Anthropology & Aging
Journal of the Association for Anthropology & Gerontology

Designing Products for Older People's Social and Emotional Needs: A Case Study

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Abstract

The products that we use in our living environment greatly assist us in maintaining health and independence as we age. Much research has been conducted on the physical ergonomic needs in product design for older people, overlooking an understanding of the 'softer' functionality that domestic products offer. Through an ethnographic case study of older peoples' cooking and heating product needs (N=40), this paper presents 1) a theoretical framework which supports the need for designers to consider social and emotional connections when designing domestic products for older people and 2) practical implications and requirements for future designers to consider when designing these products. In this paper, I encourage designers to consider the reflective and visceral connections domestic products hold and how products can both inhibit and increase social inclusion.

Keywords: *Product Design; Older People; Domestic Products, Emotional Design; Social Design; Design Ethnography; Aging*

Anthropology & Aging, Vol 43, No 2 (2022), pp. 24-39

ISSN 2374-2267(online) DOI 10.5195/aa.2022.364

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Introduction

The environment in which we age is central to living an independent, productive, meaningful, and healthy life (Davern *et al.* 2020). The products and, more precisely, domestic products that we use to achieve tasks in our living environment e.g., cooking/kitchen tasks, can assist us in maintaining these circumstances (Soar, Yu, and Al-Hakim 2020). Much research has been conducted on the physical ergonomic needs in product design for older people, overlooking the 'softer' functionality that domestic products offer. The emerging field of socio-gerontechnology has highlighted that social and emotional needs should be understood in future technology and the design of products, services, and environments for older people (Bischof and Jarke 2021; Marston, Shore, and White 2020; Marston and van Hoof 2019; White *et al*. 2020). Acknowledged is that products that are designed to improve social well-being are more likely to improve health and well-being and quality of life (Schulz *et al*. 2014).

Omnipresent in our daily lives, domestic products embody important emotional connections and can assist us with social aspects of our lives as we age (White 2012, 2018). Cooking and heating products are an example of domestic products that possess emotive qualities far beyond their primary functionality. Holding many latent emotive connections, their presence in the home provides spaces of comfort and social interaction, offering a sense of home and familiarity, and greatly enhancing emotional well-being (White 2012). This paper presents a theoretical framework that supports the need for designers to consider social and emotional well-being when designing future domestic products. It also presents practical implications and requirements for future domestic designs for older people.

The Case Study

This paper draws from ethnographic fieldwork conducted over 12 months within the homes of 40 older adult participants (aged 65-93) across various socio-economic groups in Ireland. Fieldwork was conducted by the author within the domestic environment, seeking to understand how older people used domestic products, specifically cooking and heating products. The research sought to broadly identify issues (ergonomic and otherwise) older people encountered with these products, the results of which would be used for consideration in future design and redesign. This form of user enquiry is encouraged by researchers in occupational therapy, Brenda Vrkljan *et al*. (2019), who state that by proactively involving users early in the design process, potential barriers can be identified and addressed early.

Regarding the products researched in this study, cooking and heating products come in many formats, shapes, and sizes within the domestic environment of Irish homes. These can range from microwaves, stoves, hobs, and cookers to fireplaces, central heating appliances and space heaters. All were considered and observed during this study.

Participant Sample Strategy

Since older adults are not a homogeneous cohort, a diversity of participants was required in the study to gain a representative sample. In deciding on a participant sample strategy, I chose to sample older people living in Ireland but not necessarily of Irish nationality. Due to the nature of the research (insight into heating and cooking products), further sample framing was necessary. This included dividing the study equally by gender and distributing the interview sample over a period of time. This was of interest especially in gauging the use of heating products throughout different seasons. To accommodate this, the research was conducted over the span of 12 months, from January to December. Access was gained by contacting gatekeepers of older person communities and through full participant consent (White 2013a).

Prior to fieldwork, two aspects of the sample were undecided 1) Should the sample include varying socio-economic classes? 2) Should the sample be divided equally over an urban and rural geographical spread? These decisions were made in the field as interviewing progressed, to obtain a balanced study. Prior to fieldwork, however, I decided that different forms of domestic settings would be investigated, e.g., houses, (terraced, bungalow etc.), apartments, care-home settings, and retirement homes. Deciding on a diverse range of settings enables the viewing of comparative and contrasting product usability.

To start the process, purposive sampling was used to identify and select representative information-rich cases (Palinkas *et al.* 2015; Patton 2002). However, it was also important that purposive sampling did not limit the study in any way. The framing selection needed to be sufficiently broad to facilitate the development of emerging theories, allowing for appropriate movement between participants as the study progressed. Therefore, it was determined that further construction of the sample would be decided and shaped by developing theories within the field. For this, I planned to construct approximately six interviews purposefully and decide on future participants afterwards. Methods of sample construction were utilised both before and during the research, allowing the freedom to explore and enquire as my fieldwork progressed.

The 40 participants consisted of 15 males, 15 females, and 5 male/female married and cohabitating couples (all self-identified). Each participant was over the age of 65 years, had a variety of health conditions, and belonged to different socio-economic groups. Both older adult (+65) N=26 (17 female and 9 male) and older-old adults (+85) N=14 (three female and 11 male) cohorts were included in the study, all with varying levels of independence. Participants were from a geographical spread of eight counties in Ireland, both rural (consisting of three female, six male individuals, and one female/male married couple) and urban settings (consisting of 12 female, 9 male individuals, and 4 female/male married or cohabitating couples).

