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Cross-level group density interactions on mental health for cultural, but not economic, components of social class

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ABSTRACT

Background: The ethnic density literature links mental health to ethnic minority status in one's neighbourhood. This design has also been applied to other identities, including sexual and political minorities, but surprisingly little attention has been paid to class-based identities. We use a Bourdieusian framework to examine whether a 'class density' association with mental health can be found for economic capital – people's material assets – and cultural capital – symbolic signifiers of class, such as tastes and interests.

Methods: Multi-level regression with post-stratification was used to make area-level estimates of cultural and economic capital for each middle super output area in Wales, using data from the National Survey for Wales 2017/18 (N = 11,381). These estimates were linked to independent individual-level data from the 2018/19 edition of the same survey (N = 4058) and mixed effects models containing individual-level capital, area-level capital, and their interaction were fitted, predicting whether respondents reported a mental health problem. Models were fitted unadjusted, adjusted for age and gender; for the other form of capital on the individual and area levels; and for the other capital's cross-level interaction. Multiple imputation was used to account for missing data.

Results: For cultural capital, a cross-level interaction was found where area-level cultural capital was protective in respondents reporting higher levels of individual-level cultural capital, but a risk factor for mental health problems in those with low individual-level cultural capital (odds ratio = 0.83, CI_{95%} = 0.75–0.93). No such relationship was found for economic capital (odds ratio = 0.96, CI_{95%} = 0.88–1.06). These results remained robust in adjusted models.

Conclusions: The presence of a class density association with mental health for cultural capital but not economic capital suggests that symbolic signifiers of class, more than material aspects, activate class identities and drive group density phenomena. There are implications for planning policy, mental health, and political leadership.

Cues to social identity and belonging have a powerful salience (Tajfel and Turner, 1979) and being a member of a minority group can be a risk factor for poor mental health (Meyer, 1995). This is demonstrated in studies of ethnic density: living somewhere where one's ethnic group forms a large proportion of the local population is protective against mental health problems (Baker et al., 2021; Bécares et al., 2018). This design has been extended beyond ethnicity to other types of identity, including sexual (Hatzenbuehler et al., 2011) and political minorities (Saville, 2020).

Although the mechanisms behind group density phenomena are unclear, it has been proposed that they result from socially-salient

identities, and the stress associated with not being a member of the relevant in-group (Saville, 2020). Given this, we would expect to see group density associations for the most salient ways in which societies are organised, and one of these is surely social class. There is indeed evidence of this: Zammit and colleagues found cross-level interactions between individual and school-level social deprivation on risk of psychosis later in life in a large Swedish dataset (Zammit et al., 2010); and Schofield et al. (2016) found a similar density effect for social class, measured using occupation, on risk of parasuicidal behaviours (although not for other mental health outcomes) in London.

However defining and measuring social class is not straightforward,

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and competing frameworks exist. Marxist and Weberian accounts famously emphasise the importance of relations to economic assets (Wright, 2005). Bourdieu's approach (Bourdieu, 1986) also asserts the primacy of economic assets, but recognises the importance of non-material assets in constructing class. Bourdieu decomposes class into a variety of material and symbolic resources, which he calls forms of *capital* (Bourdieu, 1986). Here, we focus on two: economic capital and cultural capital. Economic capital reflects material resources: money, ownership of property, and so on. Cultural capital reflects symbolic resources, such as understanding of social conventions, aesthetic preferences, and internalisation of culturally significant values.

Cultural capital can exist in institutionalised forms, such as educational qualifications or aristocratic titles. It can also be embodied by its owner into a *habitus*: a set of dispositions that set the different social classes apart from one another. Cultural capital represents the greater status of cultural preferences and conventions of those at the top of existing social structures. In conferring distinction to these aesthetics, existing social structures are reinforced in the cultural domain. Bourdieu notes that embodied cultural capital is less easily transferred than economic capital – one cannot easily change their accent, acquire new skills, change their tastes – and thus it often places a barrier to intra-generational social mobility (Bourdieu, 1986).

Unlike economic resources, which are materially valuable, much of the value of cultural capital is symbolic and relational: distinguishing one as belonging to a high status group (Krarup and Munk, 2016). Here, Bourdieu's work echoes Veblen's older work on conspicuous consumption (Veblen, 1899), which, although more focused on luxury goods than Bourdieu's, also explores how consumption is used to signal social status (Trigg, 2001). This relational property of cultural capital means that cultural resources do not have a consistent value, their value is instead dependent on the specific *field* where the cultural resources are deployed (Krarup and Munk, 2016). A preference for a certain genre of art or cuisine will have a different social cache in different social situations. However, as Bourdieu (1986) has argued, the value of forms of cultural capital cannot be separated from the broader field of power and inequality in which there is competitive struggle over different forms of cultural capital.

