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‘The older I get, the colder I get’ - older people’s perspectives on coping in cold homes.

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Abstract

An average of 26,560 UK excess winter deaths occur in 65+ year olds each winter, 30% of which are attributed to cold homes. Cold homes are known to exacerbate health problems prevalent in the 65+ demographic. Through conducting interviews in homes occupied by 65+ year olds known to be achieving less than the WHO minimum recommended temperature (18°C), this paper highlights their struggles in maintaining health and managing their homes, with instances of extreme and potentially dangerous methods to achieve thermal comfort identified. Fairer energy provision, better targeted financial aid and improved support networks are necessary to alleviate current problems.

Keywords: Ageing Population, Thermal Comfort, Cold Homes, Coping Strategies, Older People

1 Introduction

In recent years there has been increasing concern over how the elderly stay warm in winter within their homes (Wright, 2004; Chard and Walker, 2016; Day and Hitchings, 2011; O’Neill et al., 2006). They are construed as vulnerable (Chard and Walker, 2016; Christensen et al., 2009); often struggling to keep warm as a consequence of inadequately maintained housing (Hamza and Gilroy, 2011; Romero-Ortuno et al., 2013) and inaccurate health beliefs (Wright, 2004; Day and Hitchings, 2011; Gascoigne et al., 2010). Existing studies of older people’s practices in winter focus on those exclusively in fuel poverty (Chard and Walker, 2016; O’Neill et al., 2006), with the debate centering around government incentives to alleviate this (Wright, 2004; Critchley et al., 2007). Nearly a third of fuel poverty sufferers are aged 65 and over (Wookey et al., 2014), highlighting the clear need for such research. However, the 10 year UK mean Excess Winter Death (EWD) rate is 26,560 per year in the 65+ demographic (ONSCensus, 2018), of which only 10% occur in fuel poor homes (Wookey et al., 2014). Although the EWD figure is a small proportion of the number of 65+ year olds (0.5% of total 65+ population), it represents the most severe examples. There are believed to be many more older people suffering cold related morbidity, but the extent of this is not fully understood (Ansari and El-Silimy, 2008). In fact, EWDs tend to be more prevalent in affluent areas (Wookey et al., 2014), likely in large, old homes that are difficult to heat. Cold homes are estimated to be responsible for 30% of EWDs (Geddes, 2011), with research showing that occupiers of the coldest 25% of homes have a 20% higher risk of dying during the winter months, compared to those in warmer homes (Wilkinson et al., 2001). It is important, therefore, to recognise that a high income does not definitively result in a warm home.

Health implications of exposure to prolonged periods of cold are widely documented and are said to be most clearly apparent in older people (Donald, 2009).

Low temperatures are known to exacerbate cardiovascular and respiratory problems, the two leading causes of EWDs (Healy and Clinch, 2004; Kumar et al., 2016). Following a period of cold weather, Accident and Emergency (A&E) and GP visits increase dramatically (Elliot, 2008). For every degree that external temperature decreases below 5°C there can be as much as a 19% increase in the number of consultations held with older people suffering respiratory problems (Hajat et al., 2007). Concerningly, older people are most at risk of cold related morbidity and mortality due to a diminished metabolic and vasoconstrictive rate, caused by biological ageing (Day and Hitchings, 2011). This is often further complicated by the fact that older people are said to be less capable of recognising temperature changes and consequently less likely to make necessary changes to their environment to protect their health (Critchley et al., 2007; Wookey et al., 2014). At present cold home related morbidity and mortality in older people is estimated to cost the NHS in excess of £1.3 billion per year (i.e. around 1% of the total 2017–18 budget, (Burlinson et al., 2018)). As demands on the NHS increase (Christensen et al., 2009), it is imperative that people can live at home for as long as possible free from the threat of hospital admission through cold-related morbidity.

Furthermore, by 2050 it is predicted that over 25% of the UK population will be aged 65 and over (Wouters, 2017; Riley, 2005), most of whom will spend long, largely sedentary, periods in their homes (Havenith, 2001). It is estimated that septuagenarians spend 85% of their time at home, which rises to 95% for octogenarians (Hamza and Gilroy, 2011). The thermal efficiency of UK dwellings is known to be poor (Rudge and Gilchrist, 2005), and older people are said to be least likely to conduct regular home maintenance and install retrofit measures, which are known to improve efficiency (Hamza and Gilroy, 2011; Donald, 2009). Consequently, there are an increasing number of older people spending long periods of time in sub-optimally heated homes, raising concerns over their health

(O'Neill et al., 2006; Romero-Ortuno et al., 2013; Hamilton et al., 2017).

