Is There Room for Privacy in the Compact City?

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Abstract: Compact city theory has been embraced by the UK Government and, consequently, is embedded in planning policies seeking to deliver sustainable outcomes. New housing and mixed use developments are now being built that reflect the change in policy, for example, urban brownfield sites are being developed at higher densities with larger proportions of flats than previously. However, whilst the environmental, economic and increasingly the social, benefits of urban compaction have been promoted, there has been little discussion of its impact on quality of urban life and in particular on levels of privacy. This paper begins to address this gap by reporting the results of research into the effects of the design of compact, sustainable housing on privacy in the home. The Privacy Study investigated the impact of a number of design and location features of new housing developments on residents' perceptions of overlooking and noise in their homes. The results suggest that in certain types of dwellings, such as flats, noise from neighbours is heard more often. The size of dwellings and plots influence residents' perceptions of overlooking of their homes and private open spaces. Overlooking of private outdoor space (but not indoor space) tends to be less in larger homes on bigger plots. Given the potential roles of noise and overlooking in modulating interactions between neighbours, this study suggests that further research is warranted on the impacts of compact design on privacy and, consequently, on aspects of social sustainability.

The legacy of compact city theory is evident within the wider context of sustainable urban development in the UK. Higher residential densities, mixed-uses and intensification via urban brownfield development have been advocated as ways of achieving sustainable housing growth for almost two decades (Jenks et al., 1996; Gillham, 2002; Haughton and Hunter, 2003). In particular, planning policies (e.g. DETR, 1998; ODPM, 2005; DCLG, 2007) have encouraged high-density residential developments in close proximity to amenities (or where they are served with good transport facilities to amenities), and have promoted high-density, mixed-use developments. Although there is far from consensus about the merits of urban compaction, (Breheny, 1996; Hall, 2001; Neuman, 2005; Howley et al., 2009) the UK government has consistently sought to maximise the benefits of development in cities.

As a result of these policies, and of increased pressure for new housing in the UK, residential developments are now being built at increasingly high densities in urban areas (HM Treasury, 2006; Williams, 2009). In 2008 78% of all new dwellings in England were built on previously developed land, up from 61% in 2000. Average dwelling densities have risen from 25 dwellings per hectare (dph) in 1989 to 46 dph in 2008 (DCLG, 2009). This increase has also affected the form of housing, with the number of flats increasing by 146% between 2000/1 and 2004/5, and the number of houses declining by 11% in the same period (Whitehead, 2008). The UK now also builds the second smallest new homes in Europe (83m.sq), with only Italy building smaller (Williams, 2009). Furthermore, new houses are not as large as the existing stock (an average of 83m.sq for new build compared with 87m.sq for existing dwellings).

As well as advocating higher densities government policy also advocates high quality design and construction (DETR, 2000; DCLG, 2006). Claims have been made that high quality design enhances the well-being and quality of life of residents (Urban Task Force, 1999; Barton, 2000). Recent research suggests that there is no clear definition of high quality but that there are benefits (for example, increased feelings of safety) where an environment is perceived to be high quality by the residents (Dempsey, 2007), although public perception of building quality is that it is decreasing (Ross et al., 2006). However customer surveys of owners of new homes carried out on behalf of the House Builders Federation (HBF) suggest that satisfaction with quality has been consistent (around 75% of respondents are satisfied) over the last seven years (House Builders Federation, 2006; House Builders Federation, 2009).

There is concern that construction quality may be affected by a skills shortage in the building trade due to a lack of investment in training (Egan, 2004; Ross et al., 2006). This is further compounded by procurement being based on a lowest tender/fixed cost system which results in high standards of quality being hard to maintain and measure (Ross et al., 2006). Construction quality is important across all types and densities of housing, however in the case of high density development the quality of construction could make a significant difference to the quality of life of residents.

Perhaps surprisingly, there has been little research into the impacts of the changing profile of new housing in the UK on quality of life. However, what work has been done suggests that people tend to: prefer lower to higher density housing Howley, 2008 #1231]; feel that new housing is too dense and does not provide enough space; and prefer houses over flats (HATC, 2006). In particular, some of this research suggests that new housing is not providing individuals enough privacy in their homes, as indoor spaces get smaller and neighbouring dwellings are built closer. Yet, negative impacts on privacy could be detrimental to some social sustainability objectives, such as liveability, as privacy is closely related to the concept of 'the home' in UK culture.

This paper investigates the relationship between the design features of new compact housing developments and residents' perceptions of privacy in the home, in terms of overlooking and noise. Design features specifically related to higher density housing, mixed-use development and urban brownfield locations are assessed for their potential impact on overlooking and noise.

The importance of privacy in the UK

In the UK, the home is widely viewed as a space that offers individuals privacy from the public domain (Ariès, 1962; Weintraub, 1997; Madanipour, 2003). A desire for privacy of the individual and of the home is not unique to England or the UK; however the form and impact privacy has varies greatly between cultures. The design of dwellings reflects these differences; in England the detached house is perceived as being the only dwelling type that can provide adequate privacy whereas flats are regarded as inferior. In other countries flats are not seen as inferior types of dwellings and living in them is successfully combined with sufficient levels of privacy.

