





BMJ Open Assessing the impact of selective licencing schemes for private rental housing on mental health and well-being: protocol for a mixed-method natural experiment study in Greater London, UK

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ABSTRACT

Introduction The UK private rental housing market has poorer quality housing compared with other sectors and is subjected to calls for better regulation. Poor quality housing poses risks to mental and physical health, and housing improvement can potentially benefit health and well-being. Local authorities have powers to implement selective licencing (SL) schemes in specific localities. Such schemes involve landlord registration, payment of licence fees, local authority inspection and requirements that landlords conduct any necessary renovation works to ensure housing standards are met. We aim to evaluate SL in Greater London and to test the feasibility of a national evaluation.

Methods and analysis We will measure individual-level and area-level impacts of SL in Greater London between 2011 and 2019. A difference-in-differences approach with propensity score-matched controls will be used. We propose to exploit data from the Annual Population Survey (APS) and health and social benefit registers to measure mental health and well-being at individual (self-reported anxiety) and area (Small Area Mental Health Index) level. We estimate 633 APS participants in our intervention groups compared with 1899 participants in control areas (1:3 ratio of intervention to control). Secondary outcomes will be self-reported well-being and residential stability at the individual level and incidence of police-recorded antisocial behaviour calls and population turnover at the area level. The study size of the area-level analyses will be 3684 lower layer super output areas (including controls). Qualitative semistructured interviews with lead implementers in several London boroughs will produce insights into variations and commonalities between schemes.

Ethics and dissemination Ethical approval was obtained from London School of Hygiene and Tropical Medicine's Ethics Committee (reference number 26481) and London Borough of Hackney. All interviewees will be asked for informed written consent. Study findings will be published in a peer-reviewed journal.

Strengths and limitations of this study

- ⇒ The impacts on private renters will be measured before and after the intervention.
- ⇒ The study will be complemented by analyses of area-level impacts.
- ⇒ The mixed-methods approach will provide comprehensive insights.
- ⇒ A limitation is that, although addressed by the difference-in-differences, propensity score matching design, it is inherently not possible to eliminate selection bias due to non-random treatment allocation of selective licencing schemes.

INTRODUCTION

Housing is a social determinant of health.¹ In terms of duration of exposure, people typically spend more time at home compared with their exposure to any other kind of environment.² Poor quality homes present numerous environmental risks to residents' health, including risks of injury, physical illnesses linked to cold, damp and indoor pollution and risks to mental health and well-being.³ The costs to the healthcare system attributed to poor housing rival those of other significant societal health hazards such as smoking and alcohol consumption.⁴ Moreover, the unequal distribution of poor-quality homes across the population correlates with other forms of social inequality that contributes to health inequalities.⁵ Housing improvement interventions have been shown to have a positive impact on residents' health, including mental health and well-being, particularly when targeted at those most in need.^{3 6–9} Strategies and recommendations for promoting



health equity and improving population health, therefore, often include housing improvement.^{1 10}

In the UK, homes rented from private sector landlords are more likely to be of poor quality compared with homes that are owner occupied (with or without a mortgage) and homes that are rented from social landlords (public or third sector housing primarily intended for disadvantaged residents). According to English Housing Survey, the private rented sector accounted for 19% of all homes in 2019.¹¹ Housing quality improved between 2000 and 2019 across all sectors but continued to be worse for private renters compared with other types of tenure. The proportion of homes failing to meet the criteria of the Decent Homes Standard in 2019 was 23% in the private rented sector compared with just 12% in the social rented sector and 16% for owner-occupied homes. The UK's private rented sector doubled between 2000 and 2019 in tandem with falling affordability of private homes and shrinking of the social housing sector.¹¹ Hence, private rented homes are both increasing in number and tend to provide poorer living environments compared with homes from other sectors. This suggests a need for greater regulation of private rented homes to maintain and improve standards.