The present study continues previous work (Hatzenbuehler et al., 2011; Saville, 2020; Schofield et al., 2016; Zammit et al., 2010) extending the idea of an association between ethnic density and mental health to a broader idea of group density associations, resulting from a range of salient social identities. Specifically it develops previous work showing evidence of a group density association for class (Schofield et al., 2016; Zammit et al., 2010), by using an explicit model of class, that of Bourdieu, to decompose class into economic and cultural dimensions, to examine which, if either, show group density phenomena. Given that the value of cultural capital is in its potential for signalling in-group membership, we hypothesise that having high levels of cultural capital will be more positively associated with mental health in areas where the majority of residents also have high cultural capital, than it is in areas where a minority have high cultural capital. We further hypothesise that this pattern will be absent (or weaker) for economic capital, which is less 'identity-loaded'.

1. Methods

1.1. Ethics and data access

This study received ethical approval from the School of Psychology ethics committee at Bangor University. Access to data on respondents' area of residence of was granted by the Welsh Government's Knowledge and Analytical Service under the terms of a data access agreement.

1.1.1. Data

All area-level analyses were conducted at the middle super output area (MSOA) level. MSOAs are units of UK census geography, with

populations of 5000–15,000 and 2000–6000 households. Using the 2011 census areas, there are 410 MSOAs in Wales.

The National Survey for Wales (NSFW) is an annual cross-sectional survey of ~11,000 residents of Wales, sampled randomly from members, aged 16+, of residential households, which were in turn sampled randomly from postal address files. Interviews covered a range of topics and were carried out face-to-face. Core questions are asked to all respondents, but some sections are only asked to subsamples. The 2017/18 and 2018/19 surveys obtained response rates of 55% and 54% respectively.

1.1.2. Setting

Wales is a constituent nation of the United Kingdom. It has an urban belt across the south, which grew around the coalfield in the 19th century, a second smaller, semi-urban population centre along the north coast, and is otherwise largely rural and small town. Welsh identity is not monolithic, with commonplace understandings of Welshness emphasising "Wales' two truths" (Williams, 1985): a highly working class, predominantly anglophone form of Welshness that stems from the previously industrialised communities and a Welsh-speaking form of Welshness, concentrated in the west of the country.

1.1.3. Outline of analyses

The 2017/18 survey (Welsh Government, 2020a; N = 11,381) was used to derive estimates of area-level cultural and economic capital, while the 2018/19 survey (Welsh Government, 2020b) – specifically the subsample of the 2018/19 survey who were asked the Arts Council Wales section of questions (n = 4058) – was used to test for cross-level interactions between individual and area-level capital on mental health. Thus the exposures are derived from a different dataset to that used for the main analysis, avoiding possible circularities.

Methods for estimation of area-level cultural and economic capital are described first, followed by those for the mental health analyses. This structure is repeated in the Results section.

1.2. Estimation of area-level cultural and economic capital

1.2.1. Data for area-level estimates

As well as the survey data, some area-level data were used as components of the area-level capital estimates. The area-level variables used for the cultural capital estimates were: population density, according to the 2011 census (Office for National Statistics et al., 2016); the percentage of residents in social classes A or B under the National Readership Survey classification system,¹ according to the 2011 census; the proportion of residents who owned their homes, according to the 2011 census; and the proportion of residents in receipt of benefits on the basis of low salary, from the Welsh Index of Multiple Deprivation (Welsh Government, 2014). Data from Table DC5102EW of the 2011 census (age, by sex, by highest level of qualification) was downloaded at MSOA level using the *nomis* package (Odell, 2018) for R (R Core Team, 2019), for the purpose of post-stratification (see below). Area-level variables were chosen to capture the likely class structure of neighbourhoods (low income rates, rates of high occupational grades, and home-ownership) and the relative urbanicity of neighbourhoods, which might influence opportunities to attend cultural events.

To make the area-level cultural capital estimates, the following variables were used from the 2017/18 survey: Age (banded as Table DC5102EW: 16–24, 25–34, 35–49, 50–64, 65+), sex (male,

¹ The NRS system is a tool for classifying people's occupation into six categories: A: higher managerial administrative, or professional; B: intermediate managerial administrative, or professional; C1: Supervisory or clerical and junior managerial administrative, or professional; C2: Skilled manual; D: Semi-skilled and unskilled manual; and E: State dependents, casual and lowest grade workers (Meier and Moy, 1999).

female), highest level of qualifications (harmonised with Table DC5102EW: level 4 qualifications [degree level], level 3 qualifications [A-levels – post-16 but pre-degree], level 2 qualifications [A-C grades at GCSE/O levels, normally taken at age 16], level 1 qualifications [D-G grades at GCSE/O levels], apprenticeships, other qualifications, or no qualifications); and data on arts and culture consumption. Education was deemed important here, as it is an explicit part of cultural capital.