Privacy is an important aspect of western culture and has been shown to have an impact on peoples' mental health (Goffman, 1961; Evans et al., 1989; Halpern, 1995). Insufficient privacy can lead to social withdrawal through the reduction of social interaction and an increase in solitary pursuits (Evans et al., 1989). Goffman has argued the case for a dramaturgical perspective; in order for a person to perform in public they need a private backstage where they can remove their public mask (Goffman, 1959). The home provides the individual with the backstage area where they can recover and readjust after being in public (Goffman, 1959). For the home to be a successful backstage it must be in the control of the individual(s) who live there: control of the space ensures the individual has control of information about the self and interactions with other people (Westin, 1967; Altman, 1975). Control of space is recognised as an environmental and culturally based mechanism people use to control access to themselves (Altman, 1975). Being in control of the home enables the individual to seek out different types of privacy appropriate for particular situations (Westin, 1967). Types of privacy include solitude, intimacy with others, anonymity and reserve (Westin, 1967; Marshall, 1974; Pedersen, 1979). Using these various types of privacy enables an individual to balance their social public life with their private life of the home.

The potential impacts of the 'compact city' policies on privacy in the home

As suggested above, compaction policies have had a significant affect on housing design in the UK. These changes could have consequences for peoples' experiences of privacy in residential settings through the design of dwellings and their surroundings, including the street and neighbourhood (Newman, 1972; Hall, 2006). A number of aspects of compaction policy could affect privacy.

First, the drive to increase the number of mixed-use urban infill developments may lead to dwellings being built next to facilities and amenities rather than other housing (Jacobs, 1961; Sherlock, 1991; Rudlin and Falk, 1999). Depending on the use, this may have a negative or positive impact on privacy for residents. For example, a dwelling next to a park or playground may be more private than one next to retail units (DCLG, 2006).

Second, smaller plot sizes and an increase in the number of flats could result in reduced private outdoor space (POS) This could be detrimental as POS's that are protected from overlooking are seen as places of retreat that provide residents with a

sense of privacy (Bhatti and Church, 2004). POS's can also provide a view of nature rather than a view of other homes (Day, 2000), and can act as buffer zones, particularly to the front of homes where they provide space between the street and the dwelling (Hall, 2006).

Third, compact, higher density housing may also exacerbate a range of more common 'bad neighbour' effects. Overlooking and noise pollution could be worsened due to close proximity, and can be detrimental to levels of privacy, adversely affecting relationships between neighbours (Stokoe and Wallwork, 2003). Stokoe and Wallwork discovered that the boundary is a very significant feature of neighbour relations and that good neighbours respected boundaries whilst bad neighbours did not. The activities of good neighbours in their homes do not transgress boundaries whereas bad neighbours allow their activities to pollute the spaces beyond, for example loud music or the production of strong smells (Marshall, 1972; Stokoe and Wallwork, 2003). Residents have been found to value the privacy and the levels of control that a home with boundaries provides (Marshall, 1972; Allan, 1989).

The Privacy Study

The research presented in this paper (The Privacy Study) investigates whether elements of sustainable design, relating to density, mixed-use development and location, have any impact on privacy as experienced by residents in their homes. Privacy in the home is often affected by overlooking and unwanted noise (Mulholland, 2003). Therefore these two aspects of intrusion have been identified as indicators of privacy, both within the home and outside in the POS. The elements of sustainable design that are pertinent to the research are; distances between dwellings, distances between dwellings and the street, the size of POS's to the front and rear of dwellings, the net residential density, the number of bedrooms in a dwelling and the type of dwelling.

Methodology used in The Privacy Study

In order to test the relationship between the features of sustainable design and privacy, information was collected on both design features and householders' opinions regarding overlooking and noise in 13 sustainable housing developments in the UK. Collectively the case studies provided a representative sample of sustainable housing built between 2000 and 2005. A decision was made to select developments

that tended to be seen as characteristic of the type of new housing being built at the time. Some of the developments are wholly owned by Registered Social Landlords whilst others were built by private housing developers and the dwellings have been sold on the open market. The selection criteria involved design features of the developments such as residential density, level of mixed-use and sustainable design features, as well as a classification of either a brownfield or greenfield location (see (Williams and Lindsay, 2007) for a fuller discussion). The selection criteria did not include information relating to the processes used to develop a site, or the aspirations (sustainability or others) of the designers for the developments.

A site survey checklist was developed to measure and analyse the physical features of the developments. The checklist was based on a theoretical framework of features of sustainable housing developments developed through an extensive literature review of empirical research, policy and design guidance. The checklist is a combination of original measures and some measures from previously developed checklists (Housing Corporation, 2000; Llewelyn-Davies, 2000; BRE, 2004; Burton et al., 2005).