Minimum internal temperature recommendations have existed for over 30 years, with the key aim of maintaining occupant health. The WHO produced the basis for the recommendations, identifying that homes should be heated to a minimum of 18°C, with an elevated requirement for 20-21°C in homes occupied by older people (WHO, 1987). These recommendations have informed UK Government policy (Wookey et al., 2014) and Age UK guidance (AgeUK, 2018), albeit with the adaption of 20-21°C in the most used rooms only, not the entire house. It is unclear, however, how many older people achieve these internal temperatures and what older people do to achieve comfort in their homes.

2 Literature Review

Despite assumptions around the contributing factors, there is little evidence to show that EWDs increase with colder climate (R. de Vries, 2012), low socio-economic group, insecure tenure or low number of occupants (Wilkinson et al., 2004). It is also important to recognise that EWDs are the most severe example of cold related illness endemic in 65+ year olds in the UK. In fact, for every EWD there are estimated to be at least eight cold-related hospital admissions (Roche, 2010). It is clear that more older people than literature recognises are likely to be suffering in cold homes. The need for qualitative research highlighting people's actions to keep warm in cold weather has been identified in several studies (Jevons et al., 2016; Guy et al., 2015; Hernandez, 2016), especially the actions of older people (Miller et al., 2017; Healy and Clinch, 2002). To date there have been a small number of qualitative studies, summarised in Table 1. Although half of the studies do focus on older people, they are either on all female subjects (O'Neill et al., 2006), focus on fuel poverty (Wright, 2004; Chard and Walker, 2016; Day

and Hitchings, 2011), or investigate the impact of retrofit interventions (Devine-Wright et al., 2014). Given that it is suggested only 10% of EWDs occur in fuel poor homes (Wookey et al., 2014), there are likely many more older people suffering cold homes who do not classify as fuel poor, but this is not clearly understood (de Chavez et al., 2017).

Table 1: Summary of qualitative research on cold homes and fuel poverty.

Paper	Year	Location	Number of Participants	Demographic	Analytic Method	Key Findings
Wright (Wright, 2004)	Spring '03	England	64	60–90		Heating system was often old and ineffective, but no grants available for homeowners to modernise them. Cultures of living among the elderly contributes to their cold homes e.g. common practice to sleep in unheated bedrooms and keep the window open during winter.
O'Neill (O'Neill et al., 2006)	Winter '05–'06	North Wales	17	55+	Grounded Theory	Older women find it difficult to keep homes warm and frequently economise on food to heat homes.
Walker (Walker et al., 2014)	Nov-Dec '08	Sunderland, UK	26	All Ages	Grounded Theory	Critical for occupants to understand new technologies post-retrofit to ensure energy savings. Habit plays a significant part in occupant actions, eg. participants still used fireplaces despite retrofitting.
Day (Day and Hitchings, 2011)	Winter '08-09	Birmingham, UK	21	65+	Thematic Analysis	Current ideas of ageing are based on chronological ageing, constructing a stigmatised view that is not accurate for all older people and leads to them resisting advice. Older people recognise that their warmth preferences have changed as they aged, but they do not feel they are suffering.

Hitchings (Hitchings and Day, 2011)	Winter '08-'09	Birmingham, UK	70+	Participants rarely considered generational attitudes to warmth and did not identify with the image of an older person struggling in winter. Respondents had a limited understanding of what other older people do to stay warm in winter.
Anderson (Anderson et al., 2014)	Oct-Nov '09	Great Britain	All Ages	Participants who lacked finances to heat home used only one or two rooms. Pensioner households were more likely to ration heating than working age households. For lowest incomes retrofitting did not eliminate the risk of cold homes as any heating was difficult to fund. Personal resourcefulness and coping skills were very apparent to maintain quality of life.
Mould and Baker, 2017)		Scotland	All Ages	Fuel poverty metrics are said to be inadequate for reaching the most vulnerable.
Middlemiss and Gillard, 2015)	2010 and 2013	UK	20-69	Recognised six key challenges to fuel poor households: quality of dwelling fabric, tenancy relations, energy costs and supply, stability of households income, social relations and ill health. Recognise that respondents have limited ability to face the six key challenges.

