‘Difficult’ packaging for older Chinese adults

Xuezi Ma, Hua Dong*

Tongji University
*donghua@tongji.edu.cn
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Abstract: The ageing of the global population highlights the need to understand the implications of declining user capabilities and to help elders live full, autonomous lives. One of the poorly understood issues is that of packaging openability. The aim of this study is to develop an understanding of packaging openability from older Chinese people’s perspectives, so that packaging designers and manufacturers can address this issue effectively. A survey was conducted to rate the types of household packaging that consumers in the 60+ age group struggle with, covering opening gestures, coping strategies, attitudes towards packaging design and other related issues. The extent to which this group has difficulties when opening household products and packaging in connection with daily purchases was also discussed.

Keywords: packaging; openability; older adults; inclusive design

1. Introduction

As people get older, they become weaker and their dexterity decreases, making it increasingly difficult to open items (Sudbury-Riley, 2014). A lack of accessibility, intuitiveness or affordance, or clarification (information) and sometimes an excess of packaging have made it more difficult for older adults to access products (Dong, 2013; Passali, Gregori, & Foltran, 2012; Wang & Zhao, 2007; Winder, Ridgway, Nelson, & Baldwin, 2002; A. Yoxall et al., 2006). The age-related decline in capabilities has implications for design. The 60+ age group accounts for a growing proportion of the Chinese population. If reduced functional capability is not taken into account in the design process, this might lead to elders not being able to do their everyday tasks unassisted.

Data from the mid-2010 sixth national census from the Chinese National Bureau of Statistics showed that people aged 60 and older accounted for 13.26% of the total population (Wang, 2015). Designers may be failing to keep up with demographic changes, which will have implications for the autonomy of those who are joining the 60+ group.
In 2007, the *Consumer Reports* magazine (published in the United States of America) recognized the “wrap rage” phenomenon and created the Oyster Awards for products with the hardest-to-open packaging. At the same time, a survey in the UK magazine, *Yours* (McConnell, 2004), a magazine aimed at people over 50, found that 99% of the 2,000 respondents said packaging had become harder to open over the last 10 years, 97% said there was "too much packaging", and 60% reported they had bought a product designed with easier to open packaging. In fact, 71% of readers of the magazine said that they had hurt themselves as they struggled to open packaging. The Canadian Broadcasting Corporation (a public service television network in Canada) also handed out the first-ever Wrap Rage awards in Canada (2014). In 2011, the European Technical Specification for packaging ("ease of opening" CEN TS 15945) was published and was to be adopted as a British Standard in 2014 (BSI Group, 2011). It is likely to be used by consumer groups to report poor packaging and to lobby manufacturers for improvements. According to a British study (Winder et al., 2002), over 60,000 people receive hospital treatment each year as the result of injuries from opening food packaging. A study conducted by the Institute for Good Medicine (2009) found that 17% of adults over the age of 21 have either been injured at least once or know of someone who was injured while opening a holiday or birthday gift. In addition to physical problems with packaging, older adults experience psychological frustration and feelings of alienation (Sudbury-Riley, 2014).

Packaging openability data are fundamental to the design of safe, usable packaging. There are already several studies about packaging openability for older adults (Brooks, 2013; Clifford, 2013; Jégou & Liberman, 2012; Khanom, 2013; UK Food, 2013; Wisson, 2012; Yan & Yu, 2005). These authors make use of data collection, statistical analysis using various measures including self-reporting, and performance assessment (Bell et al., 2013; Brooks, 2013; Rowson et al., 2014; Sudbury-Riley, 2014; Wu, Wu, Liang, Wu, & Huang, 2009; Yen, Flinn, Sommerich, Lavender, & Sanders, 2013; A. Yoxall, Rodriguez-Falcon, & Luxmoore, 2013). However, the currently available end-user capability databases have weaknesses. There is a lack of surveys with an appropriate level of specificity in the questions, and the data suffers from being derived from a non-representative sample of household products. The vast majority of packaging-related work has looked at dexterity issues related to the strength of consumers when opening jars. Moreover, most of the research was conducted in western countries. Studies from China are relatively few in numbers (Ke, 2009).

