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INTERNAL DOOR CLOSING HABITS IN DOMESTIC PREMISES: RESULTS OF A SURVEY AND THE POTENTIAL IMPLICATIONS ON FIRE SAFETY

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Abstract

It is generally accepted that keeping doors closed provides a means of protection by limiting smoke and fire spread. In the design of domestic buildings, it is therefore often assumed that occupants maintain a habit of keeping internal doors closed. The paper presents the results of an online survey to determine respondents' internal door closing habits for their domestic premises. This attracted 304 responses (250 of which were from the UK) and was then followed by a more detailed survey, attracting 26 replies, to elaborate on respondents' rationale behind their habits. The findings indicate that the overall probability that a kitchen, living room and bedroom door are closed while occupants are sleeping is 46%, 45% and 60%, respectively. It was found that the type of property, and whether respondents have children or pets, all have an influence on door closing habits. Respondents who lived in apartments were found to be up to 27% less likely to close kitchen or living room doors but more likely to close bedroom doors before going to sleep (+19%). In all instances, respondents with pets were typically more likely to keep doors open (ranging from 0% difference to +16%). However, when considering door closing behaviours for pet owners independent of the property type, it was found there was no statistically significant difference for bedroom door closing habits when sleeping. The analyses in this paper ultimately point towards the potential for daily household activities to take priority over the safety benefits which internal doors can provide.

Keywords

Dwellings; residential design; fire doors; fire safety; human behaviour.

Introduction

It is commonly accepted that keeping doors closed within a domestic building provides a means of protection during fire by limiting smoke and fire spread. Traina et al. [1] highlighted the importance of door closure in their study on occupant tenability in single family homes. Seventeen experiments were conducted for different fire locations in a two-bedroom and three-bedroom house, where one or two of the bedroom doors remained open for each experiment and one was closed. Occupant tenability was considered in the form of fractional effective dose (FED). It was found that closed internal doors decreased the recorded FED significantly, with a worst-case scenario for a closed bedroom door resulting in a 2% probability of receiving an “incapacitating dose” compared to 93% for an open bedroom. Likewise, Purser [2] determined in his studies on toxic product yields for enclosed design fires that closing the doors and windows of unoccupied rooms is likely to reduce fire hazards while helping to provide tenable escape routes.

The significance of door closure on tenability becomes even greater when occupants are sleeping and prolonged pre-evacuation times would be expected [3]. Palmer [4] considered whether bedroom doors should be open or closed while people are sleeping, as while closing bedroom doors reduces the possibility of smoke spread, it may also impair the alerting of sleeping occupants from smoke alarms positioned outside of the bedroom. Ultimately Palmer concluded, by using the Fire Risk Evaluation and Cost Assessment Model (FiRECAM), event tree methods and evaluating the expected risk to life, that bedroom doors should be kept closed. In the case of the FiRECAM analysis, it was found closing the room of fire origin door and bedroom door could reduce the expected risk to life by up to 66%.

In the context of internal domestic arrangements, Approved Document B (ADB) Volume I [5], for use in England, recommends that dwelling houses (a residential accommodation unit occupied by a single person or by a family of not more than six residents) with one floor more than 4.5 m above ground level are served by a protected stair, or that an alternative means of escape is provided for floors above 4.5 m. The purpose of the protected stair is to form fire separation between the fire location and occupant escape route. Similarly, for blocks of apartments (also referred to as flats) where access is via a common escape route, it is typically recommended to provide a protected entrance hall within the apartments which serves all habitable rooms and is enclosed with fire-resisting construction [6]. These arrangements are shown indicatively in Figure 1, with a three-storey house (uppermost storey above 4.5 m) incorporating a protected stair and a single storey apartment incorporating a protected entrance hall. For the three-storey house, the final exit door is assumed to open directly to outside and is not required to be fire-rated, whereas the apartment final exit is assumed to open into a common corridor and therefore would be expected to include a fire-rated, self-closing door. Only internal dwelling fire-resisting construction has been shown, however, depending on the arrangement of adjoining rooms and dwellings, additional fire-resisting construction may be present.

As shown in Figure 1, fire doors are required to separate the protected stair or protected entrance hall from connected rooms, but a self-closing device is not recommended for these doors. Therefore, for these protected arrangements to be effective in limiting the spread of fire and smoke from an adjoining room into the protected route, it must be assumed that occupants maintain a habit of keeping internal doors closed where reasonable.

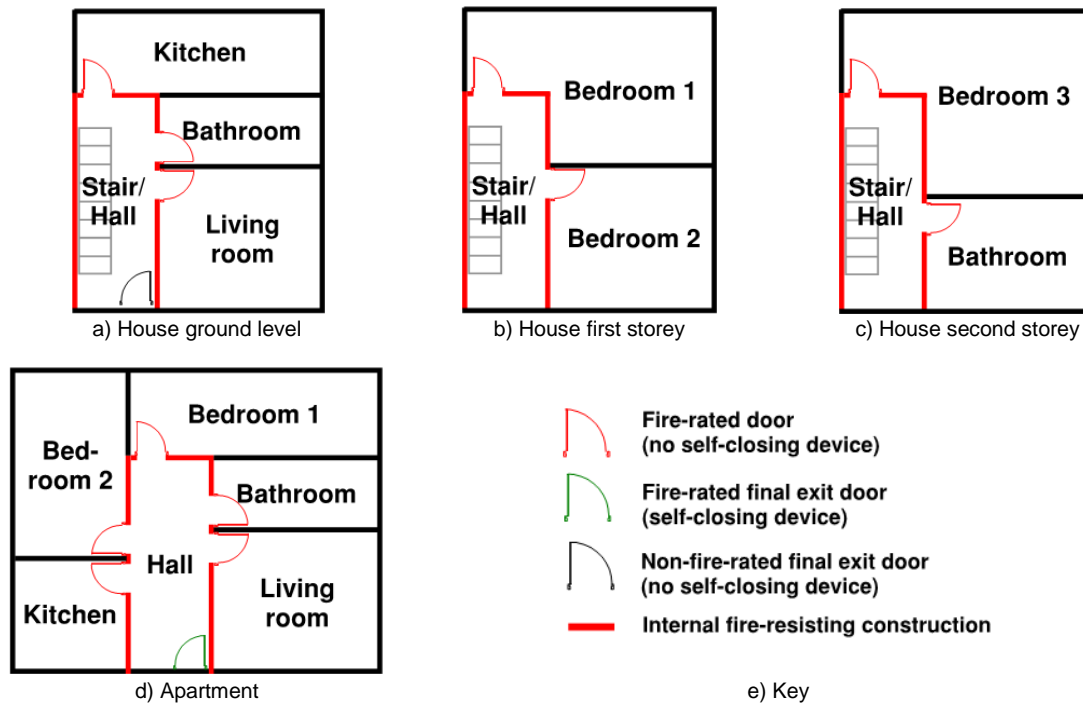


Figure 1: Indicative dwelling arrangements designed to ADB.

Many previous studies have been undertaken considering occupants' habits and interactions with self-closing devices. Prior to revisions made in 2006, ADB recommended that fire doors in dwellings be fitted with self-closing devices [7]. Changes in the recommendations occurred following studies where it was found that "there was consensus that self-closing devices could be a nuisance...", it was "fairly common practice to wedge doors open more or less permanently" [8] and "for the majority of those properties where self-closing devices are provided, users are likely to disable them to meet family needs" [9]. Reasons given for propping open self-closing doors included to allow for air circulation, to let light through, to let pets get through and to avoid children trapping their fingers [10]. Subsequent work by McDermott et al. [11], which described forty interviews with occupants inhabiting new homes, concluded that in all private dwellings with self-closing fire doors, the occupants reported interfering with the self-closing mechanism of the doors. Frank et al. [12] used logging devices to monitor the real-time positions of doors in managed accommodation buildings including hotels, apartments, dormitories and rest homes. The results indicated that there was a 10% mean probability that a door with self-closing device would be found open at a given time, either due to being propped open or due to the disabling of the self-closing mechanism.

Previous studies on self-closing devices highlights a desire for occupants to be able to keep internal doors open in certain circumstances, even when they are aware of the safety benefits of keeping doors closed [8]. However, there is limited research available which indicates the likelihood that an internal door is kept open in the absence of a self-closing device.

A study commissioned by the National House Building Council (NHBC) foundation and carried out by the Building Research Establishment (BRE) assessed the life safety implications for fires in open-plan apartment arrangements (NF 19) [13]. The study involved analysis of tenability conditions within apartments by using probabilistic computational fire and smoke modelling coupled with evacuation modelling. The NF 19 document refers to the probabilities of doors being open or closed in its assessment, where these probabilities have been determined from a separate unpublished document which includes observations of domestic properties surveyed in 1995. The door closing probabilities, recreated later in Table 3, consider two separate time periods of day and night, where day is defined as any time between 9:00 AM and 9:30 PM and night as any time outside of this period. NF 19 also states that no doors were fitted with self-closers, but it is unclear whether this refers specifically to the modelling or to the referenced surveys.

While listed as a private communication in NF 19, the authors of this paper have been able to source a summary report [14] of the original unpublished study on door closing referenced in NF 19. The summary report indicates that the study was undertaken in two UK locations, with 12 respondents from London and 12 from Ipswich, but does not expand on the methodology or types of properties surveyed. Given the absence of available information, it is difficult to determine the applicability of the data to different property types.