Grounded Theory

Chard (Chard and Walker, 2016)	Winter '12-'13	England	17	55+	Grounded Theory	Participants did not feel vulnerable, viewing their ac- tions to keep warm as common sense. Question over what actions are acceptable to achieve comfort (eg. wearing outdoor clothes indoors).
Devine (Devine- Wright et al., 2014)		UK	104 in 31 different buildings	55+	Thematic Analysis	Cosiness and glow important for older people, they need to see and feel warmth manifest in multiple ways (eg. fireplace).
Grey (Grey et al., 2017)	March '14 and March '15	Wales	22	All Ages	Thematic Analysis	Risk factors (eg. inefficient homes and expensive fuel) contributed to poor physical and mental health, finan- cial stress, social isolation and the heat-or-eat dilemma.

Our review suggests that the main strategies for keeping warm among this demographic are:

- (i) including additional clothing (Chard and Walker, 2016; Day and Hitchings, 2011; Anderson et al., 2014)
- (ii) extra sources of heat (e.g. hot water bottles and blankets) (Day and Hitchings, 2011; Anderson et al., 2014)
- (iii) altering patterns of behaviour (e.g. staying in bed longer) (Day and Hitchings, 2011; Anderson et al., 2014)
- (iv) using secondary heating (Chard and Walker, 2016; Walker et al., 2014; Anderson et al., 2014), (worryingly in one instance use of the oven as the only heat source (Hernandez, 2016))
- (v) having hot drinks (Anderson et al., 2014) and
- (vi) exercising (Day and Hitchings, 2011; Anderson et al., 2014).

Fuel rationing was commonplace (Wright, 2004; Chard and Walker, 2016; Day and Hitchings, 2011; O’Neill et al., 2006; Anderson et al., 2014; Grey et al., 2017), especially in retired households (Anderson et al., 2014), where heating is often found to be limited to certain times and rooms. In extreme situations this results in living, eating and sleeping in the same room (Grey et al., 2017), or choosing between food and heating – the heat-or-eat dilemma (O’Neill et al., 2006; Anderson et al., 2014; Grey et al., 2017; Monroe et al., 2007).

The impact of cold homes on physical health is well documented (Donald, 2009; Healy and Clinch, 2004; Kumar et al., 2016; Webb et al., 2012), but the literature also highlights the negative impact cold homes can have on mental health. Said to be due to social isolation (Devine-Wright et al., 2014; Grey et al., 2017), lack of financial means, poor housing condition and the subsequent condensation, damp and mould that is common in cold homes (Grey et al., 2017).

Energy efficient retrofitting is one method used to improve the thermal performance of the building, reducing energy consumption and thus heating bills. Although such interventions are said to improve both physical and mental health (Anderson et al., 2014; Shortt and Rugkasa, 2007), through increases in internal temperatures (Oreszczyn, 2006), older people’s interaction with retrofitting is less well understood. Habits of older people are said to influence their expectations of thermal comfort (Walker et al., 2014), with studies finding that older people preferred visible heat sources (eg. fires) above invisible sources (eg. underfloor heating) (Devine-Wright et al., 2014).

There is a need for better understanding of older people’s experiences in their homes (Miller et al., 2017; Hayashi et al., 2017), especially in trying to stay warm and healthy (O’Neill et al., 2006; Harrington, 2005; Reid, 2015). Assumptions are often made that older people are attached to outdated methods of doing things (Wright, 2004; Harrington, 2005), are not always compliant with modern methods (Day and Hitchings, 2011) and try to cope or ‘make do’ with their current situation even when it is unsuitable (Chard and Walker, 2016).

There is a clear gap in research of how older people manage to stay warm and well in cold weather, if indeed they are managing, as well as whether the assumptions made about them are true, and if so, then why this is the case. It is crucial to document the experiences, opinions and patterns of behaviour of older people to better understand their situation and tailor policy and incentives to enable their health and independence. Hence, this paper addresses the following key research questions:

1. What strategies do older people implement to keep comfortable during cold periods?
2. If uncomfortable, what prevents them from being able to achieve comfort?

3 Methods

3.1 Study Context

This paper forms part of a wider longitudinal monitoring study focusing on the thermal conditions in the homes of 43 participants all aged 65 and over and living in Bath, UK. Between November 2016 and September 2018 four phases of data collection were undertaken (November 2016 - March 2017; June 2017 - September 2017; November 2017 - March 2018 and June 2018 - September 2018) to measure the internal temperatures of the 43 homes. There were two methods used in participant recruitment. A letterbox drop of 600 leaflets in the 12 wards of Bath recruited 25 participants and the remaining 18 were recruited through talks given to Age UK, St. John's Care in Bath, U3A and Transition Bath. Sensors were placed in the living room, bedroom and on the living room radiator and set to record the temperature at 90 minute intervals for the duration of each phase. Corresponding monthly questionnaires were sent throughout the phases of the project capturing demographic data, housing characteristics, heating practices, thermal comfort and health data.