The aims of this study include the following. First, it investigates what types of packaging cause severe issues of openability and what problems ageing Chinese consumers actually come across when opening household packaging. Second, it explores ageing consumers’ attitudes to household packaging currently in the Chinese market to better match products with user needs and requirements.
2. Methods

2.1 Pilot Study
To understand a general picture of existing packaging openability issues, a pilot study was conducted. One hundred older people (50% male and 50% female) between the ages of 50 and 80 (mean of 61.3 years) in four different cities in China were interviewed in the pilot study. They were asked to participate in a 20-minute face-to-face interview. After some basic information about the subjects was recorded (age, gender, whether in charge of shopping in their household), the formal interview began. The interview covered topics including the need for help when opening packaging, the five cases of hardest-to-open packaging in their daily lives, how hard each item was to open, the reasons for bad openability and the interviewees’ general attitudes towards household packaging design. A “total packaging score” was calculated as a measure of how difficult or easy each person found it to open the specific types of packaging mentioned in the interview, using a summation of the Likert ratings provided for each individual packaging type (-2, “very easy”; -1, “easy”; 0, “neither easy nor difficult”; 1, “difficult” and 2, “very difficult”). A series of cards with photographs was used in conjunction with questions to eliminate any ambiguity regarding packaging types.

2.2 Survey
In order to determine the factors that were crucial to improving packaging openability, a survey consisting of three parts was conducted in addition to the pilot study. This survey utilized both quantitative and qualitative data collection tools. Data collection consisted of a semi-structured interview, performance test and video record as well as pictures taken from older people’s daily lives. Participation was voluntary and anonymous. A total of 130 questionnaires were distributed to randomly selected adults of 50–70 years old to ensure a sample group with an even spread of socio-economic backgrounds. The sample comprised 60 males and 70 females with a mean age of 57.4 years. The subjects were from six cities and towns across China, recruited using convenience sampling at shopping centres, parks and retirement villages. All participants had the ability to live independently.

There is extensive evidence that affective states such as moods or emotional states can change perceptions, thoughts and behaviours. So all tests were conducted in participants’ homes. Before the start of the test, the interviewer engaged in small talk with the participants to “break the ice” and help them overcome any discomfort from being interviewed by the researcher and to maintain a “normal” mood. Ethical procedure would be followed afterwards. After recording some basic information about the subjects (age, gender, level of education, living arrangements, employment status, health status, whether they had arthritis), we conducted the formal interview.

Based on the pilot study, and also considering that packaging to be surveyed needed to be portable (as the researchers will take them to the participants’ homes), four different types of packaging were selected for this survey, including a jar, a thin film pack, a bottle with a
ring pull and a shrink-wrap pack (Figure 1). These types were regarded as “difficult to open” packaging, or “harsh” packaging by the participants in the pilot study.

![Selected packaging for this survey](image)

**Figure 1** Selected packaging for this survey

The survey comprised of three parts:

The first part: recording the motion patterns. All participants were asked to open the four different types of “harsh” packaging, and 20 cases were video-recorded. The time was also recorded. The participants performed the following test procedure in the position which they thought to be comfortable and which was frequently used in their daily lives. They were allowed to use assistive tools at their home during the opening process, but they were requested to try opening the packaging first of all with their bare hands.

The second part: collecting ratings. After opening each type of packaging, participants were asked to rate the household packaging. If they thought it was hard to open, they were asked to select reasons. A 5-point scale was used to collect this information (with labels of -2, “very easy”, -1, “easy”; 0, “neither easy nor difficult”; 1, “difficult” and 2, “very difficult”). Seven “barriers” in performing the opening of packaging were presented to participants (all were multiple choices), including: do not know how to open; size hard to grasp; bottle/closure too slippery to grasp; need high skills; tedious open steps; need great strength; and need tools. These barriers were collected from the pilot study. Participants could also add other reasons that might result in issues with opening the packaging.