By comparing apartment arrangements designed to the then guidance in ADB (with protected entrance halls, shown in Figure 1d) against open-plan arrangements (with a sprinkler system and enhanced early warning detection), and using the door closing probabilities shown in Table 3 as an input in the probabilistic analyses, it was concluded in NF 19 that the open-plan arrangement can provide a level of safety that is “at least as good as that of a similar ADB compliant design”. Following this, the advice of NF 19 was incorporated into the residential design document BS 9991 [15] and influenced the recommendations of the Scottish Government Domestic Technical Handbook for fire [16]. Such conclusions would have been significantly impacted by the door closing probabilities adopted for the NF 19 study.

Between 1995, when the data adopted in NF 19 was originally obtained, and the present day, there has been a change in housing stock and how occupants interact with their premises, with an increase in tall buildings and the number of apartments; approximately 585,000 apartments were built between from 2008 to 2015 [17]. It is therefore important to know whether the inherited door closing assumptions are applicable in the modern context and to verify that recommendations of guidance, both in the form of open-plan design and protected stairs and entrance halls, remain relevant. By determining probabilities of internal doors being left open and the circumstances where this occurs, such as where there may be differences based on type of accommodation, the assumptions and analyses of NF 19 can be revisited with new evidence.

Methodology

Survey Description and Limitations

To determine whether the assumptions of guidance are appropriate in the context of internal door closing habits in domestic premises, a survey has been undertaken in two phases. The first phase considered a simplified, multiple-choice survey distributed online for respondents to answer anonymously. Specific respondents were not selected and instead the survey was widely distributed and shared using email, online professional networks and social media, in addition to word-of-mouth.

The survey incorporated 16 questions, covering demographic-based questions on age, employment and location, as well as the type of property that the respondent lives in, the number of floors and whether they have children or pets. Following this, respondents were asked to consider their door closing habits while awake and while asleep for their kitchen door, living room door, own bedroom door and the bedroom doors of other people they may live with. For example, respondents were asked: *Before going to sleep, how often do you and the people you live with close your kitchen door?* The respondents could answer the questions on a 3-point scale, with “never/rarely”, “around half of the time” and “most/all of the time”, as well as give a non-applicable answer such as “I don’t have a living room door”. The intent of the simplified survey was to obtain a large amount of quantitative data, and therefore questions were kept as short and as simple as possible to reduce the likelihood of survey fatigue, where in long surveys respondents may become disengaged part-way through [18].

The survey did not consider occupant door closing habits for bathroom/toilet doors. This was excluded as to reduce the number of questions in the survey, and also due to both the lower likelihood of bathrooms being occupied at a given time when compared to other rooms and the lower likelihood of fires occurring in the bathroom. Data from the UK Home Office dwelling fires dataset indicates that, for all recorded accidental dwelling fires between 2010 to 2017, only 2% of fires occurred in a bathroom whereas 60% occurred in kitchens, 9% in bedrooms and 8% in living rooms [19] [20].

As part of the simplified survey, respondents could opt to provide contact information to participate in a more detailed survey later, which forms the second phase. The intent of the detailed survey was to

support the broader data obtained from the simplified survey and identify any reasons for the respondents adopted door closing habits, including whether fire safety awareness influenced their habits. For this, respondents were sent an additional open-response online survey with a total of 30 questions. Questions included to what extent pets influenced their door closing habits and similarly, the same was asked for children and other cohabitants. Consideration was also given to door-closers and the type of door construction.

The overall survey methodology is not without its limitations. As both of the surveys were undertaken online, they were unsupervised, and therefore there was the potential for respondents to misread, misunderstand and erroneously answer questions [18]. An example of this can be seen in responses for the simplified survey question *How many floors does your property have?* where multiple respondents either misunderstood or skipped the introduction to the section (which stated the questions apply only to the rented/owned space) and assumed it was referring to the number of storeys for the building in its entirety. One respondent specified in the additional comments of the simplified survey “assuming property meant my flat and not the whole building”, indicating that even when making the correct assumption, details of the survey were missed. It is also likely that very few, if any, of the respondents had properties arranged exactly as shown in Figure 1 and instead there would have been some level of variation between each of the dwelling layouts.

The survey also includes limitations with respect to demographic, where not all sub-populations are represented. As the survey was predominantly distributed via email, online professional networks and social media websites, there is likely to be a greater representation of industry professionals, including those involved in fire safety. There is therefore a possibility that ‘good practices’ in terms of fire safety may be over-represented. Further to this, the uncontrolled online distribution of the survey has the potential to bias the representation of demographics in several ways, for example with certain sub-populations being less likely access online networks and social media websites. As specific respondents were not targeted in the distribution of the survey, further investigation into why people may not have opted to participate could not be undertaken. However, many responses given in the detailed survey suggest underlying habits which are still likely to apply to the general population.

Methods of Analysis

Simplified Survey

The analysis of the simplified survey focusses on determining a mean numerical value for the probability that a kitchen, living room or bedroom door is closed while occupants are either awake or sleeping. Further to determining these mean values, statistical tests have been undertaken to consider whether respondents’ living circumstances can result in different door closing behaviours. The main comparisons consider the different habits depending on whether respondents live in a house or an apartment, live with or without pets and live with or without children.

For the responses, the mean probability of a door being closed has been calculated by equating individual responses to numerical values, with “never/rarely” assumed as equivalent to a value of 0, “around half of the time” to 0.5 and “most/all of the time” to 1.

In addition to observing the mean probability that a door is closed, two-tailed t-tests (i.e. a test for the comparison of the means) have been performed between datasets separated by specific variables. These tests can provide an indication of whether responses differ significantly based on a variable, such as the type of property or whether respondents do or do not have children. The null hypothesis (H_0) for such a t-test would be that there is no significant difference between the means of the datasets, whereas the alternative hypothesis (H_1) would suggest there is a significant difference [21]. The t-value for a t-test can be calculated by:

$$t = \frac{|\bar{x}_1 - \bar{x}_2|}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} \quad (1)$$

where \bar{x}_1 and \bar{x}_2 is the mean of the first dataset and second dataset respectively, n_1 and n_2 are the sample sizes of the two datasets and S_1 and S_2 are the standard deviations.

The acceptance of the hypothesis in the analysis has been determined adopting a significance level (α) of 0.05. The critical value is based on a two-tailed test with the appropriate degrees of freedom (n_1+n_2-2), where results of the t-tests have been expressed as p-values. The p-value represents the level of marginal significance, where a p-value of greater than 0.05 indicates to accept the null hypothesis H_0 while a p-value of less than 0.05 indicates to accept H_1 , and that there is therefore a significant difference. Where a significant difference is observed in the results section, the associated p-values are shown in bold text with a grey-filled cell.

Detailed Survey

As the detailed survey allows respondents to express their answer in written form, a more qualitative method of analysis has been adopted for these results. The responses have typically been collated into similar response categories. For example, for the question *Do your pets influence your door closing habits?* responses have been collected into the groups: 'not applicable', i.e. respondents did not have pets); 'unclear or mixed response', where respondents did not feel that pets affected their habits; 'no influence'; 'more likely to close doors', where respondents were broadly shown to close doors more frequently due to the presence of pets; and 'more likely to leave doors open', where respondents more frequently left doors open due to the presence of pets. These categories have been applied throughout the detailed survey analysis. The outcomes of the results are then discussed in the context of detailed individual responses.

Results

Respondent Characteristics

The extent that the survey responses may be biased due to over or under-representation of certain sub-populations has been analysed by comparing respondent characteristics to UK census data. These potential biases will be influenced by the aforementioned limitations on the distribution of the survey.

A total of 304 participants responded to the simplified survey. Most of the respondents (82%) lived in the UK, 4% lived in Turkey, 3% in Australia, 3% in New Zealand while the remaining respondents were distributed across 12 other countries. No further statistical comparison has been undertaken between countries due to the limited number of respondents from outside of the UK, although it is noted that it would be beneficial to explore this topic further, considering the potential impact of cultural differences, different climates and different dwelling arrangements that may reflect alternative architectural norms in various countries.

Figure 2 and Figure 3 provide a demographic comparison between the UK population census and the survey respondents for age and employment status respectively. Compared to the UK census, people aged 25-64 appear to be over-represented while those aged 15-24 and 65+ are under-represented. For employment status, employed members of the population are over-represented compared to those who are inactive (this includes students, retirees and those who are unable to work or who are not seeking work).

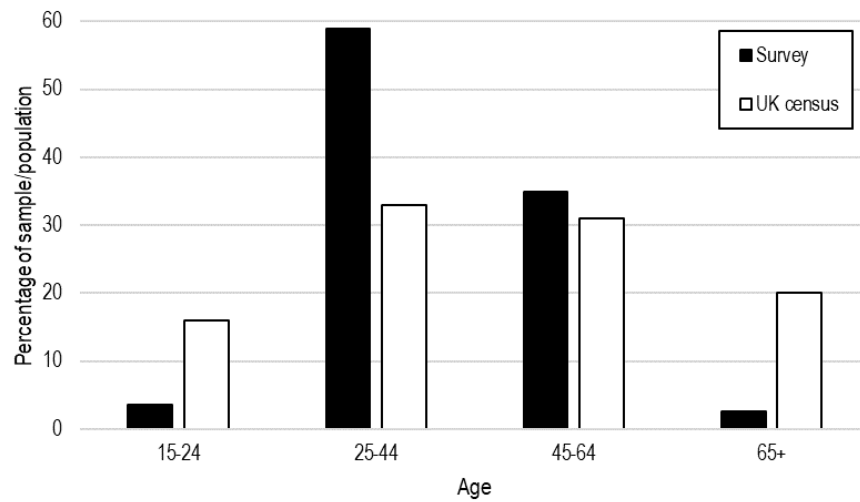


Figure 2: Percentage of respondents by age compared to UK census [22].

