LSOAs from survey wave 3 to wave 4.

People living in areas categorized in higher quintile groups on IMD2010 and SFI were likely to have a lower score for sense of attachment to their neighbourhood when compared to people in the lowest quintile (group 1). These relationships are evident after controlling for the person's individual attributes in the model (as described in the 'methods' section of this report). Both IMD2010 and SFI indices were significant when included in the model together (as illustrated below), so they have independent associations with the outcome.

1a Relationship between score for sense of attachment to neighbourhood and Index of Multiple Deprivation in quintiles for place of residence

Quintile group of LSOA

Variation in score compared with score for group 1 represented by 0 on the chart

Red bars represent significant differences

1b Relationship between score for sense of attachment to neighbourhood and Index of Social Fragmentation in quintiles for place of residence

Quintile group of LSOA

Variation in score compared with score for group 1 represented by 0 on the chart

Red bars represent significant differences

2) Diagrams 2a and 2b showing how the measure of perceived social cohesion in one's neighbourhood (recorded in the USS wave 3) related to area characteristics: quintile groupings for IMD2010 and SFI for the person's place of residence (LSOA) in USS wave 4.
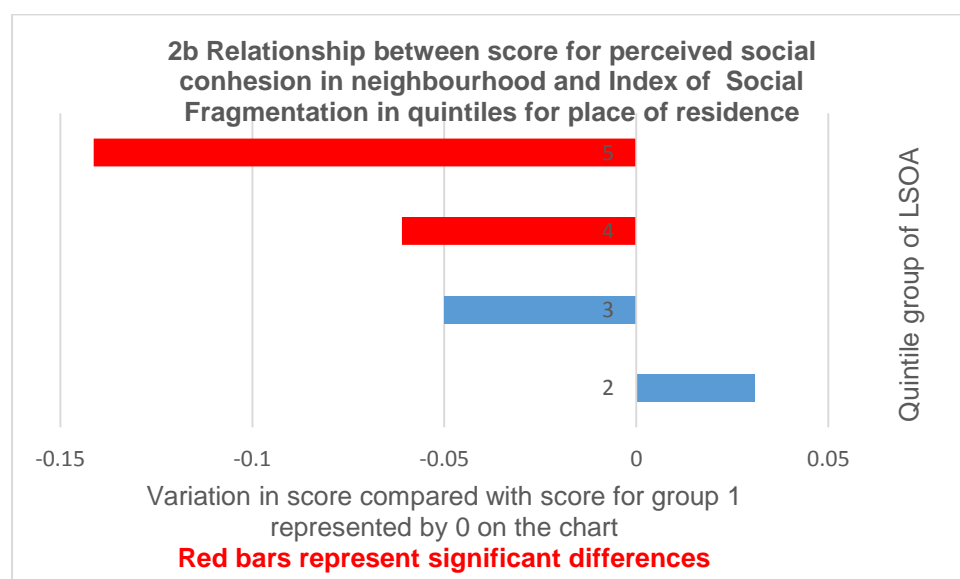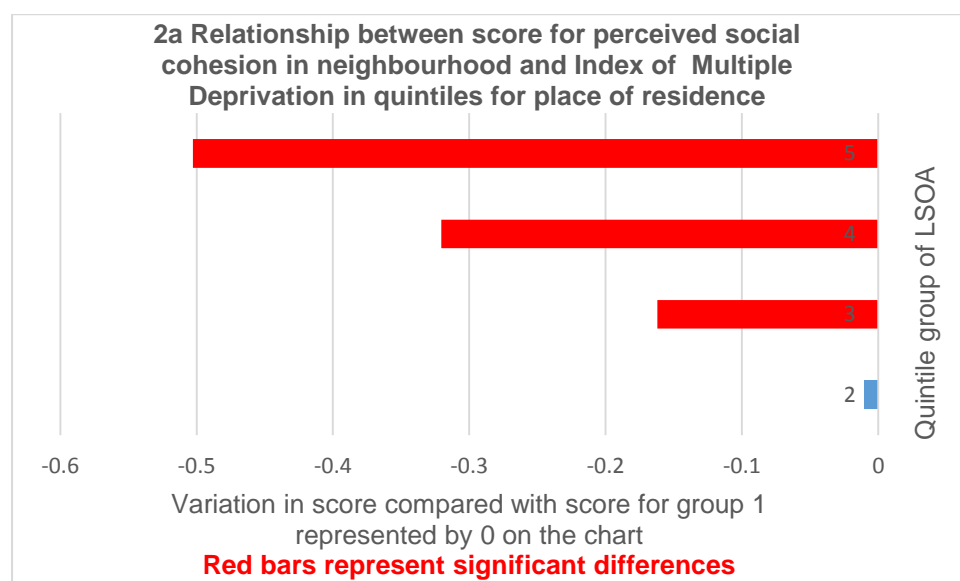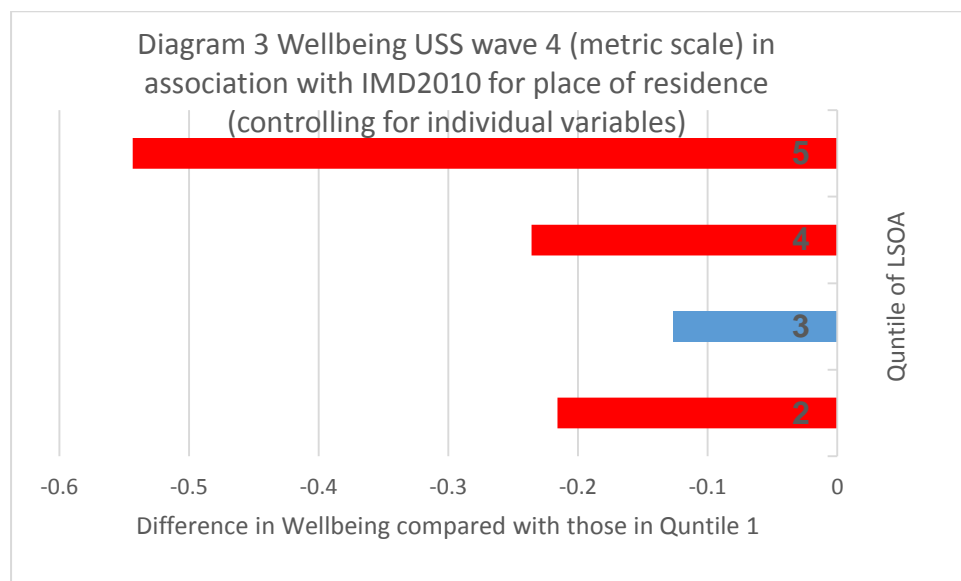
The analysis relates to over 17,000 members of the USS living in England. The analysis controlled for individual characteristics: sex, age group, whether lived with a partner, socio-economic class, whether employed, housing tenure, broadly defined ethnic group, whether the person moved between LSOAs from survey wave 3 to 4. People living in areas categorized in higher quintile groups on IMD2010 and SFI were likely to have a lower score for perceived social cohesion in their neighbourhood when compared to people in the lowest quintile (group 1). These relationships are evident after controlling for other variables in the model (as described in the 'methods' section of this report). Both IMD2010 and SFI indices were significant when included in the model together (as illustrated below), so they have independent associations with the outcome.