These participants lived in a variety of housing types, ranging from private and government housing to apartments and assisted living environments. Nine participants had moved or downsized (to assisted living or gated communities) within the previous 10 years.

The ethnographic data-collection methods were informal conversational interviews, participant and artefact observation, and participatory techniques (White 2012, 2013b, 2018; White and Devitt 2011). Rather than as a structured protocol for fieldwork, the three data-collection methods were introduced when I decided they were appropriate and necessary. Each interview lasted between one and four hours. To immerse myself fully and to get the most value from each site visit, the objective to was to remain in the field for as long a duration as possible.

Data from ethnographic fieldwork was collected via audio recordings and digital photography. This data was analysed post-fieldwork through a grounded theory approach. Data was iteratively coded in various stages; first, through manual open coding to reduce and clean the data, then selective coding to identify themes in the data (White and Devitt 2021).

To ensure rigour and validity in the analysis, peer-debrief sessions were conducted (Creswell and Creswell 2018). Each session included a facilitator (the researcher) and one participant (interpreter/reviewer). Short memos were documented by both facilitator and participant on a single Post-it note and placed beside the coded themes (see Image 1 below).

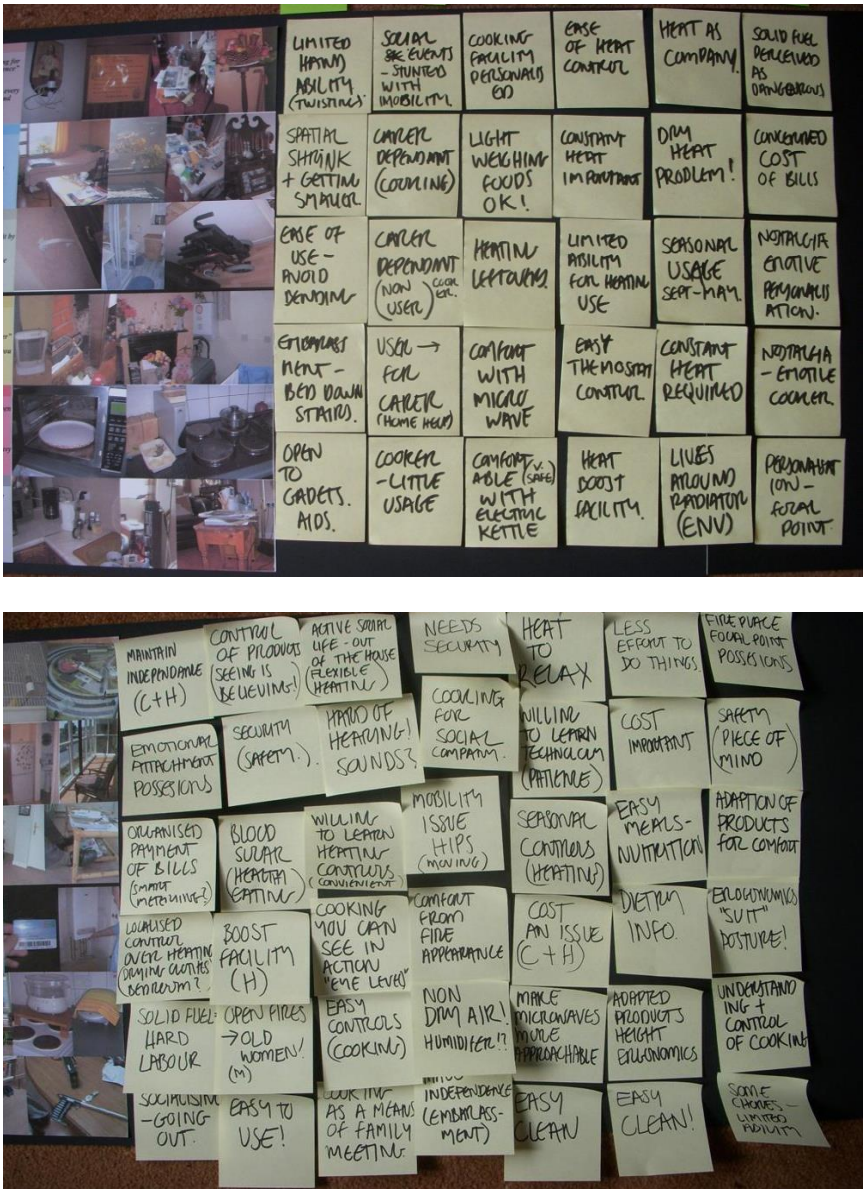

Image 1. An example of 'in progress' images from the peer-debrief sessions. Courtesy: Author

Following the analysis, themes and insights were accumulated for consideration in the future redesign of domestic products for older people. The main themes included usability, ergonomics, cost and safety of use, and social and emotional well-being derived from products. The theme of 'health benefits' was discovered amongst all of the above. In this article, I focus on the findings of the social and emotional well-being themes.

