

Social cohesion, mental wellbeing and the role of smart technology and pet ownership among social housing residents: a cross-sectional cohort study

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Abstract

Background: Smart technology has been shown to have varied effects on social cohesion and mental wellbeing. There has been very little research on associations between pet ownership and social cohesion and wellbeing.

Objective: We sought to explore this in a sample of social housing occupants in Cornwall, UK.

Methods: This was a cross-sectional study that collected data on people's living environment, health and wellbeing. Participants were social housing residents in Cornwall, UK. We used regression analyses to explore associations between people's ownership of smart technology and pets, and their reported levels of social cohesion and mental wellbeing.

Results: There were no statistically significant associations between social cohesion and ownership of either smart technology or pets. Unadjusted regressions for wellbeing showed an association with owning a smartphone. However, after adjusting for age, gender and SES, this effect was no longer significant. Those who owned any smart technology and those who owned a games console had significantly higher levels of wellbeing, after adjusting for age, gender and SES; the effect held after social cohesion was added to the model. Owning two or more dogs was associated with lower levels of wellbeing.

Conclusions: Previous research suggests that the beneficial effects of smart technology are context-dependent, and our results support that. There are limited data on pet ownership and social cohesion or wellbeing; our data suggest there is not a strong relationship.

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Original Manuscript

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Abstract

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Introduction

Social cohesion and wellbeing

The costs of mental ill health in England have been estimated at £119 billion per annum¹. A number of factors have been found to be linked to subjective wellbeing, including health status, housing tenure, relationship status and age².

Social cohesion describes the extent to which people feel integrated within their neighbourhood, based on shared values and a sense of solidarity;³ it has also been shown to be a powerful indicator of subjective wellbeing³, and cross-national studies indicate that the UK's position in national rankings of social cohesion is falling⁴.

The [anonymised] project recruited a sample of people living in social housing and included measures on social cohesion, mental wellbeing, physical and mental health, as well as physical measures of the home environment. The project was based in the UK county of Cornwall. Cornwall has been in receipt of initiatives to increase digital inclusion in rural areas⁵.

Previous research amongst the [anonymised] cohort showed that social cohesion was associated with mental wellbeing, but not with physical or mental health⁶, and gave rise to further questions about the role of smart technology and pet ownership.

Smart technology, social cohesion and wellbeing

Qualitative studies suggest that smart technologies and, more broadly, internet and communications technologies (ICT) can have a positive impact on social cohesion and societal capabilities⁷. Smart technology initiatives can provide tools for inclusive growth: early initiatives in digital inclusion led to social and economic benefits in rural communities⁸, and smartphones, used appropriately, can improve social connections among older adults⁹. In rural settings, it has been argued that ICT and smart technologies can encourage people to form social groups based on personal choice rather than geographical location, the so-called 'disembedding' of social relationships¹⁰. Clearly, this can have both positive and negative effects. ICT allows people to work remotely, potentially reducing the potential for local integration¹⁰; equally, it may enable people to create stronger connections within the community they live in rather than with colleagues: rural isolation in particular can make local social relationships even more important and ICT can connect people in ever-evolving new ways³. ICT has been shown to have the potential to improve social wellbeing among older age groups¹¹, however, this is a nuanced situation, with different age groups experiencing varied benefits from different applications of technology¹². Smart technology and ICT are increasingly integral to society, particularly post-pandemic, but the role they play can differ substantially depending on an area's

rurality, history, location and socio-economic make up¹⁰.

Pets, social cohesion and wellbeing

The limited body of research around pet ownership and social cohesion is constrained to dog ownership, and suggests that small local parks, and specifically those used by dog owners, can contribute to neighbourhood cohesion and ethnic integration¹³, by facilitating regular, informal communication between dog walkers and other park users; however, Japanese researchers observed no association between dog walking and social cohesion and a modest relationship with social capital¹⁴. Although acquiring a dog is associated with an increase in how much people walk, it does not affect their perception of their neighbourhood's social cohesiveness¹⁵. Dog ownership may explain the varying beneficial effects of living near greenspace, with dog owners more likely to meet recommended activity targets than others¹⁶; in turn, this is likely to have positive implications for mental wellbeing. Having a dog can be a catalyst for casual interactions in public places, although this effect has been shown to be breed-specific, being stronger with 'appealing' dogs like Labradors and weaker with Rottweilers¹⁷. A small study of elderly people with and without dogs found no difference in the length of conversations people engaged in while walking, although dog owners walked more frequently; however, dog owners reported higher levels of wellbeing, including regular socialising with friends and relatives¹⁸. An online study found that those who identified as 'dog people' had higher levels of extraversion and agreeableness, and lower levels of neuroticism than 'cat people', reinforcing the popular perception that 'cat people' are more introverted¹⁹. Pet ownership is associated with positive physiological measures including blood pressure and cholesterol levels and with improved coping with chronic illness²⁰.