A household questionnaire was used to measure residents' privacy. The household questionnaire also contained questions pertaining to social and economic data in order that these could be controlled for in the analyses. Responses to questions were primarily on Likert Scales with opportunities given for respondents to add their own comments at the end of questions. The questionnaires were posted to residents and collected in person by the researchers. The overall return rate was 34%, (659 questionnaires). The relationships between the measures of physical features in the site survey checklist and the questionnaire responses were analysed using regression models in SPSS v14. The analysis was carried out across the entire dataset because the focus of the research was on all the design features not the specific combinations of the individual developments. Therefore the developments are not compared with one another.

The Sample

The case studies range in location from the north-east of England to the south of England and Wales. Density levels vary across the developments as does the size in terms of number of units (see table 1). A range of densities was sought in order that the impact of higher density housing could be compared to that of lower levels of

housing densities. There is a variety of dwelling types across most of the developments; a combination of flats, terraced townhouses and detached houses is common (figure 1). The developments are situated in rural, urban edge or city centre locations and are a mixture of greenfield and brownfield development. All the developments are primarily residential and some of them have other uses within their boundaries.

INSERT FIGURE 1 HERE

Figure 1: Examples of the different dwelling types across the thirteen case studies (photos taken by Morag Lindsay and Carol Dair)

Four of the case studies have been designed in keeping with the architectural style and character of the local area. In particular, Ingress Park has been designed around the topography of the site and the influence of traditional house designs of Kent is clear. Some of the case studies can only be described as generic in terms of the design and style of the housing; there are no allowances for local or post-modern characteristics or styles. A third group of the case studies have been designed differently; for example, the design of Alpine Close is impacted by site and ecological considerations. Greenwich Millennium Village and The Staiths South Bank are post-modern and materials and colours are used in innovative ways on the facades of the buildings. The street layout of the majority of the developments tend to be curvilinear with culs-de-sac, although some of the layouts of the case studies are deformed grids (figure 2).

INSERT FIGURE 2 HERE

Figure2. Plans showing the layouts of the thirteen case studies

Name of 'Sustainable' development	Grange Farm, Milton Keynes (Bellway Homes)	Amersham Road, Reading (Catalyst Housing Group)	The Waterways, Oxford (Berkeley Group)	Alpine Close, Maidenhead (Maidenhead & District HA)	The Courtyards, nr Horsham (English Courtyard Assoc.)	Great Notley Garden Village, Braintree (Countryside Props)	Greenwich Millennium Village, London (English Prt)	Ingress Park, Greenhithe (Crest Nicholson)	Lansdowne Gardens, Cardiff (Taff HA/ Redrow Homes)	Newcastle Great Park, Newcastle-upon-Tyne (consort)	Westoe Crown Village, South Shiedls (George Wimpey)	The Staiths South Bank, Gateshead (George Wimpey)	Cooper Road, Rye (Rother Homes)
General profile data													
No of units	39	172	291	27	104	265	303	216	215	175	122	159	68
Dwellings per hectare (net)	26.0	27.1	42.0	42.0	32.5	28.0	153.0	32.0	38.7	29.1	87.1	55.0	29.9
Greenfield/brownfield	G	B	B	B	G	G	B	B	B	G	B	B	G
Rural/edge/centre	E	C	E	C	R	R	C	E	C	E	C	C	E/R
Total no of uses[1]	1	5	2	2	2	3	5	2	2	2	2	3	1
Uses													
No. parks/play areas	4	5	4	4	0	1	4	4	1	4	6	4	2
No. cafes, pubs, etc	0	2	2	2	0	1	5	4	6	1	9	1	4
No of schools[2]	1	1	6	6	0	3	2	2	4	3	8	2	2
No of local shops	0	1	1	1	0	1	2	2	3	2	2	2	1
Tenure													
% private homes	100	36	87	87	85	89	85	100	75	100	100	100	0
% RSL homes[3]	0	64	13	13	15	11	15	0	25	0	0	0	100

Notes:

1. This is simple a count of the number of different uses. Categories were: schools, health facilities, place of worship or community halls, local store (e.g. post office, newsagent or food store), shopping centre or high street, social space (e.g. public house, restaurant, café'), indoor leisure/sports facility, park and public open space. This count is for uses in the development (i.e. within the boundary of the case study area) and nearby (within a 500m radius of the development boundary)
2. This includes pre-school, primary and secondary in the development or within 500m of the boundary.
3. RSL: Registered Social Landlord

Table 1: An overview of some of the characteristics of the case studies

Table 2 shows a profile of the sample households and the type of accommodation they inhabit. Over half the sample population have lived in their current homes for over two years and the majority live in households of 2 or more people. Twelve percent are retired and 41% live with dependent children. Approximately three quarters of the sample are over 30 years old and 63 % of the respondents are female. There is a fairly even spread across accommodation types; 18% of respondents live in detached housing, 28% are in semi-detached, terraced housing accommodates 32% of respondents and 22% of respondents live in purpose-built flats. Many respondents have mortgages (48%) with the majority of the rest renting from Registered Social Landlords or private landlords. Respondents tend to be

from the managerial or professional socio-economic categories and less so from the routine occupation categories.