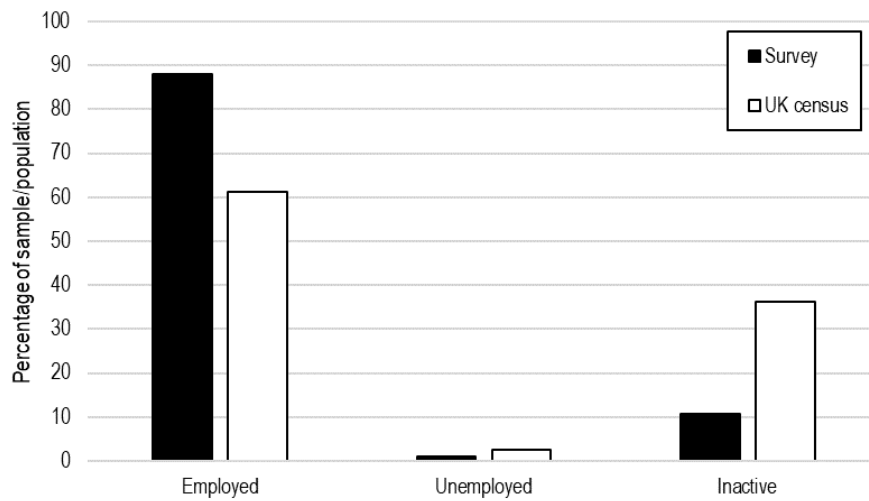


Figure 3: Percentage of respondents by employment status compared to UK labour market [23].

Figure 4 shows a comparison of the respondents who live in either houses or apartments to the UK stock profile from 2015 [17], suggesting that the survey over-represents the population living in apartments by 10%.

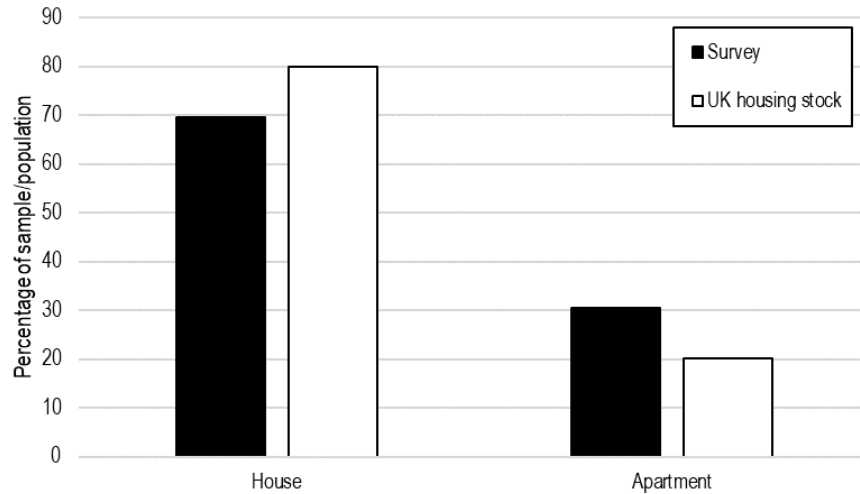


Figure 4: Respondents living in houses and apartments compared to percentage of UK housing stock [17].

52% of respondents specified that they lived in a two-storey property, 29% on one-storey, 12% three-storeys and 8% four or more storeys. However, as discussed previously, there was confusion in the interpretation of this question and whether it referred to the building in its entirety, and therefore it has been excluded from any subsequent analyses.

15% of respondents lived alone, 32% lived with one other person, 20% with two other people, 23% three others and 11% four or more others. When comparing to the raw data available in the English Housing Survey (EHS) [24] [25] [26] [27] [28] for 2008 to 2016, as shown in Figure 5, the survey appears to under-represent the proportion of the population living alone or with one other person, while over-representing those who live with two or more people.

35% of respondents lived with children under the age of 16, 43% had pets and 14% lived with both children and pets (Figure 6).

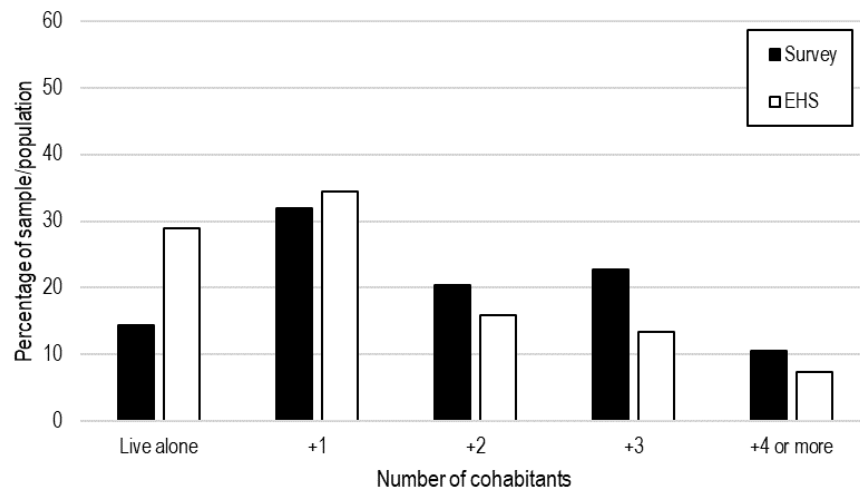


Figure 5: Number of cohabitants for respondents compared to the EHS.

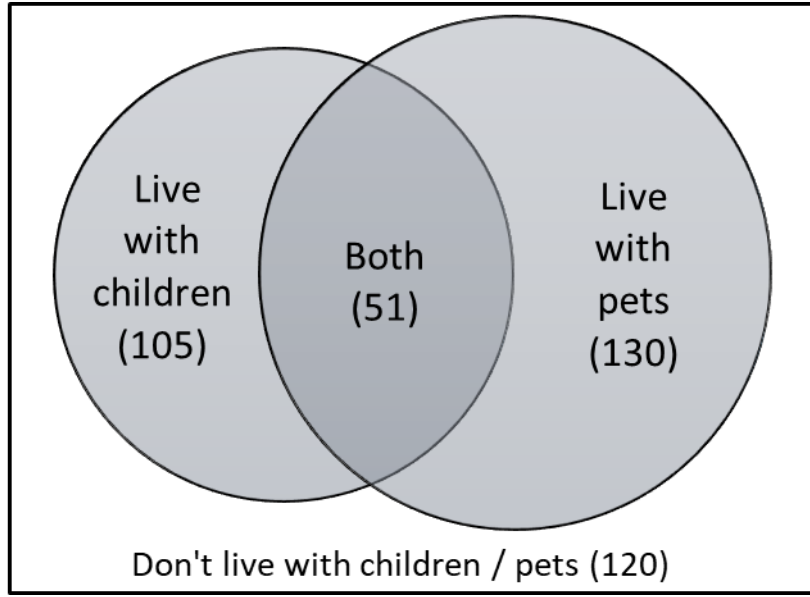


Figure 6: Respondents living with pets or children (N).

Survey Sample Size and Margin of Error

It is important to understand the extent that the survey is likely to represent the population to which it applies. For example, to what extent are the 250 people who responded from the UK likely to represent the UK population as a whole? There are multiple types of errors which can occur in a survey, including sampling error and measurement error, where the latter occurs when the recorded value is different from the true value [29]. Sampling errors inevitably emerge as it is impossible for a survey to include everyone within a given population. The standard margin of sampling error (MOE), with finite population correction, can be determined mathematically [30], using:

$$\text{MOE} = z \sqrt{\frac{p(1-p)}{n}} \sqrt{\frac{N-n}{N-1}} \quad (2)$$

Assuming a confidence level of 95% ($z = 1.96$), a sample proportion (p) of 0.5 (normal distribution), for a UK population size (N) of 65.6 million [31] and a sample size of 250 (n) for respondents from the UK only, this results in an MOE value of 6%. For example, this indicates that, where 47% of UK-based respondents have answered that they “never/rarely” close their kitchen door before going to sleep, there is a 95% likelihood that the total population sits within $\pm 6\%$ of this answer (41% to 53% range), assuming that responses are accurate and without bias. If it is also assumed that there are no cultural differences based on the respondents’ country of origin (i.e. using all 304 survey responses and not just those from the UK), the margin of error improves slightly but remains at $\pm 6\%$. However, as mentioned previously, the impact of country of origin cannot be analysed further due to the limited number of respondents from outside of the UK.

A summary of the margin of error based on age, employment, housing type and number of cohabitants is given in Table 1. The margin of error is very large for age groups 15-24 and 65+, and for those respondents who are unemployed. This will subsequently impact the precision of the data for these sub-populations, which are severely under-represented in the dataset. This will also impact the extent that the dataset is considered representative of the full population. The impact of age and employment demographics has not been investigated any further in this paper but could be considered in future work.