The third part: collecting older adults’ perspectives related to packaging openability. Participants were asked to indicate with labels of “very unimportant”, “unimportant”, “little important”, “important” and “very important”) the importance of package openability in affecting household purchasing, whether they ever needed help to open packaging, what opening strategies they might use and their suggestions and perspectives towards recent household packaging. Injuries sustained during usage of a package were noted and described. Besides each option provided, participants were allowed to add their own.

3. Results

The data received from the participants were coded by assigning a number to item on each scale. Numerical data were then analysed using SPSS (Version 10.SPSS Inc, Chicago, IL, USA).
Frequencies of responses were calculated for each question. ANOVA was used to determine the relationships between various numerical variables using SPSS. A result was considered to be significant when \( p < 0.05 \).

3.1 Pilot Study

Over half the participants (70%) came from families where women were in charge of daily shopping, and they reported more difficulties and scored higher than males; this result was the same as those reported in previous studies (Brooks, 2013; J. Claudio, de, la, Fuente, 2013; Marks et al., 2012). However, age did not make a significant difference in the rating \((p > 0.05)\).

It was identified that corks, jars, traditional white wine packaging (defined as “Fiddly Packaging”), drink cans, bottles with pull-up rings, clamshells, shrink-wrapped packaging, aluminium plastic closures, crown caps, thin films and seal thread were hard to open (Figure 2). After the participants’ difficulties were analysed, it was found that hard-to-open packaging was considered inaccessible, in general, for one or a combination of the following reasons: did not know how to open, size influenced the grasp, the bottle/closure was too slippery to grasp, opening the packaging required high skills, the steps to open were tedious, great strength was needed and tools were needed.
3.2 Survey
Table 1 shows the participants’ characteristics. Most (97%) of the participants live with others. Twenty males and 50 females are currently unemployed (i.e. retired or unable to work). Most (84%) participants thought their level of health was intermediate.

Table 1 Participant characteristics

<table>
<thead>
<tr>
<th></th>
<th>Male (n=60)</th>
<th>Female (n=70)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50-59</td>
<td>25</td>
<td>17</td>
</tr>
<tr>
<td>60-69</td>
<td>35</td>
<td>53</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary school</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Junior high school</td>
<td>14</td>
<td>16</td>
</tr>
<tr>
<td>Senior high school</td>
<td>23</td>
<td>28</td>
</tr>
<tr>
<td>Junior college</td>
<td>14</td>
<td>19</td>
</tr>
<tr>
<td>Bachelor</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>Living Arrangements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alone</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>With others</td>
<td>58</td>
<td>68</td>
</tr>
<tr>
<td>Employment Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Currently employed</td>
<td>40</td>
<td>20</td>
</tr>
<tr>
<td>Not currently employed</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td>Reported Arthritis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>8</td>
<td>15</td>
</tr>
<tr>
<td>No</td>
<td>52</td>
<td>55</td>
</tr>
<tr>
<td>Health Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very good</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Good</td>
<td>26</td>
<td>31</td>
</tr>
<tr>
<td>Ordinary</td>
<td>23</td>
<td>29</td>
</tr>
<tr>
<td>Bad</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Very bad</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

First part
Yoxall et al. (2008) defined different types of grip strength when opening packaging (Figure 3).
‘Difficult’ packaging for older Chinese adults

The still photographs showing each of the operant types adopted throughout this study were derived from the video recordings to facilitate the analysis. After analysing the video tapes, motion was analysed. Opening the thin film pack required the greatest number of motions, while jars needed the fewest combinations of motion. The time needed to open the bottle with a ring pull was significantly longer than for other packages. The average time taken to open a package was 18s. 92% participants preferred to stand up when opening packaging. 65% of them used tools while opening the packaging; these ranged from scissors (79%), screwdrivers (44%) and teeth (38%) to bottle openers (12%), pliers (9%) and knives (8%).