Arts and culture consumption was measured using the questions: “In the last 12 months, have you attended any of the following arts events?“, with the response options: “Film showing”, “Theatre”, “Live music”, “Dance performance”, “Storytelling or reading event”, “Other arts event (PLEASE SPECIFY)”, and “None of these” and the question: “In the last 12 months, have you visited any of these places?“, with the response options: “A historic building open to the public (non-religious)”, “A historic park or garden open to the public”, “A place connected with industrial history (e.g. an old factory, dockyard or mine)”, “A historic place of worship attended as a visitor (not to worship)”, “A monument such as a castle, fort or ruin”, “A site of archaeological interest (e.g. Roman villa, ancient burial site)”, “Other historic/heritage site”, and “None of these”. The number of these items endorsed was summed and each responded was coded as a 1 if they reported equal to or greater than the median number of activities (3) and 0 if they reported fewer.²

The area-level economic capital estimates used the same data as for cultural capital, except with a different dependent measure based on three variables. Firstly, the question: “[Do you/Does your household] own or rent this accommodation?“, with the options: “I/we own it or live with the person who owns it (includes homes being bought with a mortgage)”, “It is rented from the local council”, “It is rented from a housing association or housing trust”, “It is rented from a private landlord”, or “Other (e.g. live rent free or home comes with job)”. Secondly, a series of items (see documentation for detailed wording) categorised respondents’ household income into five bands: “Less than £10,400 a year”, “£10,400 to £20,799 a year”, “£20,800 to £31,099 a year”, “£31,100 to £41,499 a year” and “£41,500 or more a year”. Thirdly, respondents were categorised based on whether or not they met criteria for material deprivation (based on responses to several questions about whether or not they can afford various items, full details available from <https://gov.wales/sites/default/files/statistics-and-research/2019-02/national-survey-wales-2017-18-poverty-deprivation.pdf>). Three criteria were set: whether respondents owned their home, whether they had an income of £31,100 or greater, and whether they did not meet criteria for material deprivation. Respondents meeting the median number (two) of criteria or greater were coded as 1 and those meeting fewer were coded as 0.

1.2.2. Modelling of area-level estimates

Estimates of cultural and economic capital were made at the MSOA level using multi-level regression with stratification (MRP), a technique developed in political science for disaggregating survey data by geographical units smaller than for the survey is designed (Gelman et al., 1997). MRP involves fitting a mixed effects regression model to individual-level data, to predict a given survey response on the basis of demographic data that are also available in census or similar data, as well as area-level fixed effects and random intercepts for the specific geographical units in question. The parameters estimated from this individual-level model can then be post-stratified using the known demographic data for each geography to obtain area-level estimates that

² Such dichotomisation is not ideal, but by dichotomising both cultural and economic capital measures, the same model could be applied to both, maximising comparability. For both area-level measures, the output is an estimated percentage of residents with median or greater levels of the relevant form of capital. We experimented with fitting a Poisson model to cultural capital, which gave qualitatively similar results to a median-split, so opted to prioritise comparability.

account for the modelled demographic and geographical differences between the areas. MRP has been shown to outperform simple disaggregation of survey data by area (Hanretty et al., 2018; Saville, 2019).

In order to maximise comparability between the two analyses, the models fitted to estimate cultural and economic capital were identical, except for the dependent measures. Thus differences arise from the data, rather than being imposed by the variables chosen for the two models.

Mixed effects models were fitted to the cultural and economic capital dependent variables described above using the *glmmTMB* package (Brooks et al., 2017) for R. The fixed effects were: MSOA-level measures of population density, percentage of the population in social classes A or B, the percentage of the population who owned their homes, and the proportion of the population in receipt of low-pay related benefits. Random intercepts were fitted for each MSOA, nested within the local authority the MSOA was in, and every possible combination of the five age groups, two sexes, and seven education groups (i.e. 70 age*sex*education groups).

Multiple imputation, using the *Amelia* package (Honaker et al., 2011) for R, was used to account for missing data.³ Details of imputation can be found in the supplementary materials. Twenty iterations of multiple imputation were run and model parameters were combined across iterations using Rubin’s method (Rubin, 1987), as implemented in the *mimeld* function in the *Amelia* package.

The age*sex*education parameters were weighted by the proportion of the population that the relevant segment represented in each MSOA. These weighted terms were then summed with the relevant MSOA and local authority random effects, the fixed effect terms multiplied by the relevant value for each MSOA, and the overall intercept, before this summed value was inverted to get an estimated percentage of the population of each MSOA who met the relevant criteria for capital.

2. Mental health analysis

2.1. Data for mental health analyses

The area-level estimates of cultural and economic capital described above were linked to independent data from the Arts Council Wales subsample of the 2018/19 NSfW, see Table 1 for sample demographics. To measure cultural capital on the individual-level, an item from the section on attitudes to art and culture was used: “Spending my time attending or taking part in arts and cultural activities is of little interest to me”. The response options were “Strongly agree”, “Tend to agree”, “Neither agree nor disagree”, “Tend to disagree”, and “Strongly disagree”. This was treated as a numeric variable, scoring 1–5. To measure economic capital on the individual level, the number of economic capital criteria met, as described above, was used: home ownership, income of £31,100+, and not being classified as economically deprived, to give a score of 0–3.