Description of data	Categories	Percentages (%)
Length of residence	Less than 2 years	40
	2 years or more	60
Household size	1 person	18
	2	39
	3	20
	4	18
	5 or more	6
Household type	Non-retired couple with no dependent children	25
	Retired couple with no dependent children	7
	Couple with dependent children	33
	Lone parent with dependent children	8
	Other multi-person household	9
	One non-retired person	13
	One retired person	5
Gender of respondent	Male	37
	Female	63
Age of respondent	Less than 30 years old	21
	30 - 40 years old	33
	Over 40 years old	46
Household accommodation type	Detached house or bungalow	18
	Semi-detached house or bungalow	28
	Terraced house	32
	Purpose built flat	22
Tenure	Outright owner of property	16
	Buying it with the help of a mortgage or loan	48
	Pay part rent and part mortgage (shared ownership)	4
	Rent from private landlord	14
	Rent from a Registered Social Landlord	16
	Live here rent-free	2
Socio-economic class	Higher managerial and professional occupations	24
	Lower managerial occupations	38
	Intermediate occupations	10
	Small employers and own account workers	5
	Lower supervisory and technical occupations	5
	Semi-routine occupations	7
	Routine occupations	3
	Unclassified	8

Table 2: Summary of the characteristics of the sample

Results - introduction

Multiple regression models were developed to predict the outcome for each of the four aspects of privacy; comfort with overlooking of living area, comfort with overlooking of private open space, frequency with which neighbour noise is heard in home, and frequency with which neighbour noise is heard in private open space. The initial models investigated the impact of all density, mixed use and socio-economic features. The four final models contain the variables representing the elements of sustainable design that have a significant effect on the different aspects of privacy, as

well as any socio-economic features that are significant. Only the co-efficients with a significant effect are listed in the results tables.

Density and the design features of sustainable housing that density may impact on were measured. The net residential density was measured for each development. The range of net residential densities across the case studies ranged from 26 dph to 153 dph. To reduce the risk of any one case study having an undue influence on the results the case studies were divided into three bands measuring net residential density; low (30dph and below), medium (31-50dph) and high (51dph and above). From a review of literature it was concluded that building at higher densities may impact on several aspects of the design of housing developments (Rudlin and Falk, 1999; Day, 2000; DTLR and CABE, 2001; Crawley Borough Council). The size of dwellings is of interest but due to a variety of reasons the data for these was not available. Residents were asked for the number of bedrooms in their dwelling to give some indication of the size of the dwelling. Features external to the dwelling were measurable and those identified as being affected by higher densities were the distance between dwellings to the front, rear and sides, the setback distance from the street, area of POS's to the front and rear of the dwelling and type of dwelling.

Mixed-use was measured using a variable identifying the land uses to the rear and front of the dwellings. The overall number of uses in each of the case studies was not deemed to be relevant because the privacy measures are specific to households and their immediate neighbours. A dichotomous variable was used to measure whether the development was on a brownfield or a greenfield site. Developments were identified with a variable as being rural, urban-edge or citycentre. The previous two indicators are included to ensure that a full representation of the sites is incorporated in the analysis. The variables measuring socio-economic effects were age, tenure, household type, gender, number of people resident in the dwelling, the length of time the respondent has been in residence and socio-economic class. Each of these variables have been shown to have an impact on attitudes and behaviours and are therefore relevant to The Privacy Study. The length of time a respondent has been in residence is measured dichotomously; either less than, or more than, two years. People's perceptions of a development can change with the length of time they have lived there (Coulthard et al., 2002; Groves et al., 2003). The two year criterion was chosen for practical reasons. It allowed residents of new developments sufficient time

to become familiar with the development and the local area, and to form social relations.

Feature of compact city design (*& socio-economic measures*)	**Name of indicator**	**Unit of measurement or name of categories used**
High density development	Size of POS to rear	Area measured as m^2
	Size of POS to front	Area measured as m^2
	Setback distance between front of dwelling & street	Distance measured in metres
	Distance from dwelling to dwelling at front	Distance measured in metres
	Distance from dwelling to dwelling at rear	Distance measured in metres
	Distance from dwelling to dwelling to right	Distance measured in metres
	Distance from dwelling to dwelling to left	Distance measured in metres
	Number of bedrooms	Integer
	Net residential density	Low (< 30dph), Medium (31-50dph), High (>50dph)
Mixed-use development	Feature to front of dwelling	Buildings; gardens; communal space; public open space; public open green space; fields; industrial/commercial; schools & grounds
	Feature to rear of dwelling	Buildings; gardens; communal space; public open space; public open green space; fields; industrial/commercial; schools & grounds
Urban brownfield site	Brownfield or greenfield site	Dichotomous variable
	Urban, rural or urban-edge location	Urban; urban-edge; rural
Socio-economic measures (intervening variables)	*Age*	*3 bands (under 30, 30-40, 41 and over)*
	Tenure	*Outright owner; mortgage; part rent/part mortgage; rent private landlord; rent RSL; no rent*
	Household type	*Non-retired couple, no dependents; retired couple, no dependents; couple, dependents; lone parent, dependents; multiperson; single, non-retired; single retired*
	Gender	*Male; female*
	Number of people	*Integer*
	Length of time in residency	*Less than two years; more than two years*
	Socio-economic class	*Higher managerial and professional occupations; lower managerial occupations; Intermediate occupations; small employers and own account workers; lower supervisory and technical occupations; semi-routine occupations; routine occupations; unclassified*