This analysis sought to answer two questions:

- Is there an association between the use of smart technology and levels of social cohesion or wellbeing in this cohort?
- Is there an association between pet ownership and levels of social cohesion or wellbeing in this cohort?

We hypothesised that smart technology would overall be associated with lower levels of social cohesion, because it would improve distant rather than local communication. In contrast, we expected dog ownership to be associated with better social cohesion. We speculated that cat ownership would be associated with worse social cohesion, on the basis that owners might be more introverted and less integrated within their community. Because of the association between social cohesion and mental wellbeing already shown in this cohort⁶, we planned to consider the role of mental wellbeing in these relationships.

Methods

This is a cross-sectional study of the social cohesion and wellbeing of participants in the [anonymised] project. The [anonymised] project was a collaboration between the University of [anonymised]; the social housing provider [anonymised]; the local government body, [anonymised] and the charity [anonymised]. The project ran from March 2017 to January 2023.

[anonymised] Housing residents in [anonymised area] ([anonymised towns]) were invited to take part in the project. Because these areas have a high concentration of [anonymised] Housing, communities could be studied as well as individual homes. Participants were identified by [anonymised] Housing. Of 2,000 [anonymised provider] households, 649 were approached and 329 consented to take part. They consented to have sensors installed in their homes and to take part in associated surveys. This was a convenience sample with participants approached on a street-by-street basis until enough households had been recruited. Participants were primarily recruited during the day and were paid a modest incentive; participants were excluded if they lacked capacity to give informed consent.

Each recruited household had a main participant aged 18 or more, who gave written informed consent. Participants were interviewed in their homes by teams of two researchers. Baseline data were collected between September 2017 and April 2018, with a booster sample collected between August and November 2018.

The survey asked for sociodemographic information about the main participant, the age and gender of other household members, detailed information about the participant's home (including heating use, mould, damp, etc.) and the household's ownership of different kinds of technology and pets. Participants also completed standardised measures about their perception of social cohesion²¹ and their own mental wellbeing (SWEMWBS)²²; these were the outcome variables for the present analysis.

Both outcome measures were coded in accordance with published protocols^{21,23} and were analysed as continuous variables. If one or two items had been missed from the social cohesion scale's eight items or the SWEMWBS's seven items, those items were imputed using the mean of the other responses; where three or more items were missing, the total score for that measure was classified as missing.

Ownership of different forms of smart technology (any smart technology; smartphone; smartwatch or games console) was analysed dichotomously. The survey asked for the exact number of cats or dogs participants owned; for analysis, this was categorised as none, one, or two or more.

Participants' postcodes were used to link Index of Multiple deprivation (IMD 2015) and Rural Urban

classification (RUC11 2011) data to survey data. IMD or RUC data were not available for some properties, and they were therefore classified as missing.

Each cleaned, coded variable was summarised, and differences between those with and without complete data were tested.

The analyses presented are cross-sectional analyses of the baseline data. Sensitivity analyses on complete versus missing data used t-tests, chi-squared, Fishers exact and Wilcoxon rank sum tests. We used univariate regressions to explore associations between the outcome variables of social cohesion and mental wellbeing, and the explanatory variables of age, gender, SES (socioeconomic status, comprising IMD decile, education and employment status), ownership of smart technology and pets. We then carried out multivariable regression to further explore associations for SWEMWBS. Analyses were performed using STATA 16 statistical software²⁴.

Results

Of 329 study participants, 308 (93.6%) provided complete data. A further three participants (3/329, 0.9%) were treated as missing because they were potentially identifiable.

There were no statistically significant differences between complete and missing cases in terms of age, gender, rural/urban classification, employment, social cohesion, mental wellbeing, ownership of smart technology, or pets, as shown in Table 1. However, there were statistically significant differences in terms of IMD ranking and education.

Amongst complete cases, the mean age of participants was 54 years, and around two thirds (210/305, 69%) were female. Almost half (150/305, 49.2%) lived in the poorest 10% of English postcodes according to IMD 2015 rankings, and all were in the poorest 40%. Ninety-three per cent (284/305, 93.1%) were classified as living in an urban area. Two thirds of participants (202/305, 66.2%) had left education after primary or secondary school, with just one in twenty (16/305, 5.3%) having completed higher education. One in five participants were currently in work (60/305, 19.7%); one third were retired (102/305, 33.4%) and more than two fifths were currently not in work (136/305, 44.6%).