Table 1: Margin of error based on demographic categories.

Category	Sub-category	Margin of error	
		UK only	All respondents
Age	15-24	±35%	±30%
	25-44	±8%	±7%
	45-64	±10%	±10%
	65+	±40%	±35%
Employment	Employed	±6%	±6%
	Unemployed	±69%	±57%
	Inactive	±22%	±17%
Dwelling type	House	±7%	±7%
	Apartment	±12%	±10%
Number of cohabitants	Live alone	±16%	±15%
	+1	±11%	±10%
	+2	±14%	±12%
	+3	±13%	±12%
	+4 or more	±21%	±17%

Simplified Survey Results

Figure 7 provides a summary of all responses to the simplified survey with respect to occupant door closing behaviours while awake and while sleeping. In the figure, N/A refers to not applicable answers, such as when the respondent answered that they did not have a kitchen/living/bedroom door.

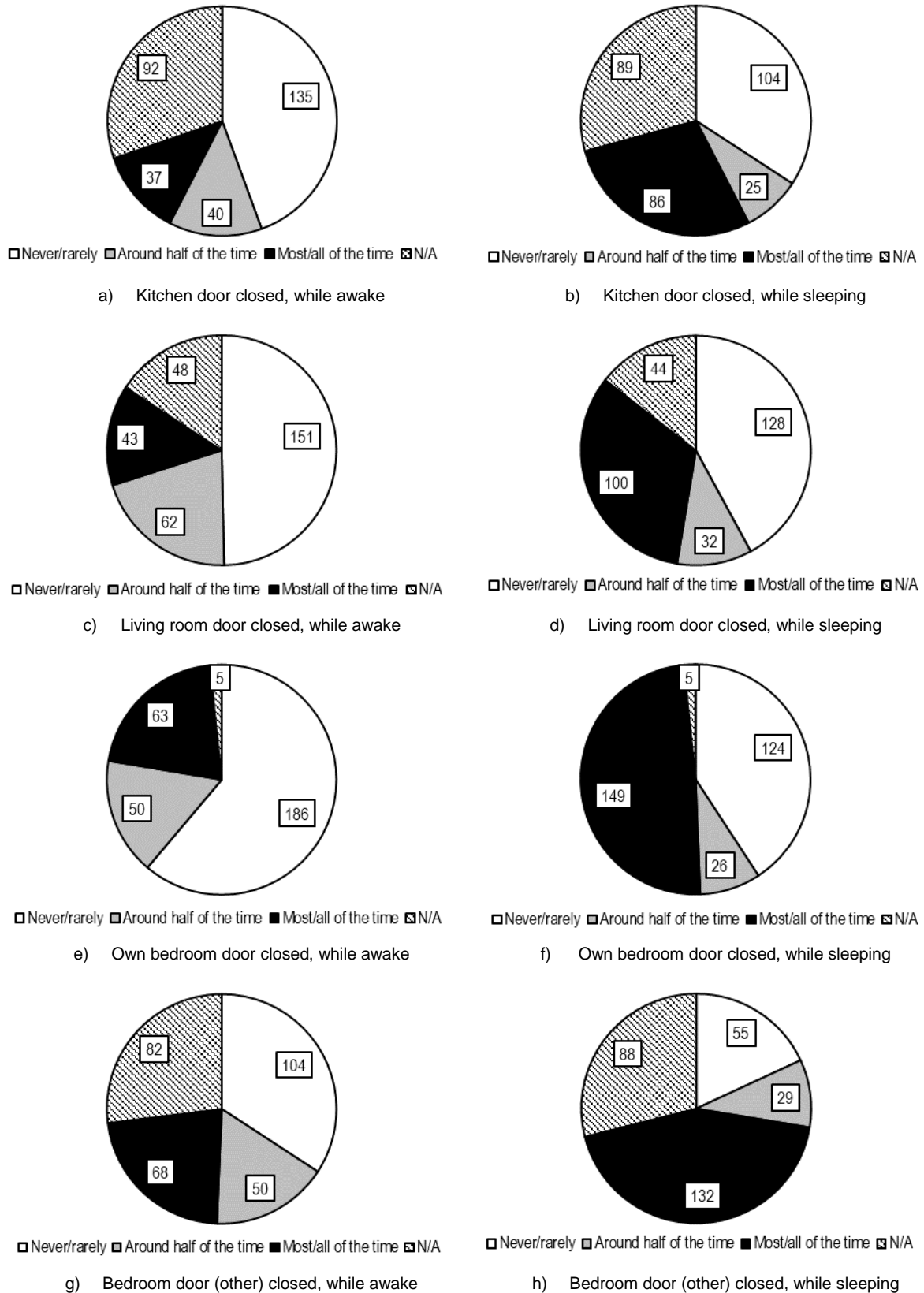


Figure 7: Summary of all responses for internal door closing habits (N/A – not applicable).

As described in the methodology, the probability that a door is closed has been calculated by equating a response of “never/rarely” to a value of 0, “around half of the time” to 0.5 and “most/all of the time” to 1. The probability of doors being closed, for all responses, is shown in Table 2. While awake, the kitchen door is least likely to be closed (27%) followed by the living room door (29%). A similar observation is

true while occupants are sleeping, with the kitchen door and living room door having a 46% and 45% likelihood of being closed respectively.

In the simplified survey, respondents were asked separately: *...how often do you keep your own bedroom door closed?* And *...how often do the people you live with keep their bedroom door(s) closed?* When both awake and sleeping, the respondents indicate that it is less likely their own bedroom door is closed than the bedroom doors of others. When combining these two responses, there is a 35% and 60% probability that a door is closed while awake and while sleeping, respectively. Therefore, based on the responses, it is more likely that a bedroom door is closed than a living room door and kitchen door.

To determine whether there is a significant difference based on the room to which the door connects and whether respondents are awake or sleeping, a two-way analysis of variance (ANOVA) has been undertaken. The analysis suggests that both variables individually indicate a significant difference ($p < 0.001$) in the likelihood that a door is closed. This suggests that it is reasonable to adopt different door closing probabilities based on both the connecting room and whether respondents are sleeping. However, the interaction of these two variables is not shown to be statistically significant ($p = 0.199$).

Table 2: Probability of doors being closed while respondents are awake or sleeping for all respondents.

Door	Probability closed	
	Awake	Sleeping
Kitchen	27%	46%
Living room	29%	45%
Bedroom (own)	29%	54%
Bedroom (other)	42%	68%
Bedroom (combined average)	35%	60%

Table 3 provides equivalent probabilities of doors being closed based on UK responses only. Also shown is the values adopted for the NF 19 study, discussed previously. Door closing probabilities for the respondents from the UK are similar to the dataset as a whole, although this may be due to the high percentage of UK respondents in the dataset. When compared to NF 19, the simplified survey predicts that occupants are more likely to close their doors. The greatest difference while sleeping can be seen in that of bedroom doors, with a difference of 10% (a relative change of 20%).

Table 3: Probability of doors being closed while respondents are awake or sleeping for UK responses only.

Door	Probability closed (simplified survey)		Probability closed (NF 19)	
	Awake	Sleeping	Awake ('Day')	Sleeping ('Night')
Kitchen	28%	47%	20%	40%
Living room	29%	44%	20%	40%
Bedroom (combined average)	35%	60%	30%	50%

Property Type

As recommendations for fire safety design can vary depending on the type of domestic property, it is important to know whether occupants living in these properties might exhibit different behaviours. Hypothetically, should occupants in single occupancy/family houses be more likely to close their doors than those in apartments, then this indicates a possibility that protected stairs in houses could be more effective in limiting the spread of smoke and heat than protected entrance halls in apartments.

Table 4 provides a summary of the t-tests for respondents who live in a single occupancy/family house and respondents who live in an apartment, where single bedroom apartments and multiple bedroom apartments have been combined.

Table 4: p-values and probability of door being closed for respondents living in houses and apartments.

Door	Awake			Sleeping		
	Houses	Apartments	p-value	Houses	Apartments	p-value
Kitchen	25%	34%	0.204	49%	38%	0.142
Living room	31%	23%	0.140	52%	25%	<0.001
Bedroom (own)	26%	34%	0.142	47%	68%	<0.001
Bedroom (other)	40%	43%	0.684	66%	72%	0.343

For habits while awake, no significant difference is observed. However, the comparisons do indicate to accept the alternative hypothesis for living rooms and respondent's own bedrooms for habits while sleeping, with a p-value of 0 in both instances, and that there is therefore a significant difference between the datasets. Based on this, it may be reasonable to suggest that different door closing behaviours should be assumed for the design of apartments when compared to single occupancy/family houses. For instance, while sleeping, an occupant of an apartment may be less likely to close living room doors but more likely to close bedroom doors.

Living with Pets

Eleven respondents from the 130 who stated that they had pets provided additional comments which suggested that having pets influenced their door closing habits, with five respondents indicating that they close doors due to pets and six indicating that they keep doors open. Comments included: "doors are left open in the flat for the cat to get around..."; "we leave doors open for the cat to get to his food and favourite seat"; and "most of the time, the decision to close my own bedroom door is due to the preference to keep pets out".

The comments indicate that pets can influence door closing behaviours in multiple ways, both by making occupants more and less likely to close certain doors. In the Andrew Irving Associates (AIA) study published in 2006, of the people surveyed who showed habits of propping doors open, 18% specified that they did this so that a pet can get through [10]. However, there were behaviours that indicated doors were closed so that pets could be shut in or out of rooms [8].