The dependent measure in the mental health analysis was measured using the item “Do you have any physical or mental health conditions or illnesses lasting or expected to last for 12 months or more?“. Respondents whose responses included conditions coded under the category “mental disorders” were scored as a 1 and all other were scored 0. Note that this coding was carried out by the Welsh Government’s Survey Team, rather than by the authors.

2.2. Mental health analysis models

The degree of cross-level interactions between area and individual

³ The questions on income only started being asked after three months of the fieldwork. The missing data from the period where the question was asked was 553 while 2958 missing cases were recorded while the question was not being asked, so these data can reasonably be expected to be approximately missing at random.

Table 1
Sample demographics for mental health analysis.

	Overall	Area-level cultural capital quantile (%)			
		Bottom cultural capital quartile	Second cultural capital quartile	Third cultural capital quartile	Top cultural capital quartile
Total N	4058	1024	1005	1015	1014
Reporting mental health problem (%)	418 (10.3)	136 (13.3)	95 (9.5)	96 (9.5)	91 (9.0)
Female (%)	2273 (56.0)	577 (56.3)	563 (56.0)	553 (54.5)	580 (57.2)
Age (mean (SD))	54.86 (18.4)	52.71 (18.3)	55.89 (18.4)	55.40 (18.6)	55.47 (18.3)
Disinterested in arts (%)					
Strongly agree	570 (14.0)	185 (18.1)	156 (15.5)	113 (11.1)	116 (11.4)
Agree	712 (17.5)	207 (20.2)	171 (17.0)	180 (17.7)	154 (15.2)
Neither agree nor disagree	722 (17.8)	204 (19.9)	171 (17.0)	205 (20.2)	142 (14.0)
Disagree	934 (23.0)	211 (20.6)	238 (23.7)	234 (23.1)	251 (24.8)
Strongly disagree	1120 (27.6)	217 (21.2)	269 (26.8)	283 (27.9)	351 (34.6)
Economic capital criteria met (%)					
0	379 (9.3)	151 (14.7)	87 (8.7)	80 (7.9)	61 (6.0)
1	925 (22.8)	286 (27.9)	220 (21.9)	207 (20.4)	212 (20.9)
2	2286 (56.3)	508 (49.6)	593 (59.0)	600 (59.1)	585 (57.7)
3	468 (11.5)	79 (7.7)	105 (10.4)	128 (12.6)	156 (15.4)
Area-level economic capital quantile (%)					
Bottom economic capital quartile	1028 (25.3)	659 (64.4)	176 (17.5)	65 (6.4)	128 (12.6)
Second economic capital quartile	1002 (24.7)	290 (28.3)	427 (42.5)	229 (22.6)	56 (5.5)
Third economic capital quartile	1021 (25.2)	75 (7.3)	337 (33.5)	403 (39.7)	206 (20.3)
Top economic capital quartile	1007 (24.8)	0 (0.0)	65 (6.5)	318 (31.3)	624 (61.5)

capital on mental health were tested using generalised linear mixed effects models, implemented using the *glmmTMB* package for R. Binomial models were fitted, predicting whether a respondent reported a mental health problem on the basis of: a) their individual-level cultural/economic capital; b) the area-level cultural/economic capital of their MSOA; and c) the interaction of the two. All models had random intercepts of MSOA, nested within local authority, and were weighted by the included sampling probability weights for the Arts Council Wales subsample of the NSfW 2018/19.

Separate sets of models were fitted for cultural and economic capital, gradually adjusting for possible confounding variables: Model 1 included only the individual and area-level measures of the relevant form of capital and their interaction; Model 2 added age and gender; Model 3 added the individual-level measure of the other form of capital; Model 4 added the area-level measure of the other form of capital; Model 5 added the cross-level interaction of the other form of capital (and so

was identical for the two types of capital). Individual and area-level capital measures were z-scored, in order to minimise multicollinearity. The adjusted models were designed to help assess whether an interaction was compositional (driven by differences in the sort of people who gave a certain answer in different types of neighbourhoods) or truly contextual. Model 5 was designed to test whether interactions specific to one form of capital were truly distinct, or whether they represented a combination of two interactions, due to the likely correlation between the two forms of capital.

To account for missing data, multiple imputation (again implemented using Amelia) was used, with 20 iterations, see Supplementary Materials. The iterations for each model were combined using the Rubin rule, as above.

3. Results

3.1. MRP analysis

The full results of the MRP models can be found in the supplementary materials, but are summarised below. The estimates themselves can be downloaded here <https://osf.io/5ks46/>.

For cultural capital, areas with higher population density and proportion of residents in social classes A and B had higher rates of arts and culture attendance, while higher low income rates were associated with lower rates. Area-level homeownership was not strongly associated with cultural capital. Individual level education was strongly positively associated, while cultural capital was slightly lower in older age bands, and similar in men and women.