Emotional Well-being

I drew upon design researcher Don Norman's (2004) levels of emotional state in product characteristics to classify my observations of emotional well-being in the field. These are cited as visceral, reflective, and behavioural connections. From a purely emotive stance, the visceral and reflective levels were continually apparent. Therefore, this paper focuses on these two levels. Rather than isolated entities, visceral and reflective levels were intrinsically linked. The 'behavioural level' was also ubiquitously present but was seen more in product functionality. In the sections below, I outline how these levels emerged during the research.

According to designer Andreas Komninos (2020), Norman's visceral emotive level concerns itself with appearances and refers to the perceptible qualities of the object and how they make the user/observer feel. In product design, Norman (2004) claims that visceral level or "wired in" emotive responses relate mainly to the aesthetic values of products. However, in my research, I found that visceral level responses from product aesthetics also appeared to heighten the illusion of functionality, e.g., physical comfort. This was strongest in heating products, with visual aesthetics enhancing the sense of warmth and increasing the physical comfort level in homes. Many older people preferred the 'open fire aesthetic', having a traditional open fireside visual light or 'a glow' emanating in a room providing a sense of heightened comfort. Even when heat emission was not active by heating products, this aesthetic provided older people with the comfort to relax and offered them a sense of familiarity and companionship. An 'open fire aesthetic' also encourages older people to engage in more activities such as hobbies within environments, providing an active and 'lively' focal point in the home. The fireplace provides companionship within the home by offering older people a comforting unimposing presence; both when they are on their own or in the company of guests. In this regard, one participant noted: "I generally don't use the electric fire, but I do like turning on the glow effect; it makes the room feel comfortable and warm."

In terms of visceral emotive levels, the importance of humanistic qualities in cooking and heating products was noted in the fieldwork. While co-existing with products in the home over many years, some people may describe cooking and heating products anthropomorphically and assign them with attributes of human behaviour. Anthropomorphism is a large part of visceral emotive connections, particularly in heating products. Some of the older people referred to them by personal 'nicknames' and described them with humanistic metaphors such as "waking up the house" and "…it's the heart of the home." Both cooking and heating products may also represent visceral emotional experiences for older people through family stories, shared occurrences, and significant moments from the past. The products heighten these experiences by being a sensory trigger for smells, sights, and sounds (i.e., traditional cooking, baking, and open fires). These are all positive familiar touch points of ritual domesticity.

Reflective Emotive Connections

Norman (2004) suggests that people have reflective emotive connections with products in many ways such as through personal satisfaction in use and how products can evoke memories and meaning in the user. In this definition, 'meaning' within products deals with self-image and how the product 'reflects back' on the user. Reflective emotive connections from the products that older people use are complex and intertwined with visceral level connections through product aesthetics. There are two main forms of reflective connections in cooking and heating products. From an aesthetic viewpoint, products are used as cues to remember the past and look toward the future. From a functionality viewpoint, products are used as reminiscent and personalisation focal points in the home.

In the older people's homes I visited, traditional and contemporary product aesthetic styles coexisted. My informants explained that they did not want to feel stigmatised by 'old-style products,' and they openly embraced modern and contemporary product aesthetics within the home. However, a clear ambiguity or tension exists between their desire for traditional aesthetics, reflecting nostalgic tones and those they grew up with, and contemporary aesthetics, reflecting convenience and modernity. This ambiguity existed as a desire to have cues both to the past and future within material objects displayed in the home. In my observations of their domestic artefacts, modern technology with contemporary styling (e.g., laptops, tablets, and smartphones) showed visual outward statements of intent, possibilities for the future, self-sufficiency, and independence. Contrasted with these were traditionally styled products (some with redundant functionality). Many of the older people used these specifically and explicitly as cues for nostalgia, sentimentality, and memories of positive life experiences. The phenomenon of reflective emotive connections and aesthetics is seen further in product functionality. As a secondary function, cooking and heating products are some of the main visual focal points in the home. Fireplaces, stoves, cookers, and microwaves (see Image 2) provide affordance for displaying material possessions.

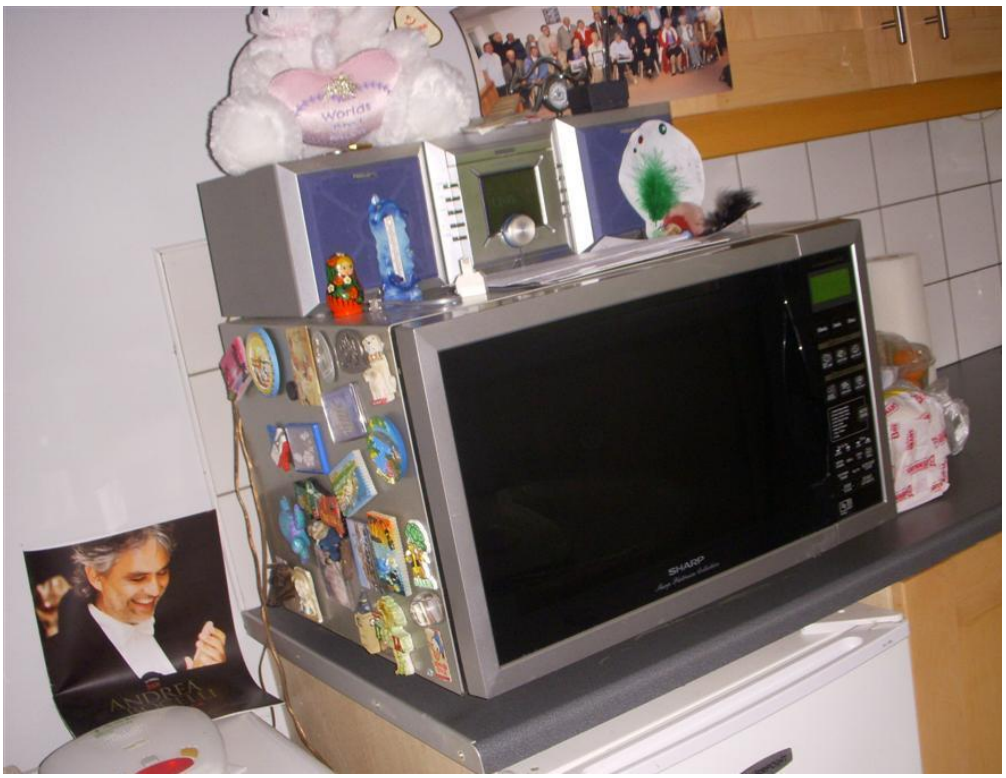

Image 2. A participant uses their microwave as a display focal point for memories and mementos. Courtesy: Author

These products act as congregation points for important and sentimental material goods such as photographs, awards, mementos, religious artefacts, and many others. Within this functionality, there were strong connections between older adults and emotive, nostalgic, and narrative values in the displayed material items. A typical example of this is shown in Image 3. In this instance, a participant's fireplace has been made redundant of its heating functionality; however, it is now used for its emotive qualities, displaying the older adult's important personal possessions. The participant explained: "My fireplace is blocked up, but I like to keep all my stuff there."

Image 3. An unused fireplace becomes a "reminiscent focal point" for one research participant's important material possessions. Courtesy: Author

This gathering of important items for display assumes a highly emotive function for some older adults, suggesting that these are "reminiscent focal points" (White and Devitt 2011) in the home. Developing these emotive functions in products further is of topical interest. Recent research on dementia indicates that the positive effects of reminiscence and remembered experiences may improve the quality of life, cognition, and communication of older people (Woods *et al*. 2018). This is particularly positive for but is not restricted to, older people living with dementia. In future design development, Human-Computer Interaction researchers Amanda Lazar, Hilaire Thompson, and George Demiris, demonstrate the benefits of developing information and communications technology-supported Reminiscence Therapy for older people (2014). Reminiscence therapy can involve a range of activities to create positive memory triggers, from music interventions and memory-box activities to life storybooks (Macleod *et al.* 2020).

As I found, the display of material items on and in the proximity of cooking and heating products provides further affordance for personalisation. Designing future products with elements of personalisation could promote positive mental health in older adults through acts of reminiscence and may also add to their comfort and familiarity within the domestic environment. In my research, acts of personalisation were seen as distinctly important during transitional periods in later life.

The concept of personalisation provides an older person with a more familiar and comfortable environment in times of radical transition. Moving home in later life is a major event on multiple levels. This event is particularly emotionally distressing if a spouse has recently passed away or if one is moving out of a home that contains lifelong memories. As in many cases with moving in later life, one is often downsizing to a smaller dwelling. Therefore, only essential items generally accompany this change of life. The fundamental products older adults have in this transition, and the ability to personalise these may be essential to their emotional well-being.

Social Well-being

Social inclusion is a basic need for all humans. Built environments and living spaces have a bearing on loneliness and social inclusion (Lyu and Forsyth 2021). From my research, domestic products play a wide and complex role in older people's sense of social inclusion. I observed in the field that an older adult's ability or inability to use these products seemed to affect their levels of inclusion. Both positive and negative social experiences are derived from the inability to use products and poorly designed usability features. This leads to sometimes more, and at times, less social interaction. In terms of more social interaction, I observed that heating products, for example, provided focal points for social activity, assuming ideal natural gathering points for social interaction, (Image 4) places where memories, stories, and events can be contained, recalled, and shared.

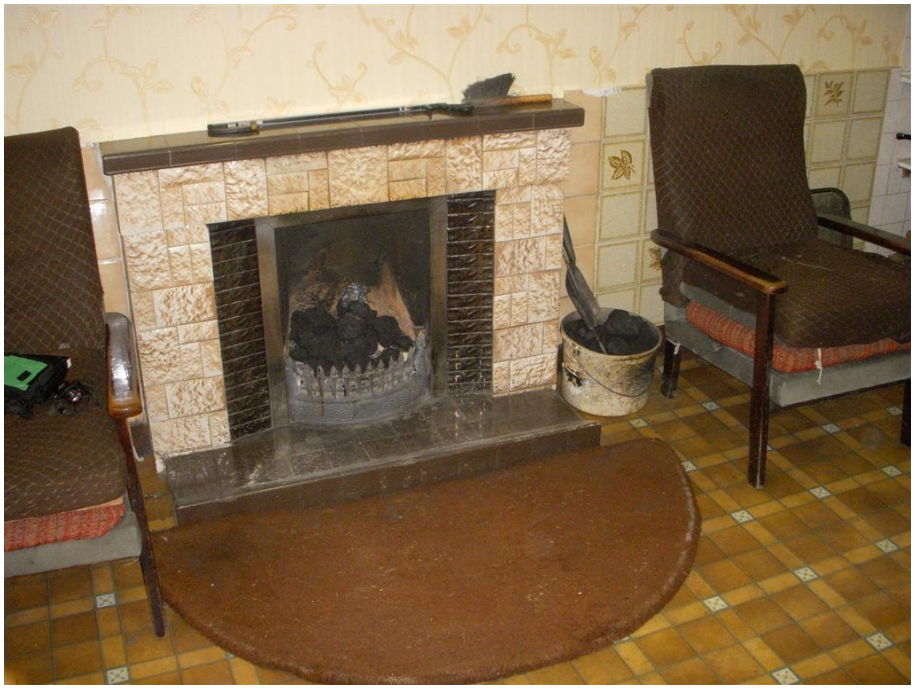

Image 4. A fireplace with seating close by, a gathering point for social interaction. Courtesy: Author

The emotional well-being connections discussed previously have a direct correlation with social connections involved in cooking and heating products. This correlation may stem from social interactions involving these products, their users, and others. Heat and heating of the home influence social interaction (Basham, Shaw, and Barton 2007), my research showed that heating products create both social and emotional hotspots in the domestic environment. The previously discussed reflective emotive act of reminiscence seems to create an important individual/personal experience and shared/social experience. When older people are on their own, reminiscence may be a positive, reflective, and comforting experience for the individual. When shared with others, it often evolves into a rich social experience through sharing conversations, stories, and memories. This sharing, in many cases that I observed, becomes part of a daily and weekly routine that further increases social integration.

Participants in this study viewed domestic-product usability as a balance between independence and social interaction, and new products created should allow for this balance. Specific examples were seen both in cooking and heating products and, most notably, the usability of controls in these products.

Strong social bonds may be created by using peripheral control products such as thermostats and temperature switches. In one respect, the use of controls (e.g., thermostats) is necessary for independence in the home. However, family, friend, or carer interaction and involvement in the operation of these provide both social contact and peace of mind for everyone involved. These controls also provide a sense of security and safety for users, families, and carers. In some situations, an older person's inability to operate these controls is their only opportunity for social contact; typically, through the intervention and assistance of a family member. One example of this was when a participant was discussing their thermostat: "I don't understand how to use it, so I just leave it on" but mentioned they welcomed the social interaction when a family member came to visit to help them operate the thermostat, setting it up for the week ahead.

From my research, dining and eating with family and friends provide one of the most effective means of social inclusion for older people. Many older people rely on this as a daily or weekly source of interaction. Whether it is visiting friends, neighbours or family, having daily meals in a communal space, or being visited in their own home, dining in company provides an essential routine and strengthens the sense of self and independence. Thus, an inability to cook or provide meals can have negative effects on health (Plastow, Atwal, and Gilhooly 2015). From my research, this is seen to not only lead to nutritional issues but also associates itself with older people being socially excluded. Image 5, for example, illustrates the unused dining space of a female research participant who, after a series of falls, had sustained injuries to her wrists and could not cook to her desired standards anymore. Prior to this, her main social outlet was to entertain friends at dinner parties with her talent for cooking. She has had fewer visitors to her home since her falls and her inability to cook and stated: "I miss hosting my dinner parties; after my falls, I can't cook well."

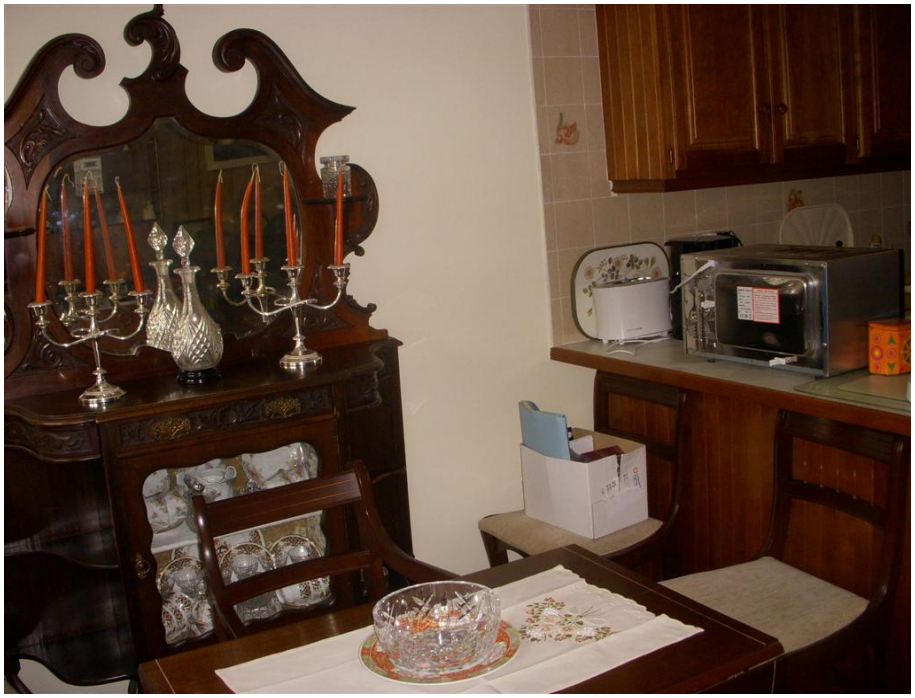

Image 5. This image shows an example of unused dining space. A research participant feels socially isolated following several falls at home. Her dinner parties were her only social outlet, and these have ceased due to her inability to cook. Courtesy: Author

The act of cooking is more than the provision of personal daily nutrition. Cooking is an outward gesture of ability, a statement of independence and self-sufficiency, all of which enhances social involvement and sense of purpose (Fitzsimmons and Buettner 2003). My research found that for older Irish men and women, the ability to cook for themselves is a strong source of pride, and a statement of self-confidence and independence. Pride is enhanced when offered a platform to demonstrate ability rather than disability to their peers, friends, and family. My research indicates that cooking products should and can be designed to enhance a demonstration of ability rather than disability in the older person.

The research from this case study suggests that the social role of these products becomes more complex when associated with emotional, health, financial, and mobility themes. These products, whether heating sources or cooking appliances are essential domestic social touchpoints, fostering positive social inclusion in older people.

Financial Costs

Financial costs of energy and the usage of daily household energy was an omnipresent topic throughout this study, and this is even before the current energy crisis in Europe. This occurred across all of the participants, whether they were financially comfortable or struggling daily with financial issues. In Ireland, there are many energy price discounts available for older people together with manageable payment plans; however, many of the research participants noted that these still fall short of relieving a pervading and underlying fear of energy costs and usage. Cooking and heating products and appliances are central to this fear of increased energy usage in the home. Older adults in the study also suggested that cost factors may have a direct effect on their sense of social inclusion, which I discuss below. This is further heightened when linked with mobility issues, which diminishes pride and, more importantly, can be damaging to both physical and mental health.

Due to Ireland's generally mild and cool climate with inclement weather year-round, high energy costs remained constant for older people in my study. As Irish people get older, they are also more likely to live alone, which may affect their ability to maintain and manage their accommodation (Orr *et al.* 2016). Throughout the research, cooking and heating products were essential in making the domestic environment more comfortable and healthier for older adults to live in for extended periods.

One of these comforts was 'thermal comfort' provided by heating products, with the appropriate level of this critical in the home. The Combat Poverty Agency (2008) claims that this is essential in supporting health and human activity in the home with the appropriate temperature being between 16 and 21 degrees Celsius. In the field, I noted that when internal temperatures were reduced and thermal comfort was neglected, it was extremely problematic for both older adults' health and social inclusion. The main catalyst for reductions in thermal comfort was the issue of high energy costs. This reflected findings by researchers Kathy Walsh and Brian Harvey indicating that fuel and heat costs are the greatest financial point of pressure for older Irish people (2011). I continually observed instances of research participants dipping in and out of suspected 'fuel poverty.' Fuel poverty, although complicated to measure, is cited as involving a mix of energy efficiency, household incomes, and fuel costs (Grey *et al.* 2017a; McAvoy 2007). Traditionally, the issue of fuel poverty is prevalent across all age groups; however, older people, due to factors discussed previously, are often the most susceptible to its hardships (Walsh and Harvey 2011). It was noted in my research that as a result of fuel poverty, a proportion of participants live in a smaller area of their dwelling, usually in the corner of a ground floor room centred in proximity to a localised heat source such as a radiator. In many cases, the remaining house is left unused, prone to disrepair due to lack of use, and open to health hazards through dampness and deterioration over time. This phenomenon in living environments has been described as "spatial shrink" (Grey *et al.* 2017b). This

is a growing concern among people experiencing impoverished conditions or susceptible to fuel poverty. Spatial shrink is not just isolated to impoverished cases; I also observed this in the field among older people with mobility issues, particularly among participants with both financial and mobility issues. Image 6 illustrates how a research participant's entire home shrunk to the size of her living room due to economic and mobility issues. The remaining home remains unheated, leaving it exposed to dampness and deterioration. The participant stated: "I never go upstairs anymore because the stairs are too steep, and it costs too much to heat the whole house."

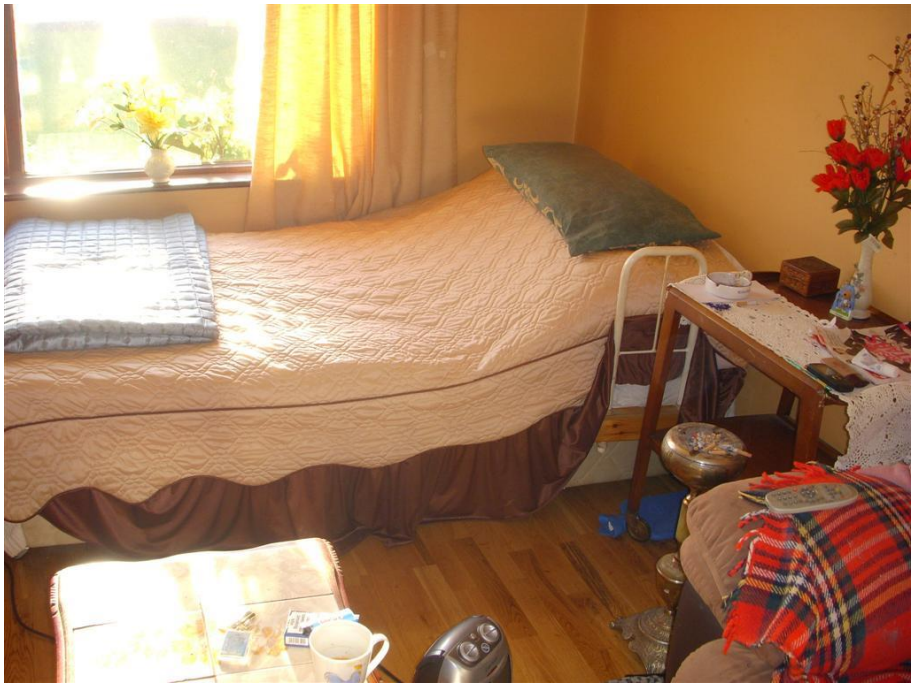

Image 6. Spatial shrink due to economic and mobility issues. Courtesy: Author

The energy efficiency and quality of homes and products are a large contributing factor to high energy costs and spatial shrink (Grey *et al*. 2017a, 2017b). It is not just older dwellings and poorer participants that are susceptible to this; I interviewed financially stable people who also require more energy-efficient means of heating their homes. In many instances, homes were relatively new buildings, however large in scale. In these cases, I observed that spatial shrink was evident as a result of mobility issues. To achieve more energy efficiency, some older people attempted extreme intervening actions and modifications to their homes and products. For example, one participant who covered his fireplace said, "I put my best blanket on the fire because of the cold that comes down the chimney; I don't light it 'cos the heat goes straight out the chimney" (see Image 7). In terms of product selection and purchase, some older people in my study associated energy-efficient use with using smaller scale appliances such as small tabletop ovens.

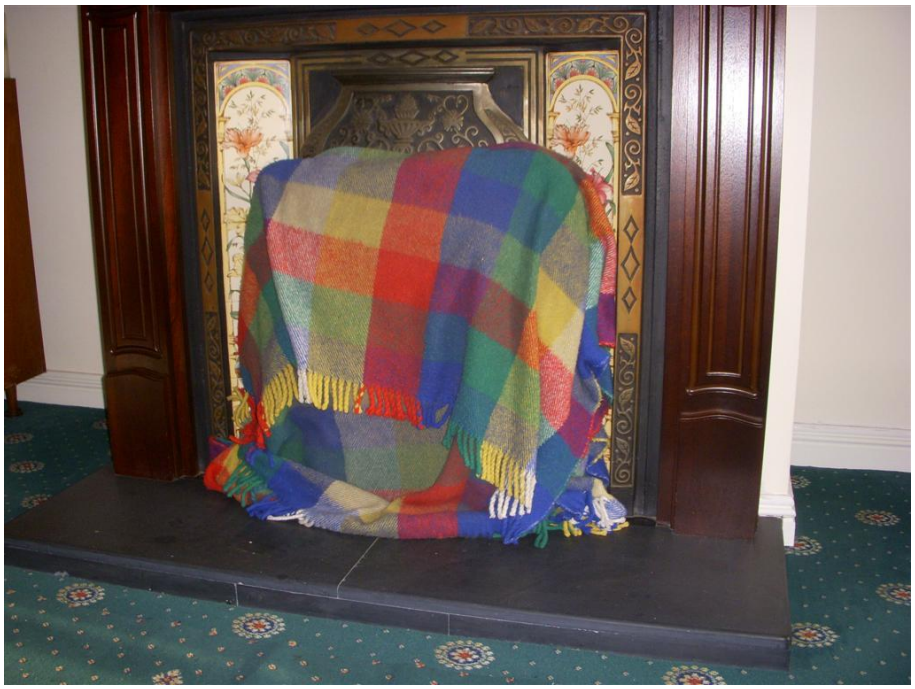

Image 7. A research participant managed the issue of heat efficiency in their living room by covering the fireplace. Courtesy: Author

In cases of spatial shrink, it is not just the occupant's physical home that is affected; people's self-confidence and pride may also suffer. My research with older Irish people suggests that pride is an ever-present factor concerning household appearance; this pride is seriously diminished when they have to rearrange their living environment due to spatial shrink. This was particularly ubiquitous when older people were restricted to the downstairs floor of their homes solely due to mobility issues. A common occurrence was moving a bed downstairs to the ground floor (as in Image 6). Participants told me that they felt a deep embarrassment in using their living room or kitchen as a sleeping area due to mobility or cost issues. Albeit practical, having a private personal space such as a bed in full view of visiting guests may portray personal or physical weakness. Many of my participants said they were less willing to have guests in their homes because of this. Being confined to limited rooms of the home also resulted in exposing parts and objects of the home they would rather not, such as mobility aids, which could visually communicate and heighten their sense of vulnerability.

Implications and Requirements for Future Design

Post fieldwork, a list of design requirements and features was drawn up for early-stage design conceptualisation, which is shown in Table 1. To draw up this list of requirements, it was important to achieve a balance of explicit and implicit meaning. Moreover, it was essential to have a set of defined design requirements without diluting the 'voice' of the end-user. Reinforcing this point, designers Karl Ulrich, Steven Eppinger, and Maria Yang, state that design requirements should be expressed as the language of the end user (2019). Table 1 shows the social and emotional requirements list under their assigned 'requirement or feature,' and the product category that the requirement falls under, either cooking or heating. The final list of requirements was ambiguous in meaning, which was done intentionally to allow for creative movement at the conceptualisation stage. However ambiguous, the table was a firm advancement in defining what these products should physically embody.

This list of requirements was used as the basis to create early design ideas through sketch conceptualisation. Figure 1. shows an example of one idea that was generated through this conceptualisation.

		Space Heating	Fireplace/Stove	Cooker Oven	Cooker Hob
Social	**Requirement/ Feature**				
	Localised heat for warm gathering points in the home	•	•		
	Promotion of meals for social interaction			•	•
	Products/features that enhance the ability of the user	•	•	•	•
	Family/Carer shared controls	•	•	•	•
Emotive	**Requirement/ Feature**				
	Display area to show personal or nostalgic items (reminiscence)		•		•
	Personalisation of heating products	•	•		
	Warm aesthetic (e.g. traditional open fire)	•	•		
	Products/features that provide comfort in familiarity	•	•	•	•
	Areas of cooking products that one could personalise				•
	Contemporary aesthetic	•	•	•	•
	Traditional nostalgic aesthetic	•	•	•	•
	Nostalgia in cooking and baking			•	•

Table 1: Design requirements and features list

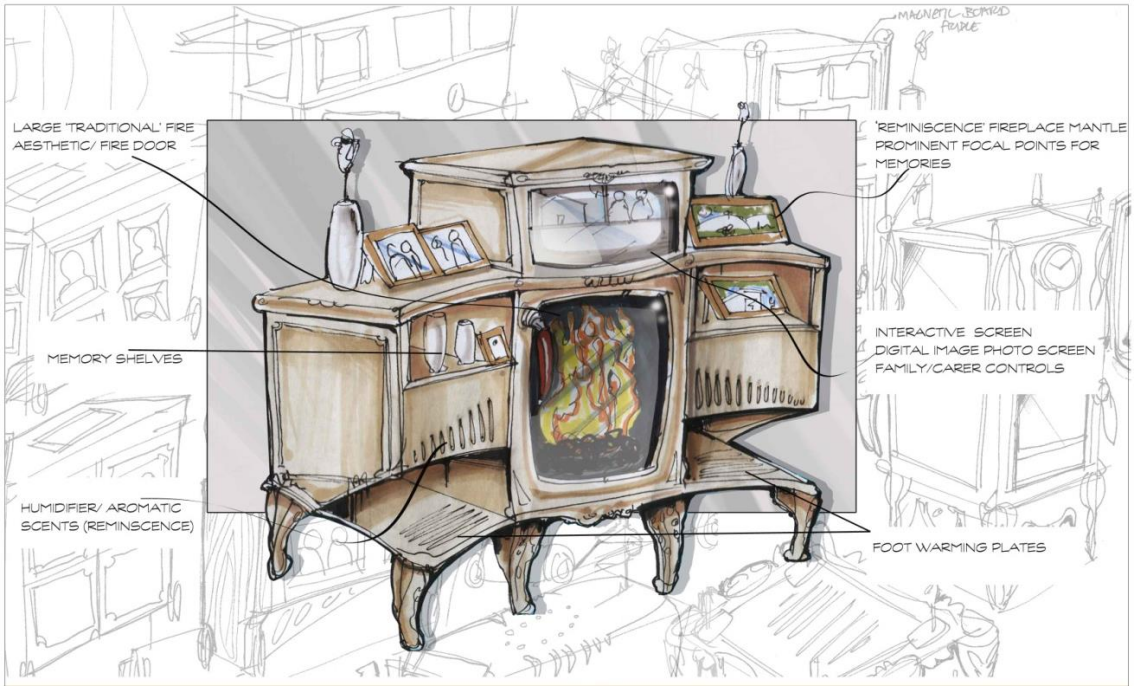

Figure 1. Example of an early-stage sketch conceptualisation idea 'the Social and Emotional fireplace.' Sketch created by author

Conclusions

Domestic products should provide for basic health needs, thereby enhancing well-being and improving older adults' quality of life. When considering health needs, designers of domestic products should understand and enhance the 'softer' functionality that these products offer to help meet social and emotional needs. Concerning emotional well-being, this paper encourages designers to consider reflective and visceral emotive connections. This means that, from an aesthetics viewpoint, designers should consider how products can be used as cues to both the past and the future. From a functionality viewpoint, they should consider how products could be designed as reminiscent focal points in the home. Future products should be designed with elements of personalisation that can promote positive mental health through acts of reminiscence and add to an older person's sense of comfort and familiarity within the domestic environment.

From a social perspective, this research has shown that both positive and negative social experiences are derived from the inability to use products and poorly designed usability features (e.g., social exclusion from the inability to cook or poor thermostat design). The use of domestic products is an outward gesture of ability, a statement of independence and self-sufficiency, all of which enhance social involvement and maintain pride and individual well-being. Participants in this study viewed domestic-product usability as a balance between independence and social interaction, and new products created should allow for this balance. My research also found that economic factors may have a direct effect on an older person's sense of social inclusion. This is heightened further when linked with mobility issues, diminishing pride, and negative effects on physical and mental health. This research has highlighted that social and emotional needs should be understood deeper in the future design of products, services, and environments for older people and central to future studies within the field of socio-gerontechnology.

Acknowledgements

This work was supported by the Maynooth University John & Pat Hume Doctoral Scholarship Award. The author declares that they have no conflict of interest. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institution. Consent was obtained from all individual participants included in the study.

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