Social cohesion scores were compared with a sample of residents of Caerphilly, Wales, which had comparable levels of deprivation and which used the same measure of social cohesion²⁵. At baseline, White et al's intervention group were categorised as having low, medium or high levels of social cohesion, which we replicated in the [anonymised] data. White et al reported 25.8% as low ([anonymised current data set] 20/305, 6.6%); 36.6% as medium ([anonymised current data set] 212/305, 69.5%) and 37.6% as high ([anonymised current data set] 115/305, 23.9%). The mean [anonymised] score on SWEMWBS was 24.1 (SD 5.2); this is comparable with the UK population

norm of 23.6 (SD 3.9), from the Health Survey for England 2011²³. A large majority (260/305, 85.3%) of the sample owned at least one form of smart technology in their household. Over two thirds (213/305, 69.8%) had a smartphone; a smaller proportion owned a smartwatch (23/305, 7.5%) or games console (35/305, 11.5%). One third of participants (104/305, 34.1%) had one or more dogs in the household, and slightly fewer (46/305, 30.5%) had one or more cats.

Table 1: Participant characteristics (complete n=305 vs missing n=24)

VARIABLE	LABELS/LEVELS	COMPLETE ^A	MISSING ^A	P ^B
AGE	Years	54.1±17.6	53.4±14.2	0.87
GENDER	Male	31.20%	30.00%	0.91
	Female	68.90%	70.00%	
IMD 2015	Ranking	4446 (964 – 8548)	1512 (964 – 10826)	0.94
	1st decile (most)	49.20%	56.50%	<0.01
	2nd decile	15.40%	8.70%	
	3rd decile	12.50%	8.70%	
	4th decile	23.00%	13.00%	
	5th decile	0.00%	0.00%	
	6th decile	0.00%	13.00%	
	7th decile	0.00%	0.00%	
	8th decile	0.00%	0.00%	
	9th decile	0.00%	0.00%	
	10th decile (least)	0.00%	0.00%	
RUC 2011	Urban city and town	93.10%	95.80%	0.61
	Other	6.90%	4.20%	
EDUCATION	Secondary and/or primary	66.20%	57.90%	0.02
	Further	28.50%	21.10%	
	Higher	5.30%	21.10%	
EMPLOYMENT	In work	19.70%	15.00%	0.85
	Education or training	2.30%	0.00%	
	Retired	33.40%	35.00%	
	Not in work	44.60%	50.00%	
SOCIAL COHESION		26.9±6.5	26.1±5.6	0.60
SWEMWBS		24.1±5.2	23.3±7.1	0.50
ANY SMART TECH	No	14.75%	12.50	1.00
	Yes	85.25%	87.50	
SMARTPHONE	Yes	69.84%	58.33	0.24
SMARTWATCH	Yes	7.54%	4.17	1.00
GAMES CONSOLE	Yes	11.48%	12.50	0.74
DOGS	0	65.90%	50.00	0.27
	1	24.26%	37.50	
	2+	9.84%	12.50	
CATS	0	69.51%	75.00	0.45
	1	17.05%	20.83	
	2+	13.44%	4.17	