The results of the temperature monitoring are reported extensively in another paper, but are briefly reported here for context. Figure 1 shows internal living room temperatures of each home, ranked by median temperature, for the two winters monitored in the study (November 2016 - March 2017 and November 2017- March 2018). The significant amount of information collected over the two year period provided an excellent context in which to conduct interviews in a subset of the coldest homes to explore in more detail how the participants dealt with the cold. All homes from the monitoring period between November 2016 and March 2017 whose average internal temperatures were below the WHO threshold of 18°C (WHO, 1987) (identified with a box in Figure 1) were considered for

interviews, to investigate what strategies they use to stay warm and what reasons there are, if any, that prevent them from attaining comfort.

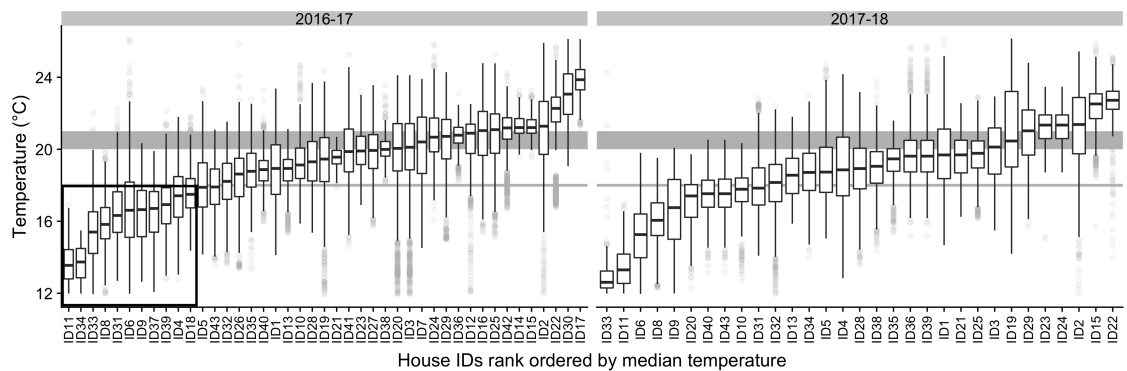


Figure 1: Ranked median internal living room temperatures for each house across the winters of 2016-17 and 2017-18. The grey band shows the WHO suggested minimum threshold internal temperatures for the elderly (20-21°C), and the grey line shows the minimum recommendation for all homes (18°C). Homes included in the black box (under 18 °C) in the 2016-17 graph were selected for interviews.

Of the 11 homes recording 18°C or lower, a total of seven were interviewed (two were omitted due to ill health and two due to unavailability at the time of the interviews). Table 2 shows the characteristics and heating practices of the participants.

Table 2: Participant characteristics and heating practices

Participant ‡	Age	Gender	Income	House Type [◊]	House Age (years)	Number of Chronic Illnesses	Central Heating Patterns *	Secondary Heating (Gas Fire)	Daily Hours at Home
Catherine	68	F	Low	SD	60	1	1A		16
Gladys	71	F	Low	SD	90	● 2	2A		20
Jennifer	74	F	Low	F	233	● 5	1B	Yes	20
Elizabeth	72	F	Medium	SD	40	● 2	1A		18
James	66	M	Medium	T	121	● 1	2B		16
Anne	82	F	Not Sure	SD	73	0	∅	Yes	22
Susan	74	F	Low	SD	57	● 1	2A	Yes	20

Notes:

All homes were owner occupied by a single occupant.

‡ names have been changed to ensure anonymity.

◊ SD = Semi-detached, T = Terrace, F = Flat

● Denotes participant has one or more of chronic arthritis, respiratory problem or circulatory problem.

∅ participant did not have central heating.

* 1A= heating is on once per day, between 4pm and 9pm; 1B = heating is on once per day between 9pm and 10pm;

2A = heating is on twice per day, between 7am and 10am then between 5pm and 7pm; 2B = heating is on twice per

day, between 7am and 1pm and 5pm until 10pm.

3.2 Internal temperatures and heating patterns in the selected homes

The temperature profiles of our selected homes are shown in Figure 2. Heating duration per day over the selected homes equalled on average 4.64 hours (SD=2.55), compared to an average of 8.29 hours over the entire participant sample of 43 homes (SD=4.51), showing that on average the coldest homes had the heating on for only about half the time of the non-coldest homes.