Table 3: Indicators of (a) the features of compact city design and (b) the socio-economic measures used in the analyses

Results – descriptive analyses

Preliminary analyses were carried out to gauge the relationships between density and the other indicators, and dwelling types and the other indicators. Cross-tabulations were used to ascertain whether variables were associated. Density and dwelling type were chosen as these are key indicators within The Privacy Study (table 4).

The analyses of density with the other indicators revealed some interesting trends. The proportion of people under 30 years old living in high density developments was substantially higher than the proportions living at low and medium densities. It was discovered that a higher percentage of people rent in high density developments than in either medium or low density developments. However, across the three levels of density buying a dwelling with a mortgage was the most common type of tenure. Interestingly, the residents in the high density developments are more likely to have lived there for less than two years compared to those in the low and medium density developments where residents are likely to have lived there for two or more years.

The residents in the high density developments tend to be living alone or as couples but without dependents, whereas those with dependents tend to live in the low and medium density developments. Most retired people (couples and single residents) live in the low density developments. The cross-tabulation between density and the number of people in the household suggest a similar trend; the highest proportion of single households and couples are in the high density developments and those households with four or more members are more likely to live in the low and medium density developments. There are likely to be numerous reasons for these ratios however one reason may be the number of bedrooms in the dwellings. The analysis indicates that three quarters of the dwellings in the high density developments have one or two bedrooms. In contrast, two thirds of the dwellings in the low and medium density developments are three and four bedroom properties. A substantial proportion of the dwellings in the low density developments are likely to be detached or semi-detached houses whereas in the high density developments the greatest proportion of dwellings are flats.

The analyses for the front and rear land uses revealed that the feature to the front of properties tends to be public open space. Dwellings in low and medium density developments are likely to have gardens to the rear. Communal space is the rear land use for over three-quarters of the dwellings in the high density developments.

The second set of cross-tabulations dealt with dwelling type. Residents who live in detached homes are more likely to own their properties outright or have mortgages than rent. There is a more even distribution between renting and owning for flat dwellers. Residents in flats tend to not be retired or have dependents whereas detached dwellings are more likely to have families living in them. There is a less skewed distribution of household types in semi-detached and terraced housing. These relationships are confirmed by the cross-tabulation with the number of people in the household. Flats tend to house one or two residents, detached dwellings two to four but the range for terraced housing is from one resident to eight. One explanation for the varying household sizes across dwelling types may be the number of bedrooms in the dwellings. Almost 95% of flats have either one or two bedrooms and over half of detached dwellings have four bedrooms. The majority of terraced and semi-detached dwellings have two to four bedrooms and the spread is relatively even.

The most common dwelling type in the high density developments is the flat and in low density developments it is detached and semi-detached housing. Terrace housing is the most common form of dwelling overall and is the major dwelling type in medium density developments. As with the density cross-tabulations the most likely front feature across all dwelling types is public open space. The greatest proportion of houses have gardens to the rear whereas flats are more likely to have communal spaces to the rear.

Indicator		**Density**			**Dwelling type**			
	Category	**Low**	**Med**	**High**	**Det**	**Semi**	**Terr**	**Flat**
Age	30 and under (%)	18.3	12.9	37.7	9.3	16	20.1	36.4
	31 – 40	33.6	32.7	32.7	33.3	33	34.5	30.7
	41 and over	48	54.4	29.6	57.4	51	45.4	32.9
	TOTAL (number)	*229*	*263*	*159*	*108*	*100*	*284*	*140*
Tenure	Outright owner (%)	13.5	21.8	8.8	26.8	7	18	7.1
	Buying with mortgage	43.7	50	50.3	66.7	42	47	42.9
	Part rent, part mortgage	7.9	2.3	2.5	0	9	4.6	2.9
	Rent, private landlord	3.9	17.6	23.9	2.8	8	13.8	30
	Rent, RSL	30.1	6.1	13.2	3.7	33	14.8	14.3
	Live for free but not owner	0.9	1.9	0.6	0	1	1.4	2.1
	Other	0	0.4	0.6	0	0	0.4	0.7