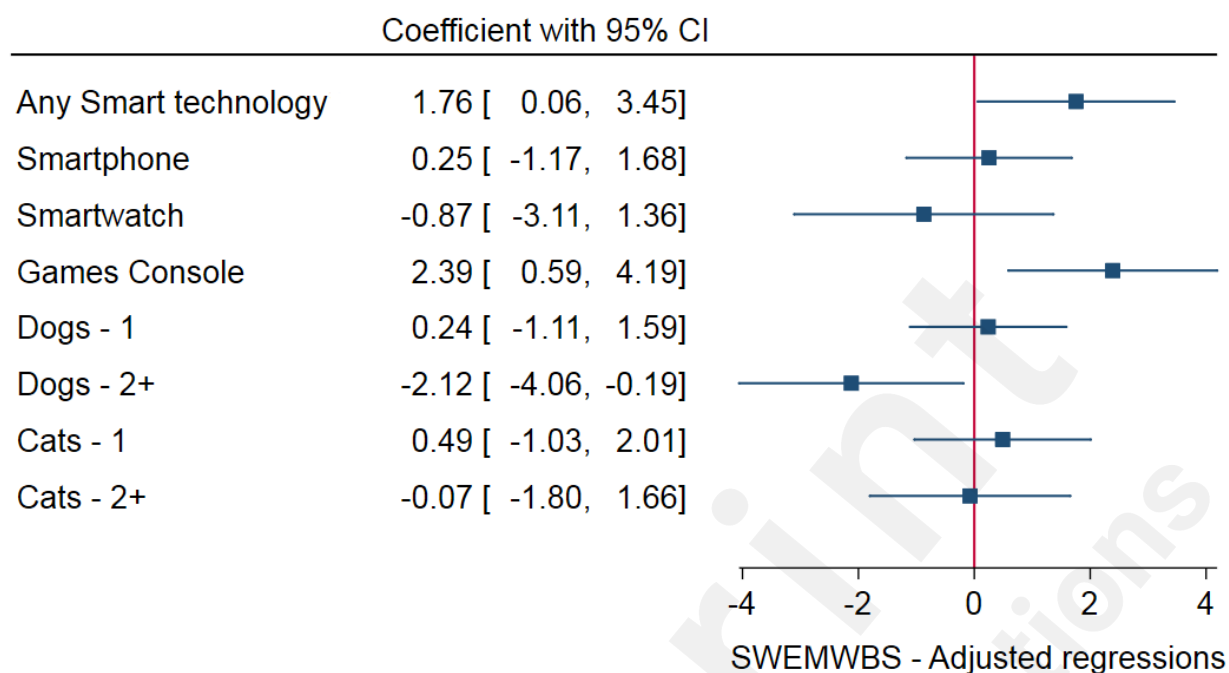
IMD 2015: Index of Multiple Deprivation, RUC 2011: Rural Urban Classification 2011, SWEMWBS: Short Warwick-Edinburgh Mental Wellbeing Scale.

^aValues are presented as mean $\pm$ standard deviation where data are normally distributed, median (interquartile range) when data were skewed and percentages for categorical data. ^bT-tests, Chi-squared, Fishers exact and Wilcoxon rank sum (Mann Whitney U) tests were used to compare complete and missing groups.

There were no statistically significant differences in social cohesion by age, gender or socioeconomic variables. Nor were there differences by the variables of interest: household ownership of any form of smart technology, dogs or cats. Adjusting the regressions for age, gender and SES did not affect this. See Table 2 in the Appendix for full results on social cohesion.

There was a significant difference in SWEMWBS scores by IMD 2015 ranking; being in the 2nd or 3rd decile was associated with lower SWEMWBS scores. Having studied in further education was also associated with significantly lower SWEMWBS scores. In unadjusted regressions, there was a significant effect of a household owning a smartphone or owning two or more dogs being associated with lower scores on SWEMWBS. The former effect did not hold after adjusting the model. However, owning two or more dogs remained associated with lower SWEMWBS scores after adjusting for age, gender, SES and social cohesion. Adjustments were made to the other variables of interest. Owning any smart technology was significantly associated with higher SWEMWBS scores after adjusting for age, gender and SES and remained so after adding social cohesion to the model. Owning a games console was associated with higher SWEMWBS scores after adjusting for age, gender and SES, and remained so after adding social cohesion to the model. Full results on SWEMWBS can be found in Table 3 in the Appendix; the fully adjusted models are presented in Figure 1.

Figure 1: SWEMWBS - Adjusted regressions (adjusted for age, gender, IMD decile 2015, Education, Employment and Social Cohesion)



Discussion

We found no evidence of increased social coherence among people with smart technology or dogs amongst [anonymised] participants. This may reflect the relatively high level of uniformity in participants' socioeconomic circumstances, and levels of social cohesion were more homogeneous than in White's Welsh sample, with over two thirds of [anonymised] participants classified as having 'medium' social cohesion. However, there was evidence that ownership of any form of smart technology, or a games console specifically, was associated with higher levels of mental wellbeing, while owning several dogs was associated with worse mental wellbeing.

Previous research on social cohesion and technology has had mixed results and appears to be heavily context dependent, and this may be what our neutral findings reflect. Good ICT can encourage stronger community connections but it can also enable remote working and increased social isolation¹⁰. It can both exacerbate and bridge social divides^{10,26}, and it may prove more beneficial in places which already have a well-developed sense of local identity²⁷. Miklian et al suggest that smart technology is more usefully viewed as a medium, rather than as an entity which is inherently either positive or negative²⁶: it reflects the existing state of a community's social cohesion, rather than enhancing or damaging it. Our findings challenge the notion that smart technology alone is sufficient to improve community circumstances.