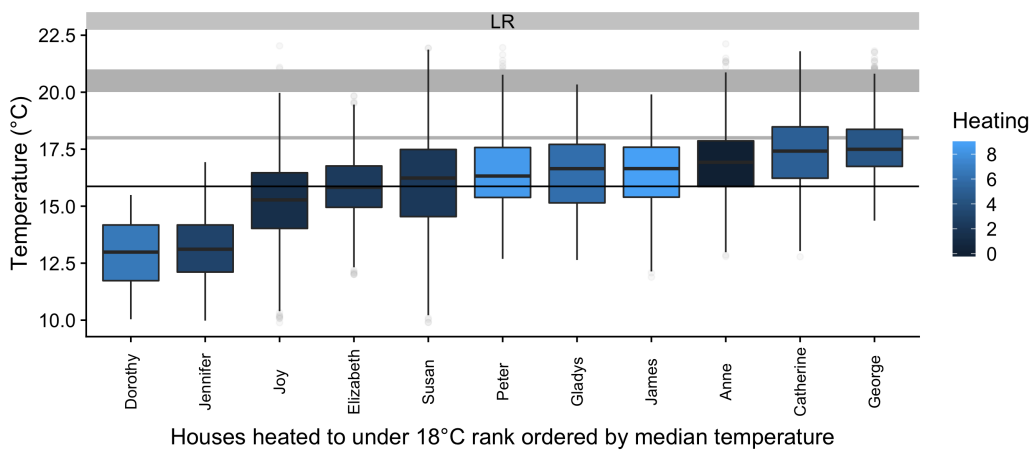


Figure 2: Ranked median living room (LR) temperatures for each house across the winter of 2016-17 evaluated between [0700, 2100). The grey band shows the WHO suggested minimum threshold internal temperatures for the elderly (20–21°C), the grey line shows the minimum recommendation for all homes (18°C), and the black line shows the mean internal temperature across all 11 homes (15.87°C). The colour scale shows the number of hours of heating per day.

Older people are said to need longer periods of heating, due to long periods spent at home (Kane et al., 2015), but this was, unsurprisingly, not observed in our sample of the coldest homes (Table 2 and Figure 2). Most participants had either one (non-continuous) or two heating patterns per day, in line with findings of other studies (Kane et al., 2015; Huebner et al., 2013). Although none of the interview participants interviewed met the WHO recommended temperatures, some self-reported as thermally comfortable, which raises an interesting question over the extent to which current guidance information is suitable. Similar to findings of

other studies (Critchley et al., 2007), an ethical dilemma arises that if healthy occupants are comfortable at low temperatures, should they be encouraged to increase it? Raising internal temperatures in the current climate, which is heavily focused on reducing space heating consumption could be paradoxical.

3.3 Method Selection

Most studies of a similar nature use either Thematic Analysis (Day and Hitchings, 2011; Devine-Wright et al., 2014; Grey et al., 2017) or Grounded Theory (Chard and Walker, 2016; O’Neill et al., 2006; Walker et al., 2014; Middlemiss and Gillard, 2015) to code and analyse data (see Table 1).

This method was chosen as it enables understanding of the participants perspective to be gathered, identifying themes and patterns about older people’s coping strategies and challenges in cold weather to emerge from the data. Grounded theory, although sometimes used in similar studies, was not chosen as it requires either the creation of a theory from the data, the representation of reality (Positivist Grounded Theory) or acknowledges that the researcher will shape the data and thus argues there is not one ‘accurate’ reading of the data (Braun and Clarke, 2012).

Using Thematic Analysis, our goal was to ascertain the ways in which older people managed to stay warm in winter and how their attitudes, opinions and everyday practices affected this. This was undertaken using semi-structured interviews, conducted in March 2018. This period, fortuitously, experienced unusually cold temperatures, with two spells of snow. By this point the author had been visiting the participants every three months for over 18 months, so had built good relationships and rapport with the participants which enabled potentially sensitive topics to be discussed in the interview (eg. health problems, income).

4 Thematic Analysis

All the participants for this paper live alone, mostly in semi-detached houses and on low incomes (see Table 2 for further information). Overall, the analysis of our sample resulted in four major themes: (i) thermal comfort and health (ii) strategies to deal with the cold (iii) energy provision and (iv) energy efficient refurbishment; each of which is presented below.

4.1 Thermal comfort and health

The widespread concern for older people in winter is a consequence of their physical ageing, which exacerbates vulnerability to the effects of the cold. In this study, most participants (88%) felt the cold more than when they were younger and had started to notice this in their late 50s and early 60s, which is concurrent with other studies of a similar nature (Day and Hitchings, 2011).