As per the comparison of habits for different property type, t-tests have been carried out comparing the 130 respondents who stated that they have pets against those that did not, as shown in Table 5) The t-test results indicate that there is a significant difference between door closing behaviours of occupants with and without pets. The most significant of those are for the living room (while awake) and the respondent's own bedroom (both while awake and while sleeping), where in both cases those without pets are more likely to close their doors.

Table 5: p-values and probability of door being closed for respondents with and without pets.

Door	Awake			Sleeping		
	Pets	No pets	p-value	Pets	No pets	p-value
Kitchen	27%	27%	0.934	41%	50%	0.184
Living room	23%	33%	0.034	39%	49%	0.113
Bedroom (own)	21%	36%	0.001	45%	61%	0.004
Bedroom (other)	42%	42%	0.973	64%	71%	0.281

It was previously identified that property type results in a statistically significant difference in door closing habits between respondents. However, for the 130 respondents with pets, a majority (83%) live in a single occupancy/family house. To verify that the habits observed for respondents with pets are independent of the property type, a further comparison has been undertaken exclusively for the respondents which live in single occupancy/family houses. The p-values for this comparison are shown in Table 6, with the associated door closing probabilities. In contrast to the previous set of results, it is indicated that there is not a significant difference between respondents with and without pets specifically for their bedroom door closing habits, and therefore the differences shown in the previous comparison are not independent of property type. However, those with pets are still shown to be less likely to close kitchen living room doors both while awake and before going to sleep, with a difference of -12% and -15%, respectively.

Table 6: p-values and probability of door being closed for respondents with and without pets (single occupancy/family house only).

Door	Awake			Sleeping		
	Pets	No pets	p-value	Pets	No pets	p-value
Kitchen	25%	24%	0.876	42%	56%	0.053
Living room	25%	37%	0.028	45%	60%	0.023
Bedroom (own)	21%	31%	0.084	46%	49%	0.623
Bedroom (other)	45%	35%	0.102	65%	66%	0.905

Living with Children

Seven respondents from the 105 who stated they live with children made additional comments in the simplified survey on the influence of children on their door closing habits, where in all instances the presence of children meant that doors were more likely to be kept open while sleeping, for example: “we keep our bedroom doors slightly ajar at night so we can hear if the toddler is crying”; “bedroom doors are typically open to hear children in adjacent rooms”; and “children bedroom doors sometime [sic] are not closed as they don't like the dark”.

The above described behaviours are similar to those discussed in previous studies, where concern for child safety was prioritised over the intended safety benefits of doors with self-closers. A respondent to McDermott et al.'s study specified that “we have a child under 2 years old and need to be able to see him at all times” [11]. In the AIA study, 14% of people surveyed who showed habits of propping open doors were concerned that children might trap their fingers, while a further 7% specified that children not 'liking' closed doors was a reason for propping open doors [10].

Table 7 provides the t-test results, and calculated probabilities of doors being closed, for the comparison of 105 respondents with children against those without. The t-tests indicate that respondents with children are less likely to close their bedroom doors while sleeping (by up to 24%) than those without children, but more likely to close kitchen (+18%) and living room doors (+15%). In the case of bedroom doors in particular, this is consistent with the additional comments made and the behaviours observed in the previous self-closer studies [10] [11].

Table 7: p-values and probability of doors being closed for respondents with and without children.

Door	Awake			Sleeping		
	Children	No children	p-value	Children	No children	p-value
Kitchen	26%	28%	0.721	57%	39%	0.008
Living room	26%	30%	0.388	54%	39%	0.012
Bedroom (own)	21%	34%	0.010	38%	62%	<0.001
Bedroom (other)	30%	52%	<0.001	59%	76%	0.002

98 of the 105 respondents (93%) with children lived in a single occupancy/family house, with the remaining 7 living in a multiple bedroom apartment. As per the consideration of pets, a comparison has been undertaken only for respondents that live in single occupancy/family houses only, to test whether observed behaviours for respondents with children are independent of the property type (Table 8). A reasonably consistent pattern is observed to that shown above, i.e. respondents with children are less likely to close their bedroom doors while sleeping than those without children, but more likely to close kitchen and living room doors.

Table 8: p-values and probability of door being closed for respondents with and without children (single occupancy/family house only).

Door	Awake			Sleeping		
	Children	No children	p-value	Children	No children	p-value
Kitchen	27%	23%	0.569	59%	40%	0.009
Living room	28%	34%	0.309	58%	47%	0.127
Bedroom (own)	22%	30%	0.125	38%	56%	0.006
Bedroom (other)	31%	53%	0.001	59%	77%	0.009

Detailed Survey Results

Detailed surveys were distributed to respondents who opted to participate as part of the simplified survey. These surveys allowed for open and qualitative written responses to questions. The detailed survey incorporated 30 questions, where none of these were considered compulsory and respondents could give as little or as much detail as preferred. The questions covered potential influences and reasons for door closing habits, such as pets, children, cohabitants, type of property and fire safety. A total of 26 detailed surveys were completed, where all respondents who completed the detailed survey also completed the initial simplified survey. Responses to the two separate surveys were compared to check for consistency, where it was found that no clear differences were observed in the answers given.

Property Type

In the detailed survey, respondents were asked if they believed the type of property they lived in influenced their door closing habits. Most respondents (69%) did not feel that this was the case, while 15% did and another 15% were uncertain. Of those who noted that it did change their habits, multiple respondents referred to safety provisions and the arrangement of the house, such as “primary bedroom provided with large window at a height circa 3 m...therefore, doors are rarely closed as comfortable with window escape”. One respondent noted that “if we lived in a house I think I’d be more likely to leave all the doors open, but not really sure why.”

It may be perceived that these responses broadly contradict the findings of the quantitative assessment in the simplified survey, in that the simplified survey suggests property type does influence habits. However, this disparity could be due to the demographics who typically live in certain property types, or external factors associated with living in a different type of property, rather than directly associated with personal and conscious decision-making.

Living with Pets

The results of the simplified online survey broadly suggest that respondents with pets are more likely to leave internal doors open. In the detailed survey, respondents were asked *Do your pets influence your door closing habits? If so, how?...* Figure 8 provides a collated summary of the written responses.

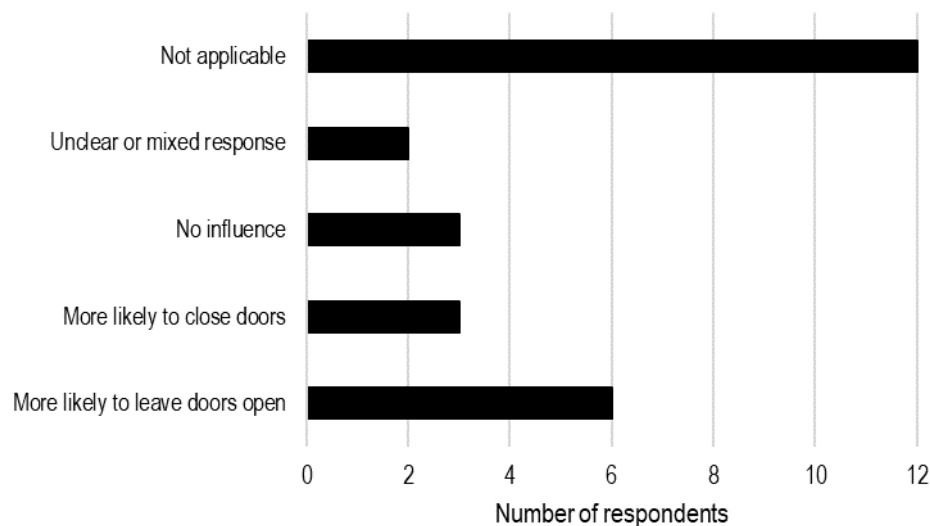


Figure 8: Collated responses to “Do your pets influence your door closing habits?”

The detailed survey suggests greatest number of respondents (6) with pets are more likely to leave doors open compared to those who are more likely close doors (3) or those who say pets have no influence on their habits (3). A common reason given for keeping doors open is so that dogs or cats “can roam freely”, while one respondent noted that “I always closed my doors before I got the dog. Now I wedge the living room door open all day and night except in the evening...” In contrast, respondents who kept doors closed did so to keep the pet contained to or away from certain rooms, such as

“particular...doors would be closed to minimise pet hair on...laundry” and “during daytime...dog is contained to the kitchen.”

Living with Children

In total eight of the 26 respondents of the detailed survey had children (Figure 9). Of these eight, four suggested they were more likely to leave doors open due to the presence of their children, while two said it had no influence, one was more likely to close doors and one gave a mixed response. This somewhat aligns with the analysis of the simplified survey, where respondents who had children are shown to be more likely to leave bedroom doors open than those without. Reasons given include “...we pull all bedroom doors to, but don’t completely close them so we can hear him in the night/morning if he needs us” and “I keep my bedroom door open, so I can hear my children.” One respondent did note that they close all doors to stop their children falling down stairs and also close their children’s bedroom doors when they are asleep.