One potential means of regulating and improving private rented homes is through licencing schemes where landlords pay a licence fee and register their homes with a government body,¹² leading to inspections of the property and enforcement of renovations to substandard homes. In England, licence schemes are mandatory for rented houses or flats that are occupied by five or more people, who are not all related and live in the property as their main home: so-called 'houses in multiple occupation' (HMOs).¹³ Additional HMO licence schemes can, at the discretion of the local authority, also be applied to properties occupied by three or four people living together as two or more separate households.

However, most private renters in England (89.1%) do not live in any type of HMO.^{11 13} Most live either by themselves or with partners, family or friends and do not share basic amenities such as bathroom and kitchen with anyone from another household. In English law, these types of homes can be licenced through so-called selective licencing (SL) schemes. SL schemes are discretionary and most English local authorities have not implemented such schemes.¹²

The Housing Act 2004, and subsequent revisions in 2015, gave local authorities discretionary powers to designate areas of SL.¹⁴ This scheme requires landlords in geographically defined areas to apply for a market licence for a period of 5 years. The licence requires payment of a fee to cover costs of processing of the application and supporting the enforcement scheme. Fees vary by scheme but are typically around £600 for a 5-year licence.¹² The 2015 legislation also stipulated that locally approved schemes should target no more than 20% of the privately rented housing stock (or geographical area) in a local authority. In some instances, local authorities have

introduced the scheme in 20%–100% of their jurisdiction with approval from central government.

While SL schemes focus on improving housing standards, there is evidence that housing improvements benefit residents' mental health and well-being.^{3 6–9} Qualitative studies have linked poor quality housing to quality of household relationships, relaxation and sleep, feelings of stigma and low self-esteem, social isolation (eg, poor quality homes are depicted as a barrier to friends and family visiting the home) and barriers to performing important daily tasks such as cooking and working at home (including children's school homework).^{9 15 16}

The Housing Act 2004 stipulates that SL schemes can only be implemented as a response to certain specified problems, some of which occur at the neighbourhood level. These include low housing demand or persistent antisocial behaviour (ASB). New legislation enacted in 2015, however, gave local authorities wider powers to designate areas to SL based on poor property conditions, high levels of migration, deprivation and crime in addition to the previous conditions.¹⁴ A survey of local authorities in 2019 found poor property conditions, ASB, deprivation and low demand were the most cited reasons for introducing the scheme.¹²

Housing improvement interventions are sometimes posited to have neighbourhood-level impacts.^{7 9} The mechanisms by which SL schemes may achieve such impacts are not clearly stated, but mechanisms could be hypothesised to include area-level gentrification and reduced incivilities linked to improved (and, perhaps, higher valued) property and positive feelings towards the area. However, unintended impacts, including potential harms, can also be hypothesised. For example, if the cost of licence fees and improvements is passed onto tenants, and/or leads to evictions, or if gentrification displaces households experiencing hardships to other localities.

This protocol describes a quantitative impact evaluation of SL schemes on housing-related health outcomes in Greater London boroughs. Specifically, we will examine the impact on mental health and well-being, resulting from SL schemes. We also intend to identify and include other health-related outcomes that can feasibly be measured in a natural experiment study design. This will help us plan a larger evaluation of SL schemes across England. Given the importance of housing to health and well-being, there are good grounds to evaluate SL schemes and consider a range of impacts on health and social outcomes. This protocol is linked to a related evaluation of the SL scheme implemented in the London borough of Hackney (a separate protocol for that study is currently under preparation).