The interview started by asking whether the participants were comfortable with the internal temperature in their homes, to which all but one replied yes, although for half of those who said yes, there was a clear sense that they found it bearable but not ideal:

Catherine: Yes, I'm sure it could be better, but um, yes.

James: Not always, no. I seem to have a bit of a draught problem, so literally it depends on where the wind's blowing from.

Jennifer: I put up with it, I wouldn't say I'm comfortable, but I put up with it. I just think well if I'm cold I've got to do something about it to keep warm, it's no good if I moan to you or my friends, because they can't do anything about it.

Health is known to have an impact on EWDs, especially cardiovascular and res-

piratory problems. Table 2 shows that the participants had a range of chronic health problems. All participants recognised that low temperatures were potentially harmful to their health, reporting that the cold worsens health conditions:

James: This year from mid-December onwards, I've been almost clear of it [osteoarthritis] and I thought I've really got away with it this year, but I've now got quite nasty pain in the left leg, all the way up and down it.

Jennifer: My asthma is chronic, and I do feel that as I get older my lung function deteriorates and the cold does exacerbate it, but I manage.

Anne: I have got some arthritis, I've had injections in both knees now. It doesn't worry me too much, but I think if there's a change in temperature and it gets wet or cold then it can make a difference [to pain levels].

There is a clear stoicism attached to managing physical health, through participants claiming they cope. Persistent cold is also said to have a negative impact on mental health (Allmark and Tod, 2013), which was not overtly discussed, but did arise in two instances:

Catherine: 'I don't think I make myself miserable with the amount of heating I have.'

Jennifer: 'I do consciously sort of mind my own well being. But I do get fed up with wrapping myself in blankets because the one I have is a very long one and I often trip over it, I have to be so careful.'

4.2 Strategies to deal with the cold

Section 2 highlighted the coping strategies used by older people in cold weather. The five strategies found in this study correspond well with other studies, with four out of five strategies in this paper matching those in the literature review. Physical alterations made to the home to improve comfort has not previously been identified as a strategy.

4.2.1 Clothing

The literature showed that a frequently used strategy was to add clothing layers (Chard and Walker, 2016; Day and Hitchings, 2011). For the most part this is an acceptable adaptation to an environment, however, in certain cases this can include the routine wearing of outdoor clothing indoors (Anderson et al., 2014). In this study all participants added layers of clothing, in common with findings of other studies (Chard and Walker, 2016). A range of items were used, from simply either a scarf or slippers to regularly wearing four layers:

James: As far as I'm concerned I'm almost dressed for the outdoors.

Gladys: I don't take many chances!

Almost all participants reported that they would put on extra clothing rather than turning up the heating, for most this is due to cost consciousness, but habit also plays a significant part:

Susan: At my age I suppose I'm economical with everything and it's what I always used to do. We'd just put on more clothes, so I suppose I'm in the habit of it.

Anne: It's funny isn't it, I suppose I just think oh it's cold today, I'll put this on. Turning up the heating isn't something I would think of.

Whilst most studies of a similar nature also found that participants seemed accepting of adding layers (Chard and Walker, 2016), others found that although some older women did add layers for comfort, they were embarrassed to admit this, fearing they could seem old fashioned (Day and Hitchings, 2011). Interestingly, while additional clothing seemed acceptable for participants in this study, use of personal heat sources did seem to elicit feelings of age related stigma and embarrassment.

Elizabeth: I don't possess a hot water bottle or anything.

Anne: No I never use a hot water bottle or blankets downstairs or anything like that. I've never done that, no, no.

Whilst adding another layer or wearing slippers, and using blankets are widely considered acceptable alterations to one's indoor environment in pursuit of achieving comfort, this raises an ethical question over the point at which adaptive actions become unacceptable.

4.2.2 Movement

Within the literature conducting exercise or movement to stay warm was not particularly common, with only one of the studies reporting it (Anderson et al., 2014). This is likely because many older people have mobility issues and movement as a strategy is therefore neither practical nor suitable. In this study one of the participants regularly moved when she felt cold.

Jennifer: If I felt cold, I wouldn't put the heating on, I would just pick up the Hoover and start hoovering around or move furniture or dance.

Older age frequently impairs mobility, meaning this strategy is not suitable or safe for a vast number of older people. This highlights that some strategies used

might not be considered culturally acceptable and raises another ethical dilemma over what and when interventions should occur to ensure that the elderly do not feel the need to move furniture to stay warm.