	TOTAL (number)	*229*	*262*	*159*	*108*	*100*	*283*	*140*
Household type	Non-retired couple, no dependents	16.2	26.1	36.9	25.9	15	24	33.8
	Retired couple, no dependents	10.1	7.7	3.1	7.4	13	7.1	4.3
	Couple, dependents	39	37.5	17.5	49.1	39	35.7	12.9
	Lone parent, dependents	14.5	5	4.4	6.5	8	11	2.2
	Other multi-person	7	8	11.3	2.8	10	9.5	9.4
	One non-retired person	6.6	11.1	25.6	3.7	6	9.2	35.3
	One retired person	6.6	4.6	1.3	4.6	9	3.5	2.2
	TOTAL (number)	*228*	*261*	*160*	*108*	*100*	*100*	*139*
Gender	Female (%)	29.8	36.5	48.4	30.8	38	31.4	52.5
	Male	70.2	63.5	51.6	69.1	62	68.6	47.5
	TOTAL (number)	*228*	*263*	*159*	*107*	*100*	*283*	*141*
No. of residents	1 (%)	13.2	16.4	27.7	8.3	16	12.4	39.6
	2	36	35.5	48.4	30.6	39	38.2	45.4
	3	21.5	19.8	17	28.7	12	21.9	12.9
	4	21.9	23.3	2.5	27.8	23	21.2	0.7
	5 or more	7.4	5	4.4	4.6	10	6.5	1.4
	TOTAL (number)	*228*	*262*	*159*	*108*	*100*	*283*	*139*
Length of residency	Less than 2 years (%)	29.3	36.7	62.5	25.9	22.3	42.7	61.2
	2 or more years	70.7	63.3	37.5	74.1	77.7	57.3	38.8
	TOTAL (number)	*232*	*264*	*160*	*100*	*103*	*286*	*139*
Socio-economic class	Higher managerial and professional occupations (%)	16.3	28.2	28.8	22.2	25.2	23.3	29.1
	Lower managerial occupations	37.8	38.7	38.1	45.4	33	38.3	34.8
	Intermediate occupations	11.2	10.2	8.1	10.2	3.9	12.2	9.9
	Small employers and own account workers	3.9	6	5.6	3.7	5.8	4.5	7.8
	Lower supervisory and technical occupations	5.2	4.5	4.4	4.6	3.9	5.6	4.3
	Semi-routine occupations	9.4	3.4	8.1	3.7	12.6	5.2	5
	Routine occupations	6	2.3	0.6	3.7	5.8	2.1	2.8
	Unclassified	10.3	6.8	6.3	6.5	9.7	8.7	6.4
	TOTAL (number)	*233*	*266*	*160*	*108*	*103*	*287*	*141*
Density	Low (0-30dph) %	-	-	-	63	64.1	28.9	2.1
	Medium (31-50dph)	-	-	-	37	34	50.5	27.7
	High (51 and over dph)	-	-	-	0	1.9	20.6	70.2
	TOTAL (number)	-	-	-	*108*	*103*	*287*	*141*
Dwelling type	Detached or detached-link house or bungalow	30.9	15.5	0	-	-	-	-
	Semi-detached	30	13.5	1.3	-	-	-	-
	terrace	37.7	56	36.9	-	-	-	-
	flat	1.4	15.1	61.9	-	-	-	-
	TOTAL (number)	*220*	*259*	*160*	-	-	-	-
Front feature	Buildings (%)	0.9	1.5	0.6	0.9	1.9	1.4	0
	Gardens	2.7	0	0	1.9	0	1	0.7
	communal space	11.7	29.9	0	10.3	17.5	20.6	11.3
	public open space	74	57.1	74.4	70.1	70.9	67.9	60.3
	Public open green space	9.4	11.5	23.1	94.1	9.7	8	27.7
	Schools & grounds	-	-	-	1.9	0	11	0
	TOTAL (number)	*223*	*261*	*160*	*107*	*103*	*287*	*141*
Rear Feature	Buildings (%)	11.2	8.8	3.8	11.1	9.7	10.1	1.4

	Gardens	61.6	37.5	1.3	59.3	51.5	38.7	6.4
	communal space	10.3	18.4	76.9	13.9	13.6	24	67.4
	public open space	4.9	13.4	0	5.6	3.9	8.4	7.1
	Public open green space	4	13.8	11.3	3.7	12.6	10.1	11.3
	Fields	1.8	4.2	0	2.8	0	4.2	0
	industrial/commercial	0.9	2.7	6.9	0.9	0	3.5	6.4
	schools & grounds	5.4	1.1	0	2.8	8.7	1	0
	TOTAL (number)	*224*	*261*	*160*	*108*	*103*	*287*	*141*
No. of bedrooms	1 bedroom (%)	3.1	3.8	25.3	1.9	6	0	35.3
	2 bedrooms	26.9	19.5	51.3	0.9	28	26.7	59
	3 bedrooms	30.4	30.9	17.7	25.9	28	38.1	4.3
	4 bedrooms	31.7	42.7	5.1	54.6	36	32.7	1.4
	5+ bedrooms	7.9	3.1	0.6	16.7	2	2.5	0
	TOTAL (number)	*227*	*262*	*158*	*108*	*100*	*281*	*139*

Table 4: results of cross-tabulation analyses for density and dwelling type

Results – responses to privacy questions

The regression analysis is based on the responses to questions about overlooking and noise in the living areas of the home and POS's. Five point likert scales were used and table 3 shows the responses. The majority of people were very uncomfortable or uncomfortable with the level of overlooking of the living area of their home. In comparison the majority of people were comfortable or very comfortable with the level of overlooking of their POS. The frequency with which people could hear their neighbours was consistent for being in the home and for being in the POS. The majority of respondents said they could hear their neighbours either 'quite often' or 'hardly ever.'