We will draw on data from the ONS Annual Population Survey (APS), Department for Work and Pensions (DWP) and National Health Service (NHS)^{17 18} to measure mental health and well-being and residential stability at an individual and area level. APS is a rolling social survey, which is suitable for repeated cross-sectional analysis.¹⁷ Advantages of the APS are that it is the largest, annual

Table 1 Subjective health and well-being questions in APS

Dimension	Variable and description
Anxiety	ANXIOUS: Overall, how <i>anxious</i> did you feel yesterday?(0–10)*
Happiness	HAPPY: Overall, how <i>happy</i> did you feel yesterday?(0–10)*
Life satisfaction	SATIS: Overall, how <i>satisfied</i> are you with your life nowadays?(0–10)*
Self-worth	WORTH: Overall, to what extent do you feel that the things you do in your life are <i>worthwhile</i> ?(0–10)*

*Scale [0–10]: 0='not at all X' and 10='completely X'. NB anxiety goes from something 'good' to something 'bad', whereas the other dimensions are scaled in the opposite direction.
APS, Annual Population Survey.

survey, representative of the country and its regions, and that it since 2011 holds data on the subjective health and well-being of adults (table 1). For the study of neighbourhood effects, Small Area Mental Health Index (SAMHI) will be the primary outcome, and population turnover and the incidence of police-recorded ASBs, the secondary outcomes.^{18–20} SAMHI combines data on mental health from multiple sources (NHS data on mental health-related admission, antidepressant prescribing, depression diagnosis and DWP data on mental health-related benefits) into a single index. Should we identify a change in SAMHI score we will secondarily assess the underlying indicators individually. ASB is defined in the law as behaviours causing 'harassment, alarm or distress', which ranges from littering to complaints over rowdy neighbours.²¹ Although by definition, a non-crime, reduction of ASB is considered a key objective for the policing of London based on consultation and social surveys on the perception of crime.²² Population turnover data will be explored at the same time to test an association between intervention exposure and moving. The identified yearly population turnover data are estimates based on a combination of electoral roll and consumer data (Consumer Data Research Centre Residential Mobility Index 2020).²³

We will interpret the findings in light of other housing-related policy interventions enacted during this time period, for example, Homes Act 2018, which aims to improve housing conditions through the courts.²⁴ A strength of the difference-in-difference (DiD) design, however, is that it will be possible to measure the effects of an area-based intervention such as SL over and above a universal policy such as Homes Act 2018. It should also be noted that Homes Act 2018 was only enacted in March 2019 towards the end of the study period and that it only applied to new tenancy contracts taken out during this time period.

Aims and objectives

This study has two aims: (1) assess the impact of SL schemes on mental health and well-being in Greater London and (2) examine the feasibility of evaluating the impact of SL schemes on mental health and well-being across England. The first aim will be met by conducting a quantitative impact evaluation of SL schemes in Greater London. The second aim will be

met by conducting a mixed-method process evaluation examining the feasibility of scaling the study up to a national evaluation.

The first aim will be met by objectives to assess the following individual and area-level impacts:

Individual-level impacts

1. Primary outcome: changes in self-reported anxiety (measured using the APS) for private renting tenants in intervention areas (undergoing SL) relative to matched comparison areas (not undergoing SL).
2. Secondary outcomes: changes in three self-reported well-being outcomes (life satisfaction, feeling worthwhile and happiness, measured using the APS) for private renting tenants in intervention areas (undergoing SL) relative to matched comparison areas (not undergoing SL).
3. Secondary outcome: changes in residential stability (years at address, measured using the APS) for private renting tenants in intervention areas (undergoing SL) relative to matched comparison areas (not undergoing SL).

Area-level impacts

1. Primary outcome: changes in SAMHI in intervention areas relative to matched comparison areas.
2. Secondary outcome: changes in the incidence of police-recorded ASB in intervention areas relative to matched comparison areas.
3. Secondary outcome: changes in population turnover in intervention areas relative to matched comparison areas.

The second aim will be met through a concurrent mixed-method process evaluation where we discern the availability of: (1) descriptive data on local schemes across England (eg, when and where the schemes are implemented) and (2) outcome measures (eg, APS data on mental health and well-being; SAMHI, population turnover, incidence of police-recorded ASBs). We will use these data to (3) estimate statistical power and (4) plan feasible statistical analysis. Finally, we will draw on qualitative data to (5) examine local variation in aims and implementation of SL.