4.2.3 Additional sources of heat

Use of sources of heat, such as gas fires or blankets and hot water bottles were commonly used strategies in the literature (Chard and Walker, 2016; Day and Hitchings, 2011; Anderson et al., 2014). In this study additional sources of heat were used, albeit infrequently. Three participants had supplementary gas fires that were rarely used:

Catherine: It's been on maybe twice this winter.

Blankets and hot water bottles were used regularly by two participants:

Jennifer: I've got a blanket and I tend to wrap myself up and I put a hot water bottle on my body and one on my feet and I put my feet up and then I can be comfortable for up to 4 hours.

4.2.4 Physical alterations to the home

Physical alterations to the home were not apparent as a coping strategy in the literature, but was used by one participant in this study. James' home is a draught prone Victorian terrace.

James: I have a screen there, that is to protect me... because I was getting a particularly nasty cold draught which was making my ear go numb.

James: I've had to tape up the bathroom window this winter, because when it was very cold and the cold wind was coming from the east, I

put my finger up to it and it was like there was an arctic gale blowing past.

This suggests energy saving measures such as draught proofing and insulation would positively impact the participants' thermal comfort.

4.2.5 Creating alternative routines.

Older people are known to adapt behaviours in their home to achieve thermal comfort, for example reconfiguring rooms or alternating between main rooms (Tweed et al., 2015; Grey et al., 2017). However, within this study only two participants altered their daily routine to account for the cold weather. For Jennifer these decisions were based on consuming the lowest amount of energy to reduce cost whereas James owns a difficult house to heat. Jennifer frequently stays in bed for long periods, after waking up she has a cup of tea and reads in bed:

Jennifer: I have occasionally dropped my teacup to make tea, because the kitchen is freezing and the heat against my hands means they don't work so well.

Although space heating was her primary concern, Jennifer also has strategies for heating water as infrequently as possible:

Jennifer: When I boil hot water I always put it in a thermos flask, so I can drink that without warming up the kettle again. Then with the hot water bottle from the night before, I use it to do the washing up.

Furthermore, as her house is especially cold to sit and read in:

Jennifer: Once a week I will go to the library and sit in there for 4 hours.

James finds that due to the age of his house it becomes difficult to make it any warmer and as a result spends time in the smallest bedroom when the weather is particularly cold.

James: I think the problem is that I don't think it's actually possible to raise the temperature in here much more, because of the age.

4.3 Energy Provision

Another prevalent theme running through six of the interviews was the cost associated with domestic energy and the difficulties in obtaining a fair deal, which has been recognised in other studies (Anderson et al., 2014). The discussion of energy providers elicited only negative feelings ranging from confusion to panic to anger. It was commonly known within the group that switching energy providers yearly enables the cheapest prices to be found, however, there was unanimous agreement that this was a struggle for the participants and energy companies do not provide suitable clarity;

Catherine: It's just so intricate, it's not easy to swap, it's like with insurance policies, when you think oh well is that included in that, so have I got a better deal or haven't I.

Gladys: I can't understand their bills and I can't understand how they're billing me, I'm completely confused, so I don't even try and understand it now.

There was a general feeling that being advised to conduct everything over the internet does not cater for older generations and puts them at a disadvantage which concerns them;

Susan: We feel a bit inferior, definitely. Definitely, we don't feel as secure as we were years ago.

This causes unnecessary worry for older people, who are at risk of being over-charged because of a lack of understanding about modern methods. This can increase feelings of powerlessness to change the situation and incite feelings of anger, panic and fear in relation to the knowledge that money could be saved if they felt confident in switching provider.

It was an overtly discussed theme that having to organise energy provision causes stress:

Susan: it's just a hassle to have to think "oh no, I've got to get on the phone again", and their systems change and you can't remember what to do and you just panic. I know lots of people my age, and they, if they were here now they'd be saying exactly the same, that it causes them more anguish getting on the phone every couple of years and getting the contract sorted and what have you, it causes more hassle [than staying with their current, more expensive, provider]. I make myself call them out of anger, not out of fear but anger, how dare you put us through this.

Thoughts of the anguish associated with energy provision provoked the discussion of the support networks for older people. Older people do not feel that suitable support is in place for them to address any queries.

Susan: We did have Age Concern here, but they've closed it, the information and the insurance and anything we need help with, they've closed it. We need a hub of people like that who we could key into without feeling embarrassed.

Catherine: I wish I had an advisor to come and do things for me and tell me "oh this is better" because to compare like for like is very difficult [when discussing different energy providers].

Susan: If you could get the Government to say that anyone over the age of 75 is going to be on the same electric tariff and the same gas, whoever they're with, that would be absolutely brilliant.