For economic capital, the only fixed effect significantly associated was home ownership, which was a strong positive predictor. The percentage of residents in social classes A and B was a weak positive predictor and low income benefit rate was a weak negative predictor, while population density had little association. Being male was positively associated with economic capital, as were age and level of education.

Maps of the MSOA-level estimates can be found in Fig. 1. Rates of cultural capital are highest in the more affluent parts of Cardiff, along the M4 corridor to the west of Cardiff, and in the western outskirts of Swansea. These more affluent parts correspond to the darker shaded areas along the south and south east coast in Fig. 1. They are lowest in the upper south Wales valleys; east Swansea, and Newport; and in northern coastal communities like Rhyl and Holyhead.

Rates of economic capital were high in some of the same area as for cultural capital: Bridgend, the Gower, Monmouthshire; and low in some similar areas – the south Wales valleys and some northern coastal towns. However economic capital was also low in university towns like Bangor and Aberystwyth. Overall the two measures were positively correlated, $r = 0.588$.

3.2. Mental health analyses

Table 1 shows sample demographic characteristics for the first imputation of the analysis; 3105 had complete data for all included variables: 121 required imputation for attitude to arts and culture, 905 for income band, and 1 for home ownership.

Fig. 2 shows the probability of reporting mental health problems, conditional on individual and area-level capital measures. Results are described separately for the two forms of capital below.

3.3. Cultural capital

For cultural capital, an interaction is evident, where area-level cultural capital is negatively associated with risk of mental health problems in those with higher individual-level cultural capital but positively associated in those with low individual-level cultural capital.

These impressions are confirmed by the mixed effects models. Fig. 3 and Table 2 show the odds ratios from the various models. The

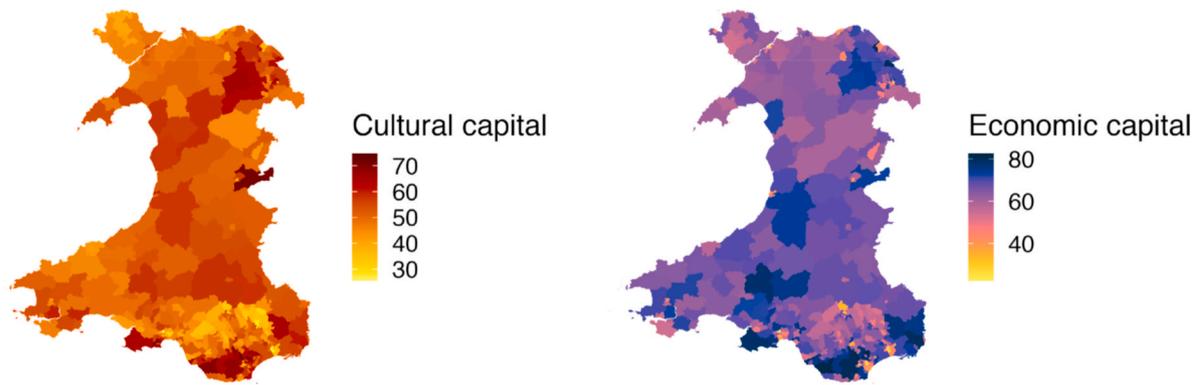


Fig. 1. Estimates proportion of the population of each MSOA who meet criteria for cultural capital (left-hand panel) and economic capital (right-hand panel).

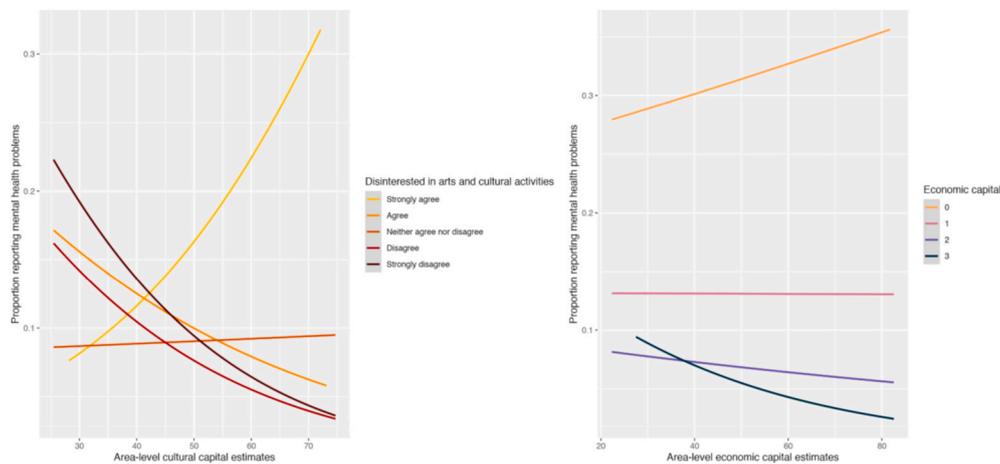


Fig. 2. Proportion of respondents reporting mental health problems as a function of individual and area-level cultural capital (left-hand panel) and economic capital (right-hand panel).

interaction term between individual and area-level cultural capital remains very consistent across models 1–4, with an odds ratio of ~ 0.83 and the confidence intervals remaining below 1 in all cases. The cross-level interaction for cultural capital is attenuated somewhat in Model 5 ($\sim 0.88, 0.79-0.98$), which contained cross-level interaction terms for both forms of capital, but the confidence intervals remain below 1.