METHODS AND ANALYSIS

Quantitative analyses

Analytical approach

Ideally, a representative sample of the population would be randomised to receive the treatment (renting with SL) or not. The causal effect of the treatment could then be measured by comparing the treatment group with the control group. However, random allocation of housing policy interventions is rarely possible and other approaches must be used. In this case, we do not know the exact allocation mechanism for treatment which is decided by local authorities based on locally held data. Therefore, we will follow a DiD approach with propensity score-matched controls (PSM).^{25–27} The controlled design will primarily strengthen causal inference by creating a counterfactual and secondarily enable capture and pooling of APS interviews from the fine-scale geography of the intervention, for example, from sets of electoral wards or census tracts.

Study setting

Adult, individual respondents in APS with residence in Greater London between 2011 and 2019. Among these, we will primarily study private renters. Homeowners and social renters will be studied in parallel for feasibility checks. For the area-level outcomes, the data concern 921 treated Lower Layer Super Output Areas (LSOA) and 3684 LSOA including three controls per treated area.

Eligibility criteria

HMOs are covered by separate legislation¹³ and would add noise to the measurement if not excluded from the study sample. The question about the ‘number of households at sample address’ in APS will be used to exclude HMO respondents. Only areas that were either ever fully treated OR never treated will be included in the study.

Interventions

We will obtain details of the spatial extent and time period of all current and historic SL schemes through Freedom of Information requests to each of Greater London’s 33 boroughs from when first enacted in 2006 to the end of 2019. Local authorities can choose the geography of the schemes. To standardise the data for data fusion and analysis, conversion weights will be calculated based on the number of 2011 Census enumeration postcodes²⁸ falling into small intercepts between the *de facto* geographical unit and the unit of analysis, Lower LSOA 2011 (LSOA; approximately 1700 average population).²⁹ LSOA units that are only partially under treatment (conversion weights >0 and <1) will be removed from both the treatment and control pool prior to analysis (preliminary analysis showed that this only concerns a small proportion of cases). We furthermore plan to exclude data from two boroughs that introduced street-level schemes, that is, Hammersmith & Fulham and Southwark, and a single electoral ward that was used as a pilot in Newham 2 years before the rest of the borough, that is, Little Ilford. For

the temporal scale, the effects will be measured in whole years from the year of initiation. The earliest scheme, Newham, will, thus, only have a single preintervention observation and some schemes will only fall into the evaluation set once more years of outcome data have accrued.

Outcomes

The four subjective health and well-being questions in APS were designed for ONS (aka. ONS4) and intended as four separate dimensions rated from 0 to 10.³⁰ We will study the anxiety question as the primary outcome given its more direct relevance to mental health, and the other questions on subjective well-being as secondary outcomes. The APS also includes other data relevant to residents’ experience of housing, such as residential stability (how long the respondent has lived at the address). The years at address responses will be recoded to category mid-point. The top category, 10+years, will be recorded to 15 years.

Alongside the analyses in APS, we propose a neighbourhood-level analysis with a similar design using SAMHI¹⁸ as primary outcome and incidence of police-recorded ASBs^{19 20} as secondary outcome.

The proportion of dwellings that were privately rented in 2011 Census was 26% (IQR 15–35) in treated areas and 23% (IQR 13–32) in non-treated areas. Any effects measured at the area-level will, thus, be the net effect of designating an area to the scheme (the implications of this are discussed below under Counterfactual).

Statistical methods

A DiD approach with 3:1 PSM will form the basis of the primary analysis.^{26 31} The propensity score matching will as far as possible use preintervention housing and neighbourhood characteristics from the 2011 Census, IMD and official dwelling age data (table 2)^{32–34} All matching variables were from 2011 with two exceptions, that is, housing affordability (2012) and Built pre-1945 (2014). Different matching algorithms, that is, propensity score or multivariate distance,³⁵ will be compared using matching diagnostics and the algorithm with the best balance across the matching variables will be selected.³⁶ As a sensitivity check of bias potentially introduced by matching and trimming, we will also conduct the DiD analysis without PSM matching.³⁷ Various sensitivity checks will be conducted such as placebo-in-time and placebo-in-space.