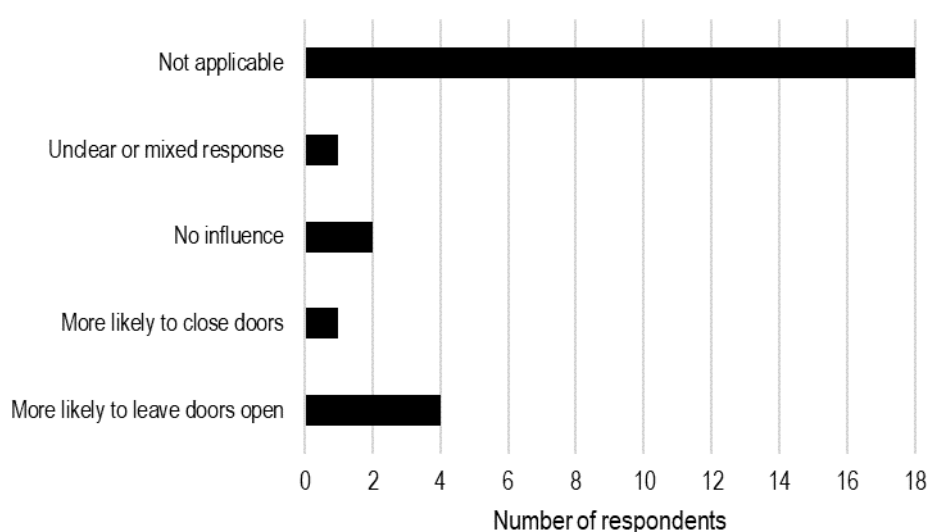


Figure 9: Collated responses to "Do your children influence your door closing habits?"

Fire Safety

The detailed survey provided questions specifically related to fire safety, such as questions regarding self-closers on internal doors, smoke detection and the influence of fire safety awareness on door closing habits.

Seven of the 26 respondents have door closers in their property. Of these seven, five of the respondents show habits of propping these doors open due to the inconvenience of the devices, with reasons including “opening and closing is a pain when going in and out of the bedroom during the day”. This behaviour is consistent with other studies undertaken on doors with self-closers [8] [9] [10] [11], discussed previously.

All respondents stated that they had smoke detectors in their property, with no respondent clearly stating that the presence of these detectors influenced their habits, although one response noted that “minor toast burn will set off hall detector with the door open to the kitchen/living room”, suggesting they were more likely to close doors because of the smoke detector. Another respondent said “I have installed 2 further [smoke detectors] in my children’s rooms. I installed these because I wanted the doors to remain close [sic] for practical (i.e. noise) and reasons (i.e. fire). However, I was concerned about the lack of warning I would get for a fire in my children’s rooms.”

Respondents were asked *Does consideration of fire safety influence your door closing habits?* This has been collated and summarised in Figure 10. Most respondents stated it did not affect their habits, while eight suggested they were more likely to close doors due to fire safety, and an additional three gave

mixed or unclear responses. Reasons for it not affecting habits included “pretty low chance of fire occurring. Could probably get out of the windows if we needed to” and “...external fires are far more likely than internal fires, and the apartment has sufficient compartmentation.” One respondent stated that “although I know that keeping them [doors] closed is safer, day-to-day activities take precedence.”

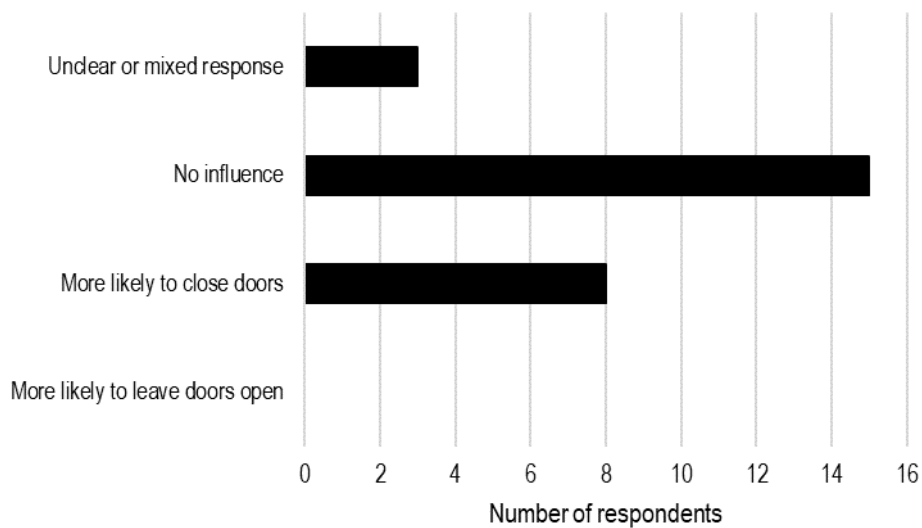


Figure 10: Collated responses to “Does consideration of fire safety influence your door closing habits?”

Following on from the above question, respondents were then asked if they were likely to change their doors closing habits for the purpose of fire safety, such as if provided with evidence showing benefits (Figure 11). Eleven respondents stated no, while eight said yes and seven gave a mixed or maybe response. Many of those who said no mentioned that they were already aware of fire safety benefits and therefore were unlikely to change habits, some of which again indicating that daily habits taking precedence. Multiple respondents gave mixed responses due to a lack of further information, including one respondent stating that the “question is unclear and to [sic] hypothetical” and another suggesting that “evidence would change my habits temporarily.”

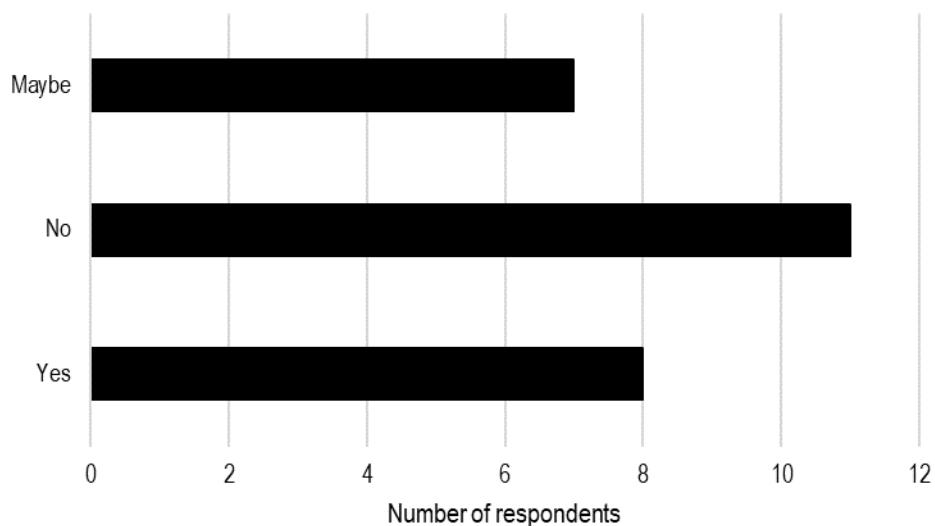


Figure 11: Collated responses to “Would you be likely to change your door closing habits for the purpose of fire safety?”

Although presented as such in the survey, whether a door is open or closed is not typically a binary answer. A door may be closed fully, ajar or swung open to varying degrees. If it is not closed fully, the

degree that a door is swung open will still influence the extent of smoke or fire spread, e.g. a partially open door into a protected entrance hall may still be able to contribute a fire safety benefit despite not being closed. Every single respondent suggested that when answering questions about whether a door is closed, they would interpret or define it as completely shut (e.g. latched and needing to turn the door handle to reopen). Therefore, any door which is left ajar is considered by the respondents to be open, but this door may still impact smoke spread between rooms and affect the development of the fire.

Other Factors

Respondents were asked if the weather or temperature influence their door closing habits, with collated responses to this question shown in Figure 12. The majority of respondents stated that temperature had no influence on their habits, while eight respondents generally indicated they were more likely to close doors. This decision making will be influenced by the climate, where most of the respondents reside in the UK. In the case of mixed responses, two respondents commented that they were more likely to leave doors open in the summer but close them during the winter.

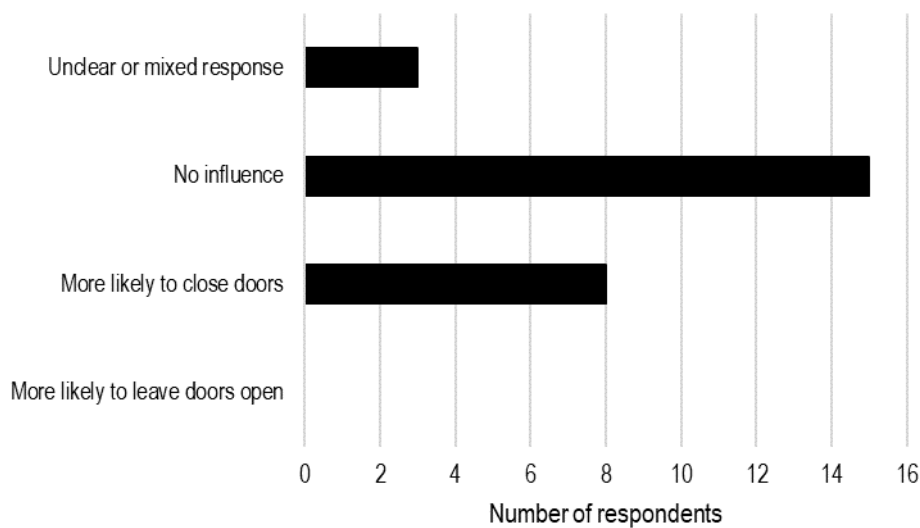


Figure 12: Collated responses to: “Does weather/temperature ever influence your door closing habits?”