Variable	**Level of Comfort with overlooking/ Frequency noise from neighbours is heard**				
	Very comfortable (%)	**Comfortable (%)**	**Neither comfortable or uncomfortable (%)**	**Uncomfortable (%)**	**Very uncomfortable (%)**
View into living area	7.8	18.6	15.7	34.2	23.7
View into POS	22.3	39.8	18.0	12.7	7.2
	Not at all (%)	**Hardly ever (%)**	**Quite often (%)**	**Much of the time (%)**	**Constantly (%)**
Noise heard in the home	9.4	49.7	25.2	11.0	4.7
Noise heard in POS	7.5	46.1	29.6	10.6	6.2

Table 3: Summary of the responses to questions regarding privacy

Results – comfort with view into living area

Three variables have a significant effect on residents' levels of comfort with the view into the living area. The results show that as the size of the POS to the front

of a dwelling increases the respondents are slightly less comfortable with the view into the living area of their home (table 4). The higher the number of bedrooms in the dwelling the less comfortable the respondents are with the view into the living area of their home. The third variable that has a significant impact on levels of comfort with the view into the living area is the gender of the respondent. Females are slightly more comfortable with the view into the living area of their dwellings than males are. The model only explains 5.3% of the variance in the level of comfort with the view into the living area.

	Unstandardised Coefficient		Standardised Coefficient Beta		Collinearity Statistics	
Predictor Variables	**B**	**SE**	**β**	**Significance**	**Tolerance**	**VIF**
Constant	3.096	.153		.000		
size of POS to front	-.003	.001	-.096	.017	.983	1.017
number of bedrooms	-.216	.046	-.188	.000	.980	1.021
gender	.237	.103	.092	.022	.990	1.010

N = 607 R = .231, R^2 = .053, adjusted R^2 = .049

Table 4: Comfort with view into living area

Results – comfort with view into POS

The second analysis identified which sustainable design features and socio-economic data had a significant impact on resident's level of comfort with the view into their POS (table 5). The three features included in the model account for 6.8% of the variance in residents' comfort. As the number of bedrooms in a dwelling increases so the respondent's comfort with the view into the private open space of the dwelling increases by a small proportion. Tenure, particularly various forms of renting, has a significant influence on the levels of comfort with the view into the POS. Compared to respondents who own their homes outright, respondents who rent from Registered Social Landlords, private landlords or have a part rent/part mortgage tend to be less comfortable with the view into their POS, whereas those who live for free (they do not pay rent nor do they own the property) are more comfortable with the view into their POS. Living in a development for more than two years had a negative impact on the level of comfort with the views into the POS.

	Unstandardised Coefficient		Standardised Coefficient Beta		Collinearity Statistics	

Predictor Variables	B	SE	β	Significance	Tolerance	VIF
Constant	3.649	.225		.000		
number of bedrooms	.122	.054	.105	.023	.838	1.193
rent/mortgage	-.698	.271	-.124	.010	.776	1.289
rent private landlord	-.548	.201	-.158	.007	.541	1.850
rent RSL	-.422	.186	-.131	.024	.543	1.840
no rent	.842	.427	.088	.049	.910	1.099
Length of time	-.310	.115	-.130	.007	.783	1.277

N = 525 R = .261, R^2 = .068, adjusted R^2 = .054

Table 5: Comfort with view into POS

Results – frequency neighbour noise is heard in the home

The relationship between the frequency with which neighbours' noise is heard in the home and the sustainable design features and socio-economic data was analysed. 15.6% of the variance in the frequency with which neighbour noise is heard in the home was explained by the three variables included in the final model (table 6). The distance between the front of the dwelling and the dwelling facing has a very small but negative impact on the frequency neighbour noise is heard in the home. An increase in the distance leads to an increase in the frequency with which respondents can hear their neighbours. Living in a detached-linked or a detached dwelling reduces the frequency with which respondents hear their neighbours. As with the previous model, tenure has a substantial effect. Renting from an RSL or part renting/part mortgaging means that respondents hear their neighbours more frequently than if they do not rent. Being retired, either as a couple or single, has a positive effect; respondents hear their neighbour's noise less often than those who are not retired. Respondents who have lived in the development for more than two years are likely to hear their neighbour's noise in the home more often than those who have lived in the development for less than two years.