3.4. Economic capital

For economic capital, there was little evidence for a cross-level density association. The cross-level interaction term for economic capital had an odds ratio of ~ 0.97 in models 1–4, with the confidence intervals comfortably spanning 1 in all models.

Thus the results largely confirm our hypotheses of a group density association for cultural but not economic markers of class. However, it should be noted that, although the confidence intervals for the cultural capital cross-level interaction do not overlap with 1, they do overlap with those for the analogous term for economic capital, so we cannot definitively conclude that the association is weaker for economic capital, just that there is evidence for this cross-level association for cultural capital, but not for economic capital.

4. Discussion

4.1. Summary

This study is the first to show a group density association to just one aspect of a broader multi-dimensional identity. The association between

mental health and individual cultural capital varied as a function of area-level cultural capital, such that high individual cultural capital was protective of mental health in areas with high cultural capital, but a risk factor in areas with low cultural capital. This association was robust to adjustment for economic capital, whether on the individual level, the area level, or the interaction between the two. No such cross-level interaction was shown for economic capital, although the confidence intervals for the cross-level interaction overlapped for the two forms of capital. We will first discuss possible mechanisms explaining our results, then move to theoretical links with the broader literature, describe some of the limitations of the work, and finally discuss possible implications.

5. Mechanisms

These findings are consistent with the idea that group density associations with mental health arise as a result of salient social identities creating inter-group boundaries. Such social relations then have adverse effects on the mental health of locally-defined minorities, either by shaping social relations, through the psychological experience of minority status, or both. Here, the economic components of class did not appear salient in this respect, but cultural components did, as would be predicted by Bourdieusian theory.

This supports previous research showing that divisive elements of class boundaries are often articulated in terms of tastes and values, rather than along those of material circumstances (Jarness, 2017). It is also interesting in the context of the growing importance of the ‘cultural axis’ in British politics, relative to economic issues (Jennings and Stoker, 2017). It is important to stress that we are not arguing that economic

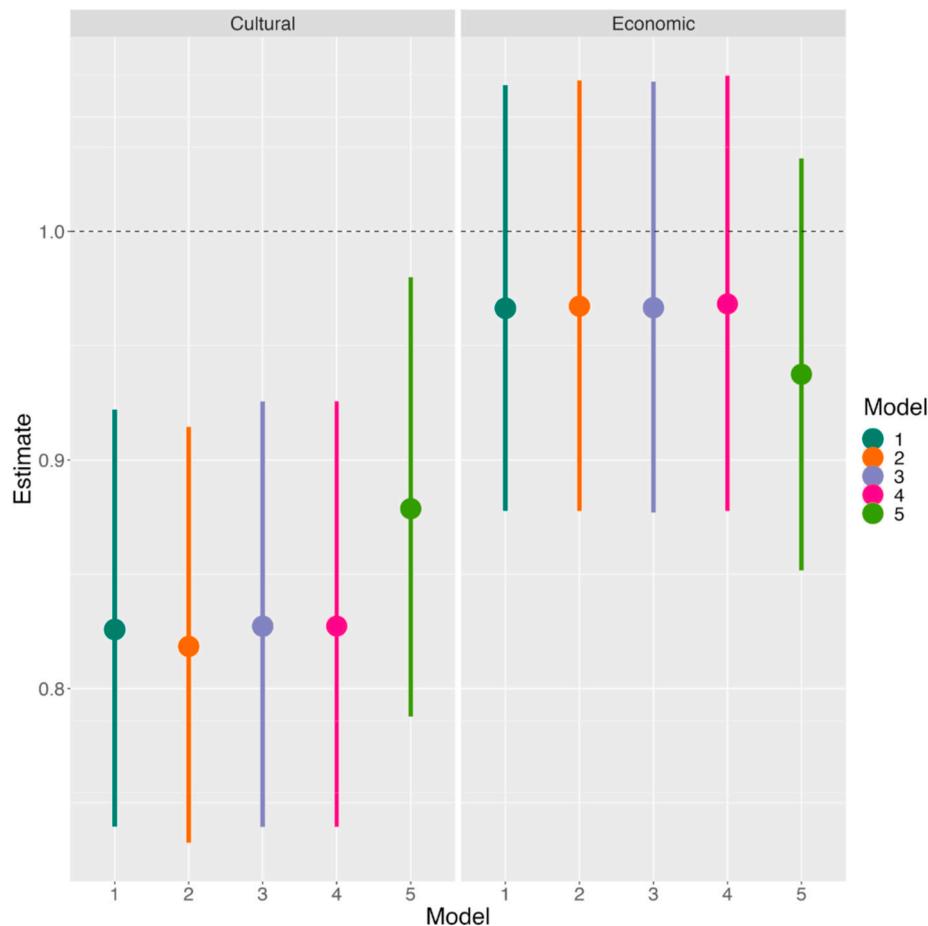


Fig. 3. Cross-level interaction terms for all models, expressed as odds ratios with 95% confidence intervals. Note that Model 5 is the same for the two forms of capital, while different versions of Models 1–4 were fitted for the two forms of capital.

capital does not shape social relations, clearly it does. However our findings show that place-based in-group/out-group dynamics may be driven by symbolic cues to status, rather than the material factors that potentially underpin them.