Similarly, occupants were asked whether having the heating on in the property affected their habits (Figure 13). Again, it was observed that most either stated it had no influence or that they were more likely to close doors to “keep the heat in”. Of those who were more likely to leave doors open, one stated it was as they had a log burner and wanted to dissipate heat throughout the house, while another stated a similar reason for keeping the bedroom door (connected to the living room) open.

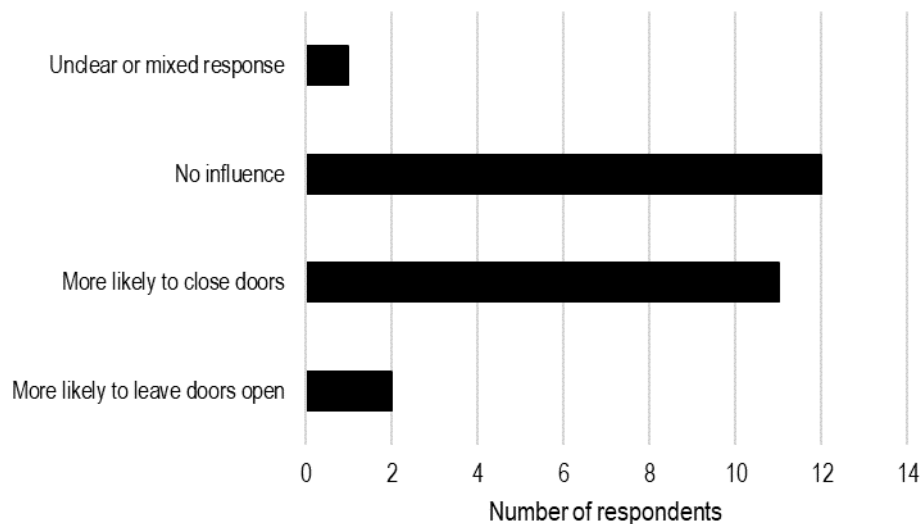


Figure 13: Collated responses to: "Does having the heating on in the property affect your door closing habits?"

Aside from those already described previously, other factors which influenced door closing habits included: noise, both internal to the property and external to the property; privacy due to other occupants within the property; and to limit spread of smoke when smoking. All of these other reasons given prompted respondents to exhibit behaviours where they were more likely to close doors.

Of the 26 respondents, 25 suggested at least one factor aside from fire safety which dictated their habits, whether it be pets, children, cohabitants, weather, heating etc.

Discussion

Improvements to the performance of protected entrance hall and stair arrangements can be made by increasing awareness of fire safety and by recommending that occupants close their internal doors, particularly when sleeping. Such campaigns and initiatives are ongoing, including the Underwriters Laboratories (UL) Fire Safety Research Institute (FSRI) "Close Your Door" pledge [32]. However, even with increasing awareness, in many cases the daily activities and needs of occupants will continue to take priority over fire safety benefits, where those benefits rarely become tangible to occupants. In the UK between 2010 and 2017, there was a total of 204,647 accidental fires resulting in fire service call out, or an average of 29,235 fire events per year. The average number of UK fire-related fatalities per year in this period was 302 [19]. In the context of risk perception, neglecting low-frequency events such as fires can be considered a reasonable survival strategy, where to be concerned with many perceived low probability dangers could produce a lack of focus on more common dangers. These low-probability dangers tend to be played down, with individuals having a strong sense of "subjective immunity" [33]. For many respondents, the perceived risk of keeping internal doors open will therefore be outweighed by the perceived benefits, such as being able to hear children in the night and allowing pets to roam around the house. This is supported by responses given in the detailed survey, where 25 of the 26 respondents gave a reason beyond fire safety which influenced their habits (albeit in both opening and closing doors), whether it be pets, children, weather, heating etc. Of the factors discussed in the detailed survey, the most significant to keeping doors open was the presence of pets, with 40% of the detailed survey respondents with pets indicating they would be more likely to keep doors open and compared to 20% who would be more likely to keep doors closed.

Statistical analysis of responses given in the simplified survey suggests that occupants with pets are more likely to keep doors open when sleeping by up to 16%. Respondents with children are more likely to keep living room and kitchen doors closed while sleeping (up to 19% difference for the kitchen) but less likely to keep bedroom doors closed (up to 24% difference). Despite these behavioural factors, there is still a fire safety benefit to protected entrance hall and stair arrangements, as many of the survey

respondents maintained a habit of closing their internal doors (24% closed all their available internal doors before going to sleep).

It appears that further consideration may need to be given to fire safety measures which do not noticeably affect the daily needs and activities of households. For UK dwellings it is typically recommended that smoke alarms be positioned in circulation spaces between bedrooms and places where fires are “most likely to start” (kitchens and living rooms) [5]. However, previous work by Bruck has suggested that smoke alarms positioned in hallways are much less likely to wake vulnerable occupants and that smoke alarms should also be installed in bedrooms, at maximum tolerable sound level, to minimise fatalities during sleep [34]. The analyses of Fraser-Mitchell and Williams [13] in NF 19 show the benefits that suppression systems such as sprinklers can provide to life safety while allowing for more flexible apartment design. Therefore, other measures may be able to enhance both fire safety and living comfort when compared to existing guidance recommendations. These measures will need to be analysed further with respect to occupant behaviours, the life safety benefits they can provide and the level of investment required.

Conclusions

When undertaking probabilistic fire and smoke modelling analyses of dwellings, it is recommended that different door closing probabilities be adopted dependent on the property type. It has been found that respondents who lived in apartments were up to 27% less likely to close kitchen or living room doors but more likely to close bedroom doors before going to sleep (+19%) when compared to those who live in houses. This is shown to be a statistically significant difference when performing t-tests. It is therefore proposed the probabilities given in Table 9 be adopted, dependent on whether the dwelling is a house or an apartment. These probabilities provide a comprehensive update to the existing values discussed in NF 19 [13]. The implications of these door closing behaviours are to be explored by the authors in subsequent work, where one such example is to undertake probabilistic fire and smoke modelling and revisit the NF 19 [13] open-plan flats study for the new data.

Table 9: A summary of recommended door closing probabilities to be adopted in fire and smoke modelling.

Door	Awake		Sleeping	
	Houses	Apartments	Houses	Apartments
Kitchen	25%	34%	49%	38%
Living room	31%	23%	52%	25%
Bedroom	32%	38%	54%	73%

The surveys and analyses discussed in this paper will help to support any future work which considers the likelihood that doors in dwellings are open or closed. The unsupervised and online nature of the survey results in several limitations, such as the likely over-representation of certain demographics, as demonstrated by the margin of error calculations, and the potential for respondents to provide erroneous data. To support the conclusions of this paper, it may be possible to undertake physical inspections of dwellings or use position loggers, such as those used by Frank [12], on internal doors in multiple properties to collate additional experimental data. This approach may also help to expand on the surveys by providing information on door opening and closing patterns throughout the day.

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Appendix A – Simplified Online Survey

Simplified Survey – Section 1

How old are you?

- ☐ 15-24
- ☐ 25-44
- ☐ 45-64
- ☐ 65+
- ☐ Prefer not to say

What is your current employment status?

- ☐ Employed
- ☐ Unemployed and seeking work
- ☐ Unemployed and not seeking work
- ☐ Unemployed and not able to work
- ☐ Student
- ☐ Retired
- ☐ Prefer not to say

What country do you live in?

Simplified Survey – Section 2

Please provide the answer which best matches the type of accommodation you currently live in. Should you live in multiple properties throughout the year, select the property in which you spend most of your time.

Note: All questions apply only to the rented/owned space and not the building in its entirety. For example, a single level flat in a multiple level high-rise residential building would be classified as a single level property and only those living in the flat would be classified as people you live with.

Which of the following best describes the type of property you live in?

- ☐ Single bedroom apartment (including studio flats)
- ☐ Multiple bedroom apartment
- ☐ Single occupancy/family house
- ☐ Accommodation with shared facilities (e.g. student accommodation)
- ☐ Prefer not to say

How many floors does your property have?

- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4+
- ☐ Prefer not to say

Simplified Survey – Section 3

Including yourself, how many people typically live in your property?

- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5+
- ☐ Prefer not to say

Do you live with any children under the age of 16?

- ☐ Yes
- ☐ No
- ☐ Prefer not to say

Do you have any pets?

- ☐ Yes
- ☐ No
- ☐ Prefer not to say

Simplified Survey – Section 4

The following questions apply to when you are awake, during typical daily use in your living accommodation.

While awake, how often do you and the people you live with keep the kitchen door closed?

- ☐ I don't have a kitchen door
- ☐ Never/rarely
- ☐ Around half of the time
- ☐ Most/all of the time

While awake, how often do you and the people you live with keep the living room door closed?

- ☐ I don't have a living room door
- ☐ Never/rarely
- ☐ Around half of the time
- ☐ Most/all of the time

While awake, how often do you keep your own bedroom door closed?