A complicating feature of the intervention for the analysis is that it was not introduced everywhere at the same time. A staggered design is, therefore, proposed for estimating the effect before and after the intervention. We will analyse the effects of the interventions over multiple areas and time periods jointly. This is notably an area of ongoing software development and we will apply the latest techniques and discuss choices and assumptions in the process.^{31 38–41} With the new multiple time period methods, it is possible to measure a combined effect of all schemes and this will be our preferred method relative to the standard DiD method. However, the individual-level data from APS could end up with panel units that

Table 2 Baseline characteristics for matching controls to treatment areas

Domain	Indicator	Year	Measure	Source
Age	Children (0–15 years)	2011	Proportion of population aged 0–15 years	Census 2011
	Adults (16–59 years)	2011	Proportion of population aged 16–59 years	Census 2011
Income	Income deprivation	2011	Proportion of population that are income deprived	IMD 2015 indicator based on social benefit receipt data
Ethnicity	UK born	2011	Proportion of population born in the UK	Census 2011
Housing	Household tenancy: private rented	2011	Proportion of households that are private rented	Census 2011
	Household tenancy: social rented	2011	Proportion of households that are social rented	Census 2011
	Housing in poor condition	2011	Proportion of households failing the Decent Homes Standard	IMD 2015 indicator based on English Housing Survey
	Houses without central heating	2011	Proportion of household without central heating	IMD 2015 indicator based on Census 2011
	Household overcrowding	2011	Proportion of households overcrowded	IMD 2015 indicator based on Census 2011
	Housing affordability	2012	Measure of inability to afford owner-occupied or private rented housing	IMD 2015 indicator based on multiple registers and surveys
	Built pre-1945	2014	Built pre-1945 (most frequent)	ONS Council tax building attributes

Year column indicates the year of the covariate, for example, 2011 for the 2015 IMD data.
Sources.^{32–34}

are too sparsely populated for the new methods. We, therefore, also plan to analyse the APS data following a standard DiD setup analysing the data by year of treatment initiation. This will also enable adjusting for differences in time-varying sociodemographic variables in APS (age group, sex, born UK and National Social Occupation Classification⁴²). This adjustment is justified on the grounds that the APS analysis is a repeated cross-sectional study where the outcome between different years could be confounded by the sociodemographic composition alone. It is at the same time assumed that treatment allocation is independent of these confounders.

We will assume that the propensity score matching combined with adjusting for sociodemographic variables collected before and after the intervention will balance out biases introduced by non-response and unequal selection probabilities in APS. To this end, we are planning balance checks such as comparing the values of the provided year weights across treatment and control groups. The neighbourhood analyses will use the same selection of treatment and control areas as the APS analyses.

Sample size

In APS, a yearly average of 13 316 adult respondents were resident in Greater London (2012–2019). Of these, 3017 were private renters. The proportion of London's population affected by selective licence schemes was 21%. The estimated number of interviews in the treatment group would, thus, be 633 (21% of 3,017). We propose to match treatment to controls 1:3, which would give us

1899 controls and a sample size of 2532 (4*633). We will exclude interviews conducted at addresses with more than one household (HMO by definition). Preliminary analyses suggest that this is a very small proportion of APS households. The unit of analysis for the area-level impacts will be London's 4835 LSOA. By 2018, 921 LSOA have been included in SL schemes (exclusion criteria are listed under the Methods section). The study size including 3:1 matched controls would be 3684, accordingly.

The power calculations are found in [table 3](#) (two sample t test). Assuming that the outcomes follow a normal distribution, the SD is the same for both the control and treatment group, and the matching will control for all confounding, the study would have 80% power to detect a minimum change in scores of 0.1 for ln(ASB) and SAMHI, 0.25 for population turnover, 0.25 for Satisfied and Worthwhile, 0.5 for Anxious, Happy, Years at address ([table 3](#)).