	Unstandardised Coefficient		Standardised Coefficient Beta		Collinearity Statistics	
Predictor Variables	**B**	**SE**	**β**	**Significance**	**Tolerance**	**VIF**
(Constant)	3.927	.160		.000		
distance from dwelling to dwelling to front	-2.40E-005	.000	-.125	.002	.841	1.189
detached linked	.515	.206	.105	.012	.786	1.273
detached	.366	.145	.128	.012	.535	1.869
rent/mortgage	-.446	.207	-.094	.032	.718	1.393
rent RSL	-.520	.142	-.196	.000	.481	2.079
retired, no dependents	.366	.160	.101	.022	.705	1.418
single, retired	.560	.206	.114	.007	.781	1.280

Length of time	-.283	.084	-.145	.001	.733	1.365

N = 633, R = .395, R^2 = .156, adjusted R^2 = .131

Table 6: Frequency neighbour noise is heard in the home

Results – frequency neighbour noise is heard in the POS

Table 7 shows the results for influences on the frequency neighbour noise is heard in the POS. Renting from an RSL increases the frequency neighbour noise is heard outside whereas being single and retired reduces the frequency with which respondents can hear their neighbours. Respondents who have lived in the development for more than two years hear their neighbour in the POS less often than those who have lived in the development for less than two years. The model explains 11.2% of the variance in the frequency neighbour noise is heard.

	Unstandardised Coefficient		**Standardised Coefficient Beta**		**Collinearity Statistics**	
Predictor Variables	**B**	**SE**	**β**	**Significance**	**Tolerance**	**VIF**
Constant	3.726	.137		.000		
rent RSL	-.425	.145	-.160	.004	.529	1.892
single, retired	.565	.216	.117	.009	.787	1.271
Length of time	-.273	.091	-.136	.003	.773	1.293

N = 574, R = .334, R^2 = .112, adjusted R^2 = .091

Table 7: Frequency neighbour noise is heard in POS

Discussion – design features

The findings from the analyses suggest that **density** has an effect on privacy in the home, in terms of overlooking and noise disturbance. The **size of the POS to the front of a dwelling** had a negative impact on the levels of comfort with the view into the living area. It may be that residents in bigger dwellings, with bigger plots, anticipate more privacy from overlooking than those who live in smaller homes. This expectation may also be reflected in the negative influence the number of bedrooms has on levels of comfort with the view into the living area. In contrast, **the number of bedrooms** had a positive influence on levels of comfort with the view into the POS. Residents in **larger dwellings** may have a more secluded POS due to being shielded by their own, and adjacent, larger dwellings.

The frequency with which respondents could hear neighbour noise in their homes was affected by the **distance to the nearest dwelling to the front** of their residence and whether their dwelling was **detached or not**. The higher the distance

between the dwellings the more frequently respondents could hear noise from their neighbours. An increase in distances at the front of dwellings may not mean an increase in distances between the rear, or sides, of dwellings, therefore residents may be in closer proximity to some of their neighbours, particularly in blocks of flats. Living in a detached dwelling meant respondents heard their neighbours less often than those who do not. The space afforded detached dwellings seems to provide a sufficient barrier to noise.

Discussion – socio-economic features

Although not a design feature, **tenure** impacted on noise and overlooking. In particular, respondents who rented their properties tended to be less comfortable with the views into their living areas and POS's, and more likely to hear noise from their neighbours more often. This finding is not a result of bias in the sample, as the majority of all respondents live in flats or terraced housing, i.e. there is no difference between housing types in different tenures in the survey. **Retired respondents** also tend to be less aware of the noise made by their neighbours. This may be because they are grouped together in social housing or choose to live in areas with other older residents.

Conclusion

The aim of the Privacy Study was to investigate the impact of 'compact city' policies, in terms of design features, on privacy in the home. The features of 'compact city' policy under scrutiny were higher densities, mixed-use development and location (whether sites were urban or rural and greenfield or brownfield). The location of a development had no implications for perceptions of overlooking and noise in the home. It might be expected that siting homes adjacent to facilities or amenities would have had an impact on privacy in the home, however, there was no indication of any effect. However, some design features related to higher densities did have an impact on perceptions of overlooking and noise. The influential design features are:

- the area of the POS to the front of a dwelling;
- the distance from the front of the dwelling to the street;
- the number of bedrooms in a dwelling;
- detached housing.

It is important to emphasise that the focus of the Privacy Study is the impact of design features. Other factors are likely to influence residents' privacy and it is important to bear these in mind. Construction quality could impact on privacy, particularly if insufficient insulation is used in terraced housing and flats. Factors relating to the residents rather than the buildings are also likely to be influential; the personal characteristics of individuals may account for their tolerance of visual and acoustical intrusion not the design of the built environment.

However, it may be of benefit to individuals if future housing developments were designed with some consideration for the results of this study. The likelihood of new developments only containing detached homes with a large number of bedrooms is very low. However there may be ways, through the use of good design, of creating developments of terraced and semi-detached homes with the levels of privacy associated with large detached homes. The space to the front of the dwellings and the relationship between the dwelling and the street would have to be considered carefully to ensure that these did not impair the residents' perceptions of privacy. For example, ensuring that high density developments dwellings are laid out in a way that minimises overlooking without jeopardising the level of active frontages on streets. These considerations for privacy would need to be balanced with the environmental, economic and social sustainability goals of 'compact city' policy. In particular, privacy in the home may have an important relationship with social sustainability that would be worthy of further investigation.

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