Given that affordable warmth is essential to maintain health (Burholt and Windle, 2006), especially in older people, enabling them to achieve this should be a policy priority.

4.4 Energy efficient refurbishment

It is frequently assumed that older people are unwilling or incapable of taking up modern technologies, due to a lack of understanding, disinterest, fear and associated cost (Critchley et al., 2007; Gibbons and Singler, 2008; Tartarini et al., 2017). Furthermore, older people are believed to be fixed in their attitudes (Day and Hitchings, 2011) and have different heating expectations stemming from childhood experiences (Gibbons and Singler, 2008; Devine-Wright et al., 2014) meaning they are not a focus of current retrofit schemes (Hitchings and Day, 2011). It has been recognised within literature that there is a lack of understanding about how older people interact with new technology (eg. a new boiler) (Devine-Wright et al., 2014), including how capable and willing they are of adapting to a new system. Retrofitting is likely to have a positive impact on thermal comfort and health (Hamilton et al., 2015; Hong et al., 2009), potentially resulting in the rebound effect meaning that predicted energy savings would not be realised. Although this is likely to have a negative impact on fuel consumption these losses should be balanced against the likelihood of reduced cold-related morbidity due to warmer homes which, in turn, may reduce costs overall healthcare costs for society.

Unlike other studies (Chard and Walker, 2016; Middlemiss and Gillard, 2015), 88.5% of participants in this study reported that they would be willing to incor-

porate retrofit measures or new technologies in their homes, but there were some barriers, including cost and the fear of lack of control.

Gladys: Yes, but not all these things in the house, I don't fancy getting my house all electronically managed. Like Hive and things like that, I saw an advert on TV where it organises everything, and I don't like that.

Catherine: I don't like the idea of, um, turning your things on from your mobile phone, I don't like that at all.

Interviewer: How come?

Catherine: I don't know, it's just anti-technology I suppose. Too much technology.

Others were theoretically happy to retrofit their homes, but recognised that the associated cost renders it unaffordable.

Jennifer: Well, for it you need the financial resources, which is something I don't have.

Others felt that at their age it was not worth it.

Susan: Well, I wouldn't now, not at my age.

Generally, most of the participants seemed more willing to retrofit than literature would suggest, but there are clear barriers of insufficient finances and perceived loss of control. However, their reticence is potentially surmountable with financial aid and dedicated education strategies, which could be incorporated into government policy. It is clear, however, that a re-education of older people is necessary as the idea of retrofitting was not something that the participants had considered, despite not being averse to it. Other comparable studies have found similar results (Chard and Walker, 2016), in that while the participants recognised they could make adjustments to their clothing and actions, the idea of making alterations

to their home was not readily apparent until overtly asked.

5 Discussion and Conclusion

There was a clear sense of stoicism in the participants, none felt their situation was unfair despite recognising that it could be better, accepting that they used common sense to alter their environment as best they could to achieve comfort, which is consistent with other studies (Day and Hitchings, 2011; Wolf et al., 2010). It is clear that older people's mentality and habits do have an impact on their thermal comfort, and in line with other studies there is a virtue associated with frugality that is perhaps not so readily prevalent in younger generations (Chard and Walker, 2016; Gibbons and Singler, 2008). This is not necessarily a positive, as it renders some older people in situations that are not good for their health and well-being, but there is no obvious way for them to rectify their situation.

It is clear that older people do struggle in cold homes and in certain instances have extreme methods of ensuring they can achieve a bearable temperature. Given the ageing population there is likely to be an increasing number of older people needing support in ensuring they can achieve a fair deal for fuel and access necessary benefits. Finding energy providers was unanimously disliked and feared with calls for a specific over 75-year-old tariff made, which participants felt would be hugely beneficial to the welfare of older people.

Furthermore, better targeting of financial aid and benefits could alleviate some suffering. Although certain aids are in place, such as the Winter Fuel Payment, it is known that up to 80% of this is wasted on homes that do not struggle to afford sufficient heating (Boardman, 2010). Readdressing this imbalance to ensure those most in need of financial aid are met with enough assistance to achieve adequate heating is hugely important.

This study has shown that older people are not as opposed to energy efficiency measures as literature suggests (Critchley et al., 2007). Therefore, another possibility could be retrofit schemes that exclusively focus on older people, as improving the condition of older people’s homes would reduce the numbers struggling to afford heat.

There are clear methods that could be adopted which would assist in enabling more older people to achieve comfort in winter, protecting their health, well-being and independence. With an ageing population it is crucial that these methods are acted on.

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