The study does not speak to the more immediate mechanisms that underly the interaction. While it appears that experiences of explicit inter-personal harassment, such as verbal or physical attacks, are an important component of the ethnic density association with mental health (Bécares et al., 2009), it seems less plausible that these mechanisms are at play here, where the interaction is between individual and wider community tastes in cultural events. Here, we would posit that the drivers are more likely to be a more implicit sense of not belonging, but further work is needed to explore this.

6. Theoretical context

These results echo previous work showing the so-called ‘dark side of social capital’ (Campos-Matos et al., 2016), where living in a high social capital area is a protective factor for the health of those with high individual-level social capital but a risk factor in those with low individual-level social capital (Elgar et al., 2011; Saville, 2021; Subramanian et al., 2002). In the Bourdieusian tradition, social capital is another component of class, alongside economic and cultural capital, and although these results have generally not been framed in the context of group density, it is plausible that such phenomena are driven by the same in-group/out-group processes as in the present study.

The findings also have interesting parallels in work on country-level predictors of status anxiety – dysphoria linked to negative social comparisons. Delhey et al. (2017) found that status anxiety was higher in

European countries where cultural consumption is more stratified by social class, although they did not find the cross-level interaction with individual social position we found here. Layte and Whelan (2014) similarly found that status anxiety is higher in more economically unequal countries, but that this association is not moderated by individual-level income rank. The present findings, with the cross-level interaction of cultural capital have more of the relational characteristics that Bourdieu’s theory of capitals might have suggested. More broadly, this relates to the debate over the link between income inequality and health articulated in *The Spirit Level* (Pickett and Wilkinson, 2010), and challenged by both proponents of a neo-materialist account (Lynch et al., 2000) and by those who regard income inequality as an inappropriate proxy for social stratification (Goldthorpe, 2010).

7. Limitations

This study had several limitations and caveats that should be highlighted. Firstly, the data are cross-sectional and causation cannot be inferred. Poor mental health might have led respondents to become alienated from their local community, rather than the other way around. Alternatively, the findings could represent some sort of compositional effect rather than a contextual one: those who have low cultural capital and live in low cultural capital areas may not be comparable to their counterparts in high cultural capital areas in some important respect.

Secondly, we collapse cultural capital onto a single dimension – an interest in the arts, museums, and so on represents high cultural capital and a lack of interest represents low. We did not differentiate between this form and other forms of cultural capital, such as the ‘emergent cultural capital’ Savage et al. (2013) propose (although see Mills, 2014,

Table 2
Odds ratios and 95% confidence intervals for all models.

		Model 1			Model 2			Model 3			Model 4		
		Odds ratio	2.50%	97.50%	Odds ratio	2.50%	97.50%	Odds ratio	2.50%	97.50%	Odds ratio	2.50%	97.50%
Cultural capital	Individual-level cultural capital (z-scored)	0.81	0.72	0.90	0.79	0.71	0.89	0.86	0.77	0.97	0.87	0.77	0.97
	Area-level cultural capital (z-scored)	0.86	0.76	0.98	0.87	0.77	0.99	0.96	0.84	1.09	0.95	0.81	1.11
	Age				0.98	0.98	0.99	0.99	0.98	0.99	0.99	0.98	0.99
	Female				1.57	1.26	1.96	1.48	1.18	1.86	1.48	1.18	1.86
	Individual-level economic capital (z-scored)							0.52	0.46	0.58	0.52	0.46	0.58
	Area-level economic capital (z-scored)										1.02	0.88	1.18
	Cross-level cultural capital interaction		0.83	0.74	0.92	0.82	0.73	0.91	0.83	0.74	0.93	0.83	0.74
Economic capital	Individual-level economic capital (z-scored)	0.48	0.43	0.54	0.50	0.45	0.56	0.51	0.46	0.57	0.51	0.46	0.57
	Area-level economic capital (z-scored)	0.96	0.84	1.10	0.98	0.85	1.12	0.98	0.86	1.13	1.00	0.84	1.17
	Age	0.97	0.88	1.06	0.99	0.98	0.99	0.99	0.98	0.99	0.99	0.98	0.99
	Female				1.42	1.13	1.78	1.46	1.16	1.84	1.46	1.16	1.83
	Individual-level cultural capital (z-scored)							0.87	0.78	0.98	0.87	0.78	0.98
	Area-level cultural capital (z-scored)										0.98	0.84	1.14
	Cross-level economic capital interaction		0.97	0.88	1.06	0.97	0.88	1.07	0.97	0.88	1.07	0.97	0.88
Combined	Individual-level cultural capital (z-scored)										0.92	0.82	1.03
	Area-level cultural capital (z-scored)										0.95	0.83	1.09
	Age										0.98	0.98	0.99
	Female										1.27	1.02	1.58
	Individual-level economic capital (z-scored)										0.50	0.45	0.55
	Area-level economic capital (z-scored)										0.96	0.83	1.12
	Cross-level cultural capital interaction											0.88	0.79
Cross-level economic capital interaction											0.94	0.85	1.03