2a Relationship between score for perceived social cohesion in neighbourhood and Index of Multiple Deprivation in quintiles for place of residence

Quintile group of LSOA

Variation in score compared with score for group 1 represented by 0 on the chart

Red bars represent significant differences

2b Relationship between score for perceived social conhesion in neighbourhood and Index of Social Fragmentation in quintiles for place of residence

Quintile group of LSOA

Variation in score compared with score for group 1 represented by 0 on the chart

Red bars represent significant differences

3) Diagram 3 showing how self-reported wellbeing (recorded in the USS wave 4) related to quintile groupings for IMD2010 for the person's place of residence (LSOA) in wave 4.

The analysis relates to over 17,000 members of the USS living in England. The analysis controlled for individual characteristics: sex, age group, whether lived with a partner, socio-economic class, household income, whether employed, housing tenure, broadly defined ethnic group, whether the person moved had between LSOAs since wave 3. People living in areas categorized in the highest quintile groups on IMD2010 (more deprived areas) were likely to have a lower score for self-reported wellbeing when compared to people in the lowest quintile group (group 1). These relationships are evident after controlling for other variables in the model (as described in the 'methods' section of this report).

Diagram 3 Wellbeing USS wave 4 (metric scale) in association with IMD2010 for place of residence (controlling for individual variables)

4) Diagram of relative change in wellbeing (self-reported wellbeing, recorded in the USS USS wave 7, relative to self-reported wellbeing in wave 4), showing association with quintile groupings for IMD2010 for the person's place of residence (LSOA) in wave 4.

The analysis relates to over 17,000 members of the USS living in England. The analysis controlled for individual characteristics, and how some of these changed between USS waves 4 & 7: sex, age group, socio-economic class, household income, housing tenure, broadly defined ethnic group, whether lived with a partner in waves 4 & 7, whether employed/moved in or out of employment wave 4 to wave 7, whether the person moved between LSOAs wave d to wave g. Wellbeing in wave 4 is included as a predictor in the model, so that the outcome represents relative change in wellbeing since wave 4 [12]. Self-reported wellbeing increased less between waves 4 & 7 for people living in areas categorized in higher quintile groups on IMD2010 (more deprived areas) when compared to people in the lowest quintile group (group1). These relationships are evident after controlling for other variables in the model (as described in the 'methods' section of this report).

Diagram 4 Wellbeing wave 7 in association with IMD2010 Quintile in wave 4 (controlling for Wellbeing in wave 4 and other individual variables)
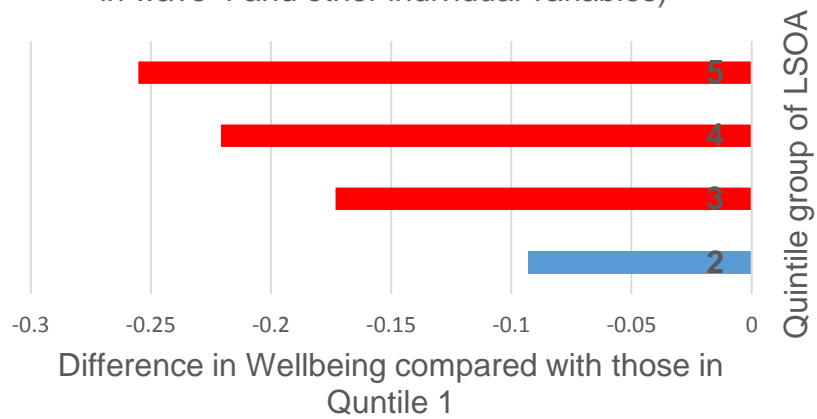
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