- ☐ I don't have a bedroom door
- ☐ Never/rarely
- ☐ Around half of the time
- ☐ Most/all of the time

While awake, how often do the people you live with keep their bedroom door(s) closed? (i.e. if they have a separate bedroom)

- ☐ I don't live with other people or they don't have a separate bedroom
- ☐ Never/rarely
- ☐ Around half of the time
- ☐ Most/all of the time

Simplified Survey – Section 5

The following questions apply to when you are sleeping and door closing habits before going to sleep.

Before going to sleep, how often do you and the people you live with close your kitchen door?

- ☐ I don't have a kitchen door
- ☐ Never/rarely
- ☐ Around half of the time
- ☐ Most/all of the time

Before going to sleep, how often do you and the people you live with close your living room door?

- ☐ I don't have a living room door
- ☐ Never/rarely
- ☐ Around half of the time
- ☐ Most/all of the time

Before going to sleep, how often do you close your own bedroom door?

- ☐ I don't have a bedroom door
- ☐ Never/rarely
- ☐ Around half of the time
- ☐ Most/all of the time

Before going to sleep, how often do the people you live with close their bedroom door(s)? (i.e. if they have a separate bedroom)

- ☐ I don't have a bedroom door
- ☐ Never/rarely
- ☐ Around half of the time
- ☐ Most/all of the time

Simplified Survey – Section 6

If you have any additional comments, please provide them below:

If you are interested in participating in a more detailed survey on this topic in future, please provide an email address below:

Section 1 – Property Layout

All questions refer specifically to doors internal to the property. This does not include doors to external areas, such as to outside (e.g. front doors, doors to gardens) or to shared corridors and other areas (e.g. doors to common corridors and lobbies in apartment blocks).

The purpose of this section is to understand the layout of your property and how fire and smoke could spread between rooms in the event of a fire.

1. Broadly describe the layout of your living accommodation (feel free to include a sketch if that helps)

Example response: I live in a three-bedroom semi-detached house with two storeys. Downstairs I have a porch, living room and kitchen. Upstairs I have three bedrooms (including one master bedroom with en-suite), a bathroom and a stair landing. The stair from ground to upstairs is open and located in the living room, going from the living room to the upstairs landing.

2. What internal doors does your kitchen have and what rooms do they connect to?

Example response: My kitchen has one door which connects to my living room.

3. What internal doors does your living room (or similar) have and what rooms do they connect to?

Example response: My living room has one door which connects to my kitchen.

4. What internal doors does your bedroom have and what rooms do they connect to?

Example response: My bedroom has one door which connects to a stair landing and another which connects to an en-suite bathroom.

5. Do you have any other bedrooms? What doors do they have and what rooms do they connect to?

Example response: I have two other bedrooms. These both have one door each and connect to the stair landing.

6. Do any of your doors have glass panels and/or open areas?

Purpose of question: to determine whether doors would be able to provide a sufficient barrier to fire and smoke spread.

Example response: All of my doors are made from wood panels except the door between the kitchen and dining room which has glass panels in the top half of the door.

7. Does your property incorporate any self-closers on internal doors? If yes, how often do you prop these doors open?

Note: a self-closer is a device that automatically closes a door after someone has opened it.

Example response: Yes, my property has self-closers on bedroom doors but I always prop the doors open as I would rather not have them closing all the time.

8. Other than bathrooms and toilets, are any of your internal doors lockable with a bolt or key? Do you lock any internal doors while you or anyone else are in the property?

Purpose of question: to understand how quickly occupants might be able to escape from your property in the event of a fire.

Example response: All of my doors can be locked with a key although I never lock the doors.

9. Do you believe the type of property you live in, e.g. house or an apartment, influences your door closing habits? If so, how does this influence your habits?

Example response: I do not think specifically the type of property I live in influences my door closing habits. I think I would do the same whether I lived in a house or a flat.

Section 2 – Living with Others

The purpose of this section is to determine how other occupants in your property may affect your door closing habits.

10. How many pets do you have? What type of pet(s) are they?

Example response: I have one dog and two cats.

11. Do your pets influence your door closing habits? If so, how? How does this differ between when you are awake and when you are sleeping?

Example response: We generally keep most doors open so that our dogs and cats can roam about the house when needed. In the day we may occasionally shut them in the kitchen if they're being a nuisance, but when we're sleeping we don't like to keep any doors closed as the pets make a lot of noise (barking etc.) if we shut them away from us.

12. How many children do you have who live with you at the property? How old are they?

Example response: I have two children, one is six and the other is four.

13. Do you live with anyone else other than those already mentioned?

Example response: I live with three friends I've met at university.

14. Do your children influence your door closing habits? If so, how? How does this differ between when you are awake and when you are sleeping?

Example response: We like to keep our bedroom door open in the night so that we can hear the children, in case they get scared and need us for something. I don't think the children really affect our habits during the day.

15. Aside from children and pets, does anyone else you live with influence your door closing habits? If so, how? How does this differ between when you are awake and when you are sleeping?

Example response: My friends stay up a lot later than I do, so we keep the living room and kitchen room doors closed at night so they don't disrupt my sleep. When we're awake we keep all the doors open, apart from our bedroom doors, because we're all in and out a lot and opening and closing doors would be annoying. I keep my bedroom door closed most of the time for privacy and my friends do the same.

Section 3 – General Influences on Door Closing Habits

The purpose of this section is to determine other factors which might affect your door closing habits.

16. Does consideration of fire safety influence your door closing habits? If so, how?

Example response: I know that I am supposed to close doors for fire safety reasons but children and day to day activities take priority in our household.

17. Does your property have one or more smoke detectors and how does that influence your door closing habits?

Example response: Yes, I have a single smoke detector at the top of the stairs and I keep my bedroom door open at night as I'm worried that I won't hear it if it activates in a fire.

18. Would you be likely to change your door closing habits for the purpose of fire safety, such as if provided with evidence showing benefits?

Example response: I am already aware that there are safety benefits to keeping doors closed, so I don't think it would change much.

19. Does weather/temperature ever influence your door closing habits? If so, how?

Example response: I'm probably more likely to keep doors open in the day if it's really hot, to get air flowing around the house. While I'm sleeping I generally keep the same habits, no matter what the weather.

20. Does having the heat on in the property affect your door closing habits? If so, how?

Example response: During the winter I keep all of my doors closed to keep the heat in the living areas.

21. Are there any other factors which might affect your door closing habits?

Example response: I live in a noisy area, so I close doors to reduce noise spreading through the house.

22. When answering questions about whether a door is closed, how would you interpret or define 'closed'?

Purpose of question: to understand how the phrase 'door closed' might be interpreted by different respondents, as this interpretation is important in the context of potential fire and smoke spread.

Example response: I only consider a door closed if it is shut fully. If a door is left ajar, I do not consider it closed.

Section 4 – Door Closing Habits while Awake

23. While awake, how often do you and the people you live with keep the kitchen door closed? What are your reasons for either closing the door or keeping it open?

Note: If you have multiple internal kitchen doors, please include responses for each.

Example response: Both kitchen doors are generally left open during the day, although we occasionally close the one into the hallway when cooking to avoid setting off the smoke detector. Otherwise there's no particular reason we leave the doors open, although I suppose it's because we prefer not having to constantly open and close doors when moving about the house.

24. While awake, how often do you and the people you live with keep the living room door closed?

What are your reasons for either closing the door or keeping it open?

Note: If you have multiple internal living room doors, please include responses for each.

Example response: If it was up to me I'd keep the living room door closed all the time, but my partner likes to keep it open for the air and light, so it's open most of the time.

25. While awake, how often do you keep your own bedroom door closed?

What are your reasons for either closing the door or keeping it open?

Note: If you have multiple internal bedroom doors, please include responses for each.

Example response: The bedroom door to my en-suite bathroom is always closed for hygiene reasons. The bedroom door to the corridor is also kept closed most of the time, mainly because I don't like other people looking into my messy bedroom.

26. While awake, how often do the people you live with keep their bedroom door(s) closed? What are their (or your) reasons for either closing the door or keeping it open?

Note: If you have multiple internal bedroom doors, please include responses for each.

Example response: The children have their bedroom doors open during the day because we like to see and hear what they're up to when they're playing in their rooms.

Section 5 – Door Closing Habits while Sleeping

27. Before going to sleep, how often do you and the people you live with close your kitchen door?

What are your reasons for either closing the door or keeping it open?

Note: If you have multiple internal kitchen doors, please include responses for each.

Example response: I keep the kitchen door propped open permanently, even when sleeping. I don't like having to constantly open and close it, and I don't like it slamming shut.

28. Before going to sleep, how often do you and the people you live with close your living room door?

What are your reasons for either closing the door or keeping it open?

Note: If you have multiple internal living room doors, please include responses for each.

Example response: We always close the living room door at nights. I was told by a fire-fighter that you should close doors and have done ever since.

29. Before going to sleep, how often do you close your own bedroom door?

What are your reasons for either closing the door or keeping it open?

Note: If you have multiple internal bedroom doors, please include responses for each.

Example response: *I keep my bedroom door open at night so that the dog can enter or leave the room. He likes to sleep in the same room as me but also wants to wander around the house sometimes.*

30. Before going to sleep, how often do the people you live with close their bedroom door(s)?

What are their (or your) reasons for either closing the door or keeping it open?

Note: If you have multiple internal bedroom doors, please include responses for each.

Example response: *My flatmates all keep their bedroom doors closed for privacy and noise.*

Section 6 – Additional Comments

If you have any additional comments you wish to provide which you do not think are covered in the previous questions, then please do so here: