Age friendly kitchens: a study based on social history and ergonomics

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A study of the age-friendliness of kitchens

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Abstract
The kitchen is an important space in the home serving many purposes both functional and social. The need was identified to chart social changes experienced by older people in relation to the kitchen and to understand current issues and problems of kitchen usage. Two interviews were conducted with 40 older participants (aged between 61 and 91) living in a variety of British housing types in Loughborough and Bristol. The first interview recorded their experience of the kitchen throughout their lives, and the second on the contemporary kitchen and how well it meets their needs. This paper focuses on the second interview. It was found that problems of reaching, bending and stretching, dexterity and sight were all relatively common while for specific tasks, problems with ironing, cleaning and shopping were the most frequent. Categorisation of participants’ likes and dislikes about their kitchens were recorded highlighting the most important issues for the participants. The paper reports on coping strategies used by older people in their kitchens which help to promote inclusive design social inclusion throughout the life course.

Keywords
Kitchen ergonomics, Kitchen adaptation, Kitchen design, Oral history

Introduction
Because such a large proportion of the time spent in the home is devoted to activities in the kitchen, it is appropriate to provide, particularly for older people, an environment that is comfortable so that tasks can be performed with the minimum amount of unnecessary effort and strain. This paper reports on a project involving social gerontologists at the Open University (Faculty of Health and Social Care) and ergonomists at Loughborough University (Loughborough Design School), funded by the New Dynamics of Ageing Programme, to study people’s lives in relation to the kitchen. The research examines people’s experience of the kitchen across the life course for older people living in a variety of accommodation both ‘ordinary’ and ‘supportive’ in urban and rural locations in England (Loughborough and Bristol). One of the aims of the project is to produce guidance for older people to help manage kitchen tasks more easily and possibly make adaptations to the kitchen to match their evolving needs. This ties in with the general aims for older people outlined by [1]: to (a) help older people as much as possible in their habitual setting and change as little as possible (b) maintain rhythms and balances if a change of setting is necessary after all, and (c) continue being able to do and learn
on one’s own. Many guidelines do exist such as [2] which are helpful but tend to be at the level of designing of the new kitchen. The aim here is to recommend simpler changes and smaller adaptations. Safety aspects are also important [3] and the need for appliances that are modern and attractive [4].

Method

The research was carried out in England, and identified a sample of 40\(^1\) older people in their 60s, 70s, 80s and 90s. The research examined people’s experience of the kitchen across the life course, living a variety of accommodation both ‘ordinary’ and ‘supportive’ in urban and rural locations in England (Loughborough and Bristol). Two interviews were held with each participant: the first interview gathering an oral history of the kitchen living across the life course and linked to specific life events e.g. first remembered home; parental home when a teenager; leaving home first housing, etc. The second interview focused on the present kitchen, how well it met the person’s abilities and needs and any coping strategies they adopted. The layout of each kitchen was also mapped out and photographs taken of positive and negative aspects of the kitchen through photography. This paper reports on the analysis of this second interview.

Participant and property details

The sample consists of 40 participants, 26 women and 14 men. Thirteen participants were between 60 and 69 years, thirteen between 70 and 79, thirteen between 80 and 89 and one 90 or above. The ethnicity of 38 participants was ‘White British’ and 2 were ‘Asian or British Asian’. Property types included: 7 detached, 7 semi-detached, and 7 terraced houses, 9 bungalows, 6 extra care/sheltered apartments, 3 flats (low rise) and 1 town house. In terms of ability, 31 people could walk independently, 7 used a stick, frame or furniture to hold on to, and one was a wheelchair user. One participant had a problem with steps and stairs, one had problems accessing the kitchen, 15 had some sight difficulties and 11 some hearing difficulties.

A series of measurements were taken. The average perimeter of the ‘kitchen triangle’ (fridge to oven to sink) was calculated to be 4.7m (maximum 6.74m for a 1950s terraced house and minimum of 3.17m for a terraced house built in 1900). This illustrates the diversity of terraced houses. The average worktop height (measured for 22 participants) was 90.4 cm (range 89cm to 92cm). The average height of the bottom shelf of kitchen wall cupboard (measured for 9 kitchens) was 140.2cm, (range 137cm to 152cm). The highest shelf was in the kitchen of a lady who was 157.48cm (5’ 2”). As described in [5] survey work was conducted between 1943 and 1968 to produce a varied selection of heights recommended for the kitchen sink and the work top. However choosing a best single height does not solve the problem for individual users who may need a customised height for them – highlighting the need for an adjustable kitchen.

\(^1\) This paper gives interim results. Forty eight participants have been interviewed in total.
Results and Discussion

Cooking, diet and health
The participants generally had some cooked food each day (either cooked by themselves, their partner, brought in or at the local community centre). Ready meals were convenient for many people being easy to prepare in the oven or microwave. In terms of timing, 5 cooked at breakfast time, 14 at lunchtime, 3 in the late afternoon and 31 in the evening. The majority (36) considered their diet ‘good’ or ‘very good’. Three stated that it was ‘quite good’ and one ‘fair’. The participants seemed generally aware of the need to eat healthily, and this was necessitated for some by health conditions such as diabetes. An interesting contrast in view arose about how the effect of people visiting might affect what people prepare. One person stated that: “I am good at adjusting my diet, if a person visits, to their preference”, while another stated that “I eat what I fancy rather than meals to please others”

Capabilities related to the kitchen
Participants were asked about their capabilities with respect to kitchen activities. The following chart (Figure 1) shows the number of participants who did have specific capability problems. All category totals relate to a sample of 40 people.

Sight
Fifteen people (37.5%) reported having sight problems in the kitchen. The most common problem was reading small instructions on packaged food or other kitchen products (5 participants). The second most common problem was seeing the cooker controls (3 participants). Two stated that “Bright sun makes oven or microwave controls hard to read” and another that they “Put on close glasses for cooking”. (This could be a hazard if leaning over hot oven plates). Two participants suffered from macular degeneration, 4 had had cataracts removed and 3 used a magnifying glass to assist them, one kept a pair of glasses in the kitchen drawer, and one found the under cupboard lighting useful
to give extra light. One usually got her son to help with cooker settings”. Many of the sample were wearers of glasses to correct their vision. Participants were asked what changes they had made to help with seeing in the kitchen. Eight participants (including 3 couples) had made changes to the lighting including putting in strip lights, spotlights and under cupboard lighting.

Lighting levels were measured for different areas of each kitchen including the food preparation area, sink area, eating area. They were also recorded with and without the kitchen lights on. A considerable variation in lighting was found. Taking the recommended ergonomic lighting levels adapted from [6], it can be seen that a relatively small or modest percentage of participants had sufficient light for particular kitchen tasks.

### Table 1: Average lighting levels for various kitchen areas with recommended thresholds

<table>
<thead>
<tr>
<th>Area</th>
<th>Average lighting level</th>
<th>Minimum light threshold</th>
<th>Number participants above threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food preparation area</td>
<td>507 lux</td>
<td>750 lux</td>
<td>6 (15%)</td>
</tr>
<tr>
<td>(lit)</td>
<td>629 lux</td>
<td>750 lux</td>
<td>9 (23%)</td>
</tr>
<tr>
<td>Sink</td>
<td>880 lux</td>
<td>300 lux</td>
<td>24 (60%)</td>
</tr>
<tr>
<td>(lit)</td>
<td>971 lux</td>
<td>300 lux</td>
<td>25 (63%)</td>
</tr>
<tr>
<td>Kitchen eating area</td>
<td>327 lux</td>
<td>300 lux</td>
<td>9 (36%)</td>
</tr>
<tr>
<td>(lit)</td>
<td>566 lux</td>
<td>300 lux</td>
<td>9 (38%)</td>
</tr>
</tbody>
</table>

A useful body that provides advice and support on lighting in the home is the Thomas Pocklington Trust which has also produced a good practice guide [7].

### Hearing

Eleven people (27.5%) reported having hearing problems. Six people wore a hearing aid although a seventh found that hearing aids were too expensive. Specific problems mentioned were: hearing the door bell with the kettle on (which was quite loud), and sometimes missing the phone ringing. One couple found that the ceiling light (humming) can affect hearing and ‘distracter noises’ can affect concentration. To cope with hearing problems, one participant said that they generally keep an eye on things in the kitchen and do not leave anything unsupervised. Another found the speaker phone button useful and volume controls to increase loudness above kitchen noise. Three participants had to keep the kitchen door open to hear what was going on if they moved into the lounge.

### Reaching and stretching

The ability to reach or stretch to use appliances, cupboards or down to the floor was a limitation for 15 people (42%). Specific comments were as follows: “I have to crouch rather than bend to reach down to oven so favour back by using legs”, “I do not like lifting heavy items from a low position so use steps to get to higher shelves” and “I have problems reaching down. Then I have to pull myself up using the worktop”. Also: “I can get giddy tilting my head, so it is difficult to change ceiling bulbs”. Very often people
described strategies for dealing with their problems. These included using steps when reaching up to a cupboard, provided they are stable and safe, or getting a son or daughter to reach up for them. Another was use of a hook or grabber but it was said that one designed with two ‘half cups’ to create a hand shape might be more effective than a simple pinch grabber. Some participants had had a carousel shelf installed to reduce the need to reach into a cupboard or put a small turntable within a cupboard to more easily reach several items located together such as small jars, herb and spice bottles, etc. One participant had new cupboards located at a lower level than standard which could also be done for existing cupboards.

Dexterity

Limitations on dexterity were also common within the sample (15 participants – 37.5%) often caused by arthritis, which cause pain with movement and reduction in strength. This affected many kitchen tasks such as opening jars, cans and bottles (8 participants), unscrewing plastic top off milk carton and pulling off plastic seal underneath (1), lifting pan or dish (1), turning knobs or taps (1). Common solutions for opening jars reported by participants were using a gadget to help (e.g. a rubber or plastic cloth, a ring pull lifter, electric tin opener, or running the jar under hot water. One used a plastic cup (or rubber cone) to grip the jar lid but this only worked if it was the right size for the jar.

Figure 3: Rubber mat for carton opening and ring pull tin opener

Figure 2: Numbers of participants experiencing task difficulties (‘Some problems’ indicates those saying they had no problems but described problems or coping strategies)
Tasks related to the kitchen
In terms of problems relating to specific kitchen tasks, the category totals relate to a sample of 40 people, although for microwave use, the total is 36 as 4 participants did not own one.

Shopping
Ten participants reported having problems with shopping. A common strategy adopted was to receive help from others either taking them shopping or shopping on their behalf. Many did the shopping themselves and used a stick to help them get there. One adopted the strategy of buying small amounts and using a shallow trolley but found it hard to push this one handed while holding a stick with the other. Two others participants were a husband who had sight problems and his wife had to use a wheelchair. They overcame their problems in shopping by adopting a mutually supportive approach. One participant used a mobility scooter for shopping trip although no problems were reported. Interestingly no one said that they shopped online.

Food preparation
Three participants reported having problems with preparing food. One participant reported pain when peeling and chopping while another stated that her hands were not strong for lots of food preparation. A further individual had frozen meals delivered and used a microwave oven to cook/reheat them. Another person stated that while she did not have problems she did however suffer from backache when baking. The other three participants stated that although they did not have problems they did engage in different strategies to make the task easier, these included the following:

- “I prepare meals from scratch unless I am tired (like after gardening etc.). Then I cook ready made meals”
- “Sit for some tasks”
- “Often sit to prepare food”

Advice: Being able to sit while preparing food, using a perching stool, lower worktop (with space under for a chair) or kitchen table. Taking rest break between preparing and cooking is helpful. Occasional ready meals take the work out of food preparation. Other strategies from participants are steaming all the vegetables in one pan, buying ready chopped food. Another gadget used was a small timer which they placed next to them sitting in the living room to warn them when the cooking was done, if they had fallen asleep. Timers built into the oven can also play the same role.

Washing dishes
Three participants reported problems with washing dishes. A number of coping strategies for washing up were suggested by participants. One person stated that she was advised to have a small slim line dishwasher which fitted more easily into her kitchen and was suitable for use on a daily basis. Another used a small counter-top dishwasher. One person suggested that their low level machine - could be raised in height for loading and unloading. Two stated that they loaded dishwasher as they go, and hand wash if not very dirty. For manual washing up, it was suggested to take time doing it and to use a plastic drainer by the sink.
Making a hot drink
Only two participants had difficulties making a hot drink. One found her kettle heavy and unsafe to lift and so had adopted a strategy of sliding it to the tap, filling it, and then sliding it back to turn it on. Other strategies were to use a small light weight kettle and to use a microwave instead of a kettle. A comment was also made from one participant was that her husband made sure there was adequate light and colour contrast for cups and surfaces.

Using microwave
Just three participants, of the 36 who owned a microwave, reported having problems using it such as cooking the food for too long, transporting food from the microwave (when hot), and the height of the device. Several participants only used the microwave rarely or only for defrosting, or reheating meals. One commented that “simple operation was important”. Another had an oven/microwave combination which they found useful and convenient. One strategy reported for was to take the food out of the microwave half way through cooking and split up to make sure it is cooked through.”

Laundry
Five participants reported having problems with washing and drying clothes. The comments from two participants with task difficulty were: “I have a rotary dryer which I leave up but closed with a cover on to keep it clean. I do find it difficult to open up and have looked at ones with a mechanical opening but they are heavy to lift into socket”. Also: “I prefer to dry clothes outside but carrying them into patio is difficult so I shuffle the basket with my feet.” Twenty participants described their strategies for managing the household washing and drying. These included using radiators or clothes horse for drying in a warm area such as the conservatory. Another approach was washing small amounts at a time, and doing it in afternoon and drying with heaters overnight. One participant also valued their tumble dryer to get their washing dry and warm. They also did not see the need to iron sheets as they would get crumpled anyway thus saving effort. Ironing when clothes are damp can also help dry them. Some people in sheltered accommodation had a shared laundry facility while another couple used a commercial laundry.

Ironing
Fourteen participants reported having problems with ironing. One participant had a problem with a heavy ironing board while the other had nowhere to store the ironing board without lifting and carrying it to a location where they could do the ironing. Strategies adopted to make ironing easier were to only use used the ironing board for large items, and having clothes that did not need ironing too much and not ironing underwear and sheets. Occasionally a relative helped with ironing when they visited. Of the 23 participants who did not experience problems with ironing (excluding 3 who did not iron), 8 (35%) kept the ironing board in the same location as they did the ironing which is normally most convenient. Interestingly none of these 23 did the ironing in the kitchen, indicating that they may have overcome any problems by moving the ironing task elsewhere where there was more space.
Cleaning
Seven participants had problems cleaning their kitchen. These included: getting the appliance out to clean behind, bending to clean the oven and fridge, cleaning from a wheelchair, reaching to clean the windows and vacuuming the kitchen carpet difficult. One suggestion for cleaning the freezer was to run items down and do this on cold day so that the remaining items outside of the freezer did not warm up too easily.

Waste disposal/Recycling
All participants did recycling. Most had a waste bin in the kitchen and many had a designated space or containers for items to recycle, such as a kitchen worktop or fridge top, in a cupboard, in plastic bags, boxes. Problems included: bending to empty the pedal bin being awkward and knowing which bags to put different items of waste or recycling. One person, who used a shared bin compound, often found this locked.

Pets
Seven participants had pets that they feed or look after in the kitchen (five cats, one budgie and a spaniel, Holly). No specific problems were reported. One strategy was to keep bulk food in the garage and to bring in small amounts as needed.

Help from others
One participant needed help with most tasks; they had a cleaner once a week and a carer who came twice a day. Seven participants said that they needed help with some tasks; one participant had help cleaning the kitchen and the windows every other weekend. One had a cleaner for 4 hours per week while another had a carer in the morning, lunchtime and evening. Others had an occasional helper e.g. a family member or friend, who they could call on when needed.

Likes, dislikes and changes
Participants were asked what aspects of their kitchen they most liked, disliked and what they have changed or would most like to change. The results are summarised in the table below (participant numbers reporting each item shown in brackets – no number indicates one participant):

Table 2: Likes, dislikes relating to the current kitchen

<table>
<thead>
<tr>
<th>Likes about kitchen</th>
<th>Dislikes</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Natural Light (4)</td>
<td>• Lack of space, storage or poor layout e.g. need oven nearer to sink (11)</td>
</tr>
<tr>
<td>• Height of appliances (3)</td>
<td>• Cleaning, opening and closing windows (7)</td>
</tr>
<tr>
<td>• Good storage space (2)</td>
<td>• Cleaning hob.</td>
</tr>
<tr>
<td>• Easy to clean (2)</td>
<td>• Lighting (4)</td>
</tr>
<tr>
<td>• Tidier after new kitchen (2)</td>
<td>• Fridge/freezer (2)</td>
</tr>
<tr>
<td>• Height of hob and oven (2)</td>
<td>• Access to Sink (2) i.e. cannot get legs under for seated use; too large to reach in properly</td>
</tr>
<tr>
<td>• Compact space (2)</td>
<td>• Access to cupboards</td>
</tr>
<tr>
<td>• Reach everything easily</td>
<td></td>
</tr>
<tr>
<td>• Not too wide for moving around</td>
<td></td>
</tr>
<tr>
<td>Likes about kitchen</td>
<td>Dislikes</td>
</tr>
<tr>
<td>---------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Carousel in unit for access</td>
<td>Smaller microwave and door on other side</td>
</tr>
<tr>
<td>Abundant surfaces</td>
<td>Slamming door is a nuisance</td>
</tr>
<tr>
<td>Self defrosting fridge</td>
<td>Not enough plug sockets, need extension leads</td>
</tr>
<tr>
<td>Table good for visitors</td>
<td>Plug located behind door</td>
</tr>
<tr>
<td>Hatch to dining area</td>
<td></td>
</tr>
<tr>
<td>Back door opening onto garden</td>
<td></td>
</tr>
<tr>
<td>Double sink. High neck taps gives space below (e.g. To hold kettle, bowls or pans)</td>
<td></td>
</tr>
<tr>
<td>Good storage and size for one person</td>
<td></td>
</tr>
<tr>
<td>Familiarity</td>
<td></td>
</tr>
<tr>
<td>Layout</td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Changes made or would like to make to the current kitchen

<table>
<thead>
<tr>
<th>Changes made or would like to make</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved or new appliances included: More plug sockets or better positioning, dishwasher, automatic kettle, lighter iron, water filter tap, lever taps fitted, fridge, washing machine, new flooring and windows.</td>
</tr>
<tr>
<td>Improvements to the kitchen environment included: A light that can be lowered over the table, lighting over/under cupboards, mirror over sink to see garden behind (kitchen window too high to see out), smaller window handle which takes up space, fan fitted in kitchen window, better lighting in larger/walk-in cupboards, cupboards under sink. table in the kitchen (but lack of room prevents this)</td>
</tr>
<tr>
<td>Improved kitchen cleaning: vinyl floor off-cuts on top of wall units so can be removed and cleaned, a ‘truly self cleaning oven’.</td>
</tr>
<tr>
<td>To help with reaching and access: shallower drawers, pull out shelves in cupboards, corner cupboards with revolving units for access, both doors opening for easier access, a better positioned kitchen roll holder</td>
</tr>
<tr>
<td>Structural changes: (1) knocking out part of a wall in the kitchen to access downstairs toilet and convert storeroom to a wet room with toilet, shower and laundry room and (2) having a porch built on the back</td>
</tr>
</tbody>
</table>

**Conclusion**

Thus far the project has identified a number of issues and problems relating to kitchen use by older people (see Figure 3). The researchers were also interested to observe the wide range of strategies and techniques used by people to overcome the problems they faced. These ranged from positioning units and worktops at a suitable height to taking a break between preparing food and cooking it. A variety of kitchen sizes were observed, as illustrated by the overall dimensions and the perimeter of the ‘kitchen triangle’. An important balance to reach was the need for good storage space in the kitchen (which many participants in flats or smaller houses did not have) and the desire to have key appliances (e.g. sink, oven and fridge) located close enough together for convenience and to save effort of movement. Innovative design is clearly required in order to balance these factors. As a result of this research, the project will develop:

(a) A CD of stories from the past kitchens that would be useful oral history and could inform experience of the kitchen today, and
(b) A guide including recommendations and ideas from participants relating to ‘ways of living’ in the kitchen as people experience different health needs - vision, hearing,
mobility, reaching and stretching, and dexterity. By adopting such coping strategies, particularly in later life, this will help promote independent living and social innovation.

Figure 4: Some common ergonomic issues: accessing window over sink, reaching up to a high shelf (assisted by positioning lower) and bending to lower shelf (alleviated by revolving shelf).

References