for a criticism of such a construct), or between embodied, institutional, and objective forms of cultural capital.

Thirdly, it could be hypothesised that living in an area where few people attended arts and cultural events would be associated with mental health because it reflects lack of access to such resources, which are intrinsically beneficial for some people’s mental health, rather than because of the relational mechanisms we propose. However, we find that the sign of the association between mental health and area-level cultural capital differs between those with high and low cultural capital, rather than just the magnitude, which seems less compatible with this explanation.

Fourthly, the measure of mental health used here was based on respondents reporting a mental health-related condition or illness, which has some disadvantages. Respondents might vary in the extent to which they reified lower wellbeing into a condition, including whether they did so in the absence of a diagnosis from a health professional. Mental health conditions can also fluctuate, and identifying as having a condition may not be a good guide to a respondent’s current level of wellbeing. Indeed, conditions could have been diagnosed before the respondent lived at their current address, compounding issues around direction of causation listed above.

Fifthly, while our design had important advantages – the group density design allows us to look at person-neighbourhood ‘fit’ as a risk factor for mental health without explicitly asking respondents about this, avoiding demand characteristics – there are limitations to this design. Importantly, our design did not look at direct mechanisms and so we can only speculate as to these. It is important to address this through

triangulation with other designs, quantitative and qualitative, which directly examine mechanisms.

Finally, although not a limitation as such, this paper focuses on cultural and economic capital, but not social capital. A cross-level analysis of social capital has already been run with National Survey for Wales data (Saville, 2021), finding a similar cross-level interaction as shown here. However, it is not clear if the conception of social capital used in this previous paper, namely sense of belonging, captured a Bordieusian form of social capital, or whether it was more in line with the form articulated by Putnam (2000). That said, analyses of Canadian data suggest that sense of belonging correlates with measures of Bordieusian social capital (Carpiano and Hystad, 2011).

8. Cultural capital and health

It is worth noting that, although our group density analysis of cultural capital is novel, there is an existing literature linking cultural capital to health (Abel, 2008). Important health practices, such as diet (Clercq et al., 2017), smoking (Gagné et al., 2015), and exercise (Veenstra, 2007) can be construed as components of cultural capital, and this may explain some aspects of health inequalities. Cultural capital, thus, can be an important framework for understanding why people make certain types of health-related choices.

9. Implications

In terms of implications, addressing alienation as a result of cultural

mismatch with one's area may be a job for policy-makers more so than for clinicians. This study dovetails with work suggesting a negative impact of gentrification on resident mental health in California (Tran et al., 2020) and suggests possible considerations for policy-makers with responsibility for planning. The creation of cross-cutting (Blau et al., 1997) and common civic identities (Fukuyama, 2018) is another possible high-level political remedy.

In the specific Welsh context, cultural participation has been an area of focus for Welsh Government and policy-makers for some time and its contribution to health and well-being is recognised within the Well-being of Future Generations (Wales) Act 2015. Indeed, one of the aims of the NSfW was to increase the evidence base in this area. What our findings suggest is that specific measures to address the mismatches between individual and area levels might be necessary if policy makers are to achieve stated goals around increasing cultural access for the purpose of improving well-being.

10. Conclusions

To conclude, the present study extends previous work on group density and mental health by decomposing social class into its economic and cultural components, finding that it is the cultural markers of class where we find these phenomena, rather than the economic. This result is consistent with cultural capital's theoretical role in signalling group membership and drawing inter-group boundaries, and a broadly social psychological explanation of the association between group density and mental health.

Author statement

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Conflicts of interest/Competing interests

The authors have no conflicts of interest to declare.

Ethics approval

Ethical permission was granted by the Bangor University, Wales, United Kingdom School of Psychology Ethics Committee.

Consent to participate

All respondents gave informed consent to participate in the source data.

Availability of data and material

Data are property of the Welsh Government. Non-identifying data are available through the UK Data Service (<https://www.ukdataservice.ac.uk/>). More detailed data on respondents' areas of residence provided by the Welsh Government's survey team (Surveys@gov.wales) under a data access agreement. Our MRP estimates of the two types of capital can be found here: <https://osf.io/5ks46/>.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.socscimed.2022.114790>.

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