Qualitative analyses

We will conduct semistructured interviews with lead implementers from at least five of the SL schemes in different parts of Greater London. The interviews will ask participants about why the schemes were implemented, the form the schemes take, implementers' goals, their views on how or if the goals were achieved and barriers or facilitators to success. This data will contribute to our understanding of local variation between schemes. This will help us interpret findings and plan a national evaluation of SL in England.

**Table 3** Sample size calculations for comparison of outcome means between two groups based on 2011 Greater London baseline data (three controls:one treated)

Outcome	Mean (SD)	Sample size for detecting change in score*							
		0.1	0.25	0.5	0.75	1	1.25	1.5	3
Anxious (APS)	3.5 (2.9)	34 404	5507	1379	615	347	223	156	42
Happy (APS)	7.2 (2.1)	18 950	3034	762	340	192	124	87	24
Satisfied (APS)	7.3 (1.8)	13 288	2129	535	239	136	88	62	18
Worthwhile (APS)	7.5 (1.7)	12 364	1981	498	223	127	82	58	16
Years at address (APS)	2.9 (3.5)	52 133	8344	2088	930	524	336	235	60
SAMHI	-1.4 (0.3)	414	68	19	11
ln(ASB)	5.9 (0.8)	2512	404	103	47	28	19	15	.
Population turnover	5.4 (1.6)	10 940	1753	440	198	112	72	51	15

*Power 80%, alpha 5%.

APS, Annual Population Survey; ASB, antisocial behaviour.

Note that we are also currently conducting another evaluation of a single London SL scheme. This second evaluation will be reported elsewhere but includes more in-depth qualitative research into the views of senior implementers, front-line staff (eg, housing inspectors), landlords, tenants and other relevant stakeholders along with quantitative analysis of outputs relevant to a process evaluation and impacts on environmental hazards in homes. Findings from this study will also inform planning for the proposed future national evaluation.

Expected study outcomes

Improving standards in the private rental sector is an important policy area with the potential to impact on population health and health equity. The findings from this study of SL in Greater London will provide an early indication of the impact of such schemes. SL schemes is an example of an intervention that modifies an important social determinant of health and health inequality (ie, housing). As such the schemes fall within a local authority's discretionary powers and local decision-makers must choose whether or not to implement and renew a scheme in their jurisdiction. Robust evidence of individual and area level of impacts on mental health and well-being, and social outcomes such as crime, should inform these decisions.

The study will also provide data relevant to planning a national evaluation, including information relevant to power calculations, analytical approach, outcomes and data sources and descriptive data relevant to local schemes.

Current study status

As of April 2021, we have recruited two postdoctoral researchers for the quantitative and qualitative strand, respectively. We have successfully obtained data on all existing SL schemes in Greater London as well as most area-based matching and outcome data. We have also started recruiting stakeholders for the qualitative analyses and identified Patient and Public Involvement representatives

from London Borough of Hackney. We anticipate submitting the study report for publication by August 2022.

Patient and public involvement

As of April 2022, we have recruited two Patient and Public Involvement representatives. We will seek feedback from them throughout the project.

ETHICS AND DISSEMINATION

Ethical approval was obtained from London School of Hygiene and Tropical Medicine's Ethics Committee (reference number 26481) and London Borough of Hackney. All interviewees will be asked for informed written consent. We plan to publish the study findings in a peer-reviewed public health journal.

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Contributors All authors (AA, LC, EC, SC, ME, DM, JP, MS) contributed to the conception, study design, data interpretation and approved the submitted version. JP and MS contributed to data acquisition. JP drafted the first manuscript.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further details.

Patient consent for publication Not applicable.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement The data supporting the findings of this study were obtained under licence and as such not available to other researchers. The data are, however, available from Office for National Statistics subject to ethical and scientific approval.

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