Owning at least one form of smart technology allows some sociodemographic groups to maintain or

improve their wellbeing, which may be through mechanisms such as social connectivity, accessing health advice, using wellbeing apps or following exercise programs. Using specific wellbeing apps can improve positive affect and reduce depressive symptoms²⁸, and improve mental wellbeing^{29,30}. Meanwhile, problematic smartphone use, defined as poor ability to self-limit smartphone use, has been negatively associated with family health³¹. Among UK adolescents, the use of digital technology has varied effects on mental wellbeing depending on factors including time of the week, type of activity, and level of use, and researchers conclude that overall the level of risk to mental wellbeing is modest³². We simply recorded household ownership and therefore could not explore issues such as type and intensity of use further.

Our finding that owning a games console is associated with higher mental wellbeing among certain groups suggests that the socially interactive aspect of gaming may have beneficial effects. A review of research into young people's use of video games suggests that, contrary to popular belief, gaming can have many beneficial effects on wellbeing, including emotional wellbeing, relationships and social connections³³. Furthermore, gaming can have cognitive benefits and improve people's motivation³⁴, both of which may have downstream benefits to wellbeing. The finding may also reflect the presence of children in the home and a degree of improved wellbeing arising from family support, or may indicate a higher level of wealth. Our fieldnotes indicate that at least two participants, one of whom had limited mobility, were using consoles for financial gain, for example being paid to produce YouTube videos of gameplay, highlighting the potential role of consoles as a source of income and autonomy.

Research on dog ownership and social cohesion, although limited, suggests that dog ownership can contribute to neighbourhood cohesion^{13,18}, although this was not supported by our data. Previous work suggests that social capital (engaging in activities with neighbours, experiencing trust, reciprocity) has limited¹⁴ or no³⁵ association with dog ownership. In our data, owning two or more dogs was associated with lower levels of mental wellbeing, and we hypothesise that owning several dogs places a burden on households in certain groups, whether in terms of time, finances, noise, or allergens. Pets can replace human company, particularly for older people: Age UK reports that half of over 65s in the UK rely on pets or television for companionship³⁶. However, they may not replace human company adequately, so some people may own dogs specifically because they are lonely. Loneliness is a particular concern among older age groups, and further research is needed³⁷. Parslow et al³⁸ also found negative effects of pet ownership: older Australians with pets had higher rates of depression than those without, as well as worse physical health among women; they hypothesised that owning a pet meant carrying out more chores, and this effect would be multiplied with several

pets. This may be particularly true among older age groups³⁹. We also consider that owning a dog could reflect concerns about safety within a neighbourhood.

Limitations

Data were collected prior to the Covid-19 pandemic, which saw changes in perceived social cohesion, both positive and negative^{40,41}, as well as in pet ownership and use of smart technology. A low proportion of the sample reported currently being in work: this is likely to reflect the fact that recruitment took place during the day, when employed people were less likely to be home. It may also partially explain the low proportion of people reporting further or higher education, and the relatively high mean age of the participants. We collected the main participants' personal perceptions of social cohesion and their mental wellbeing, however, ownership of smart technology and pets related to the whole household; the main respondent may not have been the user of the technology or the main carer for the pet. The sample size was modest with some small cell sizes: it was not feasible to carry out further analyses and the findings should be treated with caution. These cross-sectional data do not provide insights into the direction of any causality.

Conclusions

Smart technology and ICT can have mixed effects on social cohesion and mental wellbeing and should not be treated as a panacea for community health. Among our sample of social housing residents in Cornwall, there was some evidence of associations between mental wellbeing and smart technology. Previous research suggests that dog ownership can have modest beneficial effects on health, wellbeing and social interactions: our findings contradict this, showing that owning two or more dogs is associated with lower levels of mental wellbeing. People own smart technology and pets for different reasons, and they affect people's lives in different ways, both good and bad: this may account for their mixed effects on social cohesion and wellbeing in this study, where positive and negative effects may have cancelled each other out. Subsequent to this fieldwork, such effects may have been exacerbated by the COVID-19 pandemic⁴². Further research could clarify the question of who owns and uses a given form of technology within a household, and who takes care of a pet, to provide more nuance in analysing psychosocial outcomes.

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For the purpose of open access, the author has applied a 'Creative Commons Attribution (CC BY) licence to any Author Accepted Manuscript version arising.

Statement of ethical approval

The University of [anonymised] Research Ethics Committee granted ethical approval for the

[anonymised] project. All participants provided written informed consent for the collection and analysis of their data.

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Competing interests

The authors have no competing interests.

Availability of data and materials

An anonymised version of the dataset analysed during the current study is available upon request from the [anonymised] project repository: [anonymised website]

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