Table 2 Results from the first part

<table>
<thead>
<tr>
<th>Packaging Type</th>
<th>Average opening time of 130 participants (s)</th>
<th>Motion analysis of 20 video-recorded cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jar</td>
<td>16.35</td>
<td>Box grip (14 cases out of 20, i.e. 14/20); Spherical grip (3/20); Cylindrical grip (3/20)</td>
</tr>
<tr>
<td>Thin film pack</td>
<td>16.34</td>
<td>Lateral grip (20/20); Pulp pinch pull (10/20); Figure stab (5/20); Chuck pinch pull (3/20); Lateral pinch pull (1/20)</td>
</tr>
<tr>
<td>Bottle with ring pull</td>
<td>28.84</td>
<td>Pull (20/20); Chuck pinch pull (17/20); Pulp pinch pull (12/20); Lateral pinch pull (9/20)</td>
</tr>
</tbody>
</table>
Second part

In total 92% people struggled with shrink-wrap packaging, and it was given the highest score for being hard to open. Around half of the people used tools when opening shrink-wrap packaging. They rated this packaging as hardest to open mainly because they did not know how to open it (97.3%), they needed great strength to open it (87.2%) and the closure of the packaging was too tight (73.2%). In contrast, opening a thin film pack did not require much assistance from tools. Judging from the video, people appeared to use their fingernails as “tools” to open thin film packs.

Table 3 Results for packaging opening

<table>
<thead>
<tr>
<th>Packaging Type</th>
<th>Mode</th>
<th>Score</th>
<th>Average Score</th>
<th>Use tools (%)</th>
<th>Reasons for being hard to open*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jar</td>
<td>1</td>
<td>1.08</td>
<td>32.5 (11.7 give up)</td>
<td>4, 6, 3</td>
<td></td>
</tr>
<tr>
<td>Thin film pack</td>
<td>0</td>
<td>0.72</td>
<td>13 (1 give up)</td>
<td>4, 7</td>
<td></td>
</tr>
<tr>
<td>Bottle with ring pull</td>
<td>0</td>
<td>0.75</td>
<td>24 (5 give up)</td>
<td>4, 8</td>
<td></td>
</tr>
<tr>
<td>Shrink-wrap</td>
<td>1</td>
<td>1.76</td>
<td>50 (7 give up)</td>
<td>1, 6, 7</td>
<td></td>
</tr>
</tbody>
</table>

*1= do not know how to open; 3= bottle/closure too slippery to gasp; 4= need high skills; 6= need great strength; 7= closure too tight; 8=cannot tear the film

Third part

Thirty-seven out of 130 participants reported that they turned to someone else for help with opening a package. Twenty-four out of the 130 participants reported that they once hurt themselves when opening a package. Sixteen per cent of participants said the openability of packaging had an influence on their purchase decisions. The three biggest problems with respect to packaging openability were as follows: opening required high skills (97%), a lot of strength was needed (89%) and it was not clear how to open the package (78%). Participants also provided other reasons for viewing packaging as inaccessible: 35% of participants thought that the pull-up ring was an unreasonable design and that it was easily broken. Some thought it was too tiny, which made it impossible to pull up, and 3% of the participants were worried about spilling or wasting the product. Over half of participants (56%) said that openability had some influence on their purchasing decisions (Table 4).
Table 4  How does packaging openability affect elders’ purchasing decisions?

<table>
<thead>
<tr>
<th>Level of influence</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No influence</td>
<td>12%</td>
</tr>
<tr>
<td>Has little influence</td>
<td>24%</td>
</tr>
<tr>
<td>Has some influence</td>
<td>56%</td>
</tr>
<tr>
<td>Has considerable influence</td>
<td>8%</td>
</tr>
<tr>
<td>Has very great influence</td>
<td>0</td>
</tr>
</tbody>
</table>

4. Discussion and conclusions

Prior studies of packaging tend to concentrate on narrow and specific issues. For example, previous marketing studies tended to focus on brand communication (Liao, Corsi, Chrysochou, & Lockshin, 2015), ergonomic literature on physical issues (Canty, Lewis, & Yoxall, 2012; Rowson & Yoxall, 2011) and food science literature on nutrition and consumer education (Velasco, Salgado-Montejo, Marmolejo-Ramos, & Spence, 2014), while others focused on public policy implications (Auttarapong, 2012). This study takes the viewpoint of elderly consumers and provides comprehensive perspectives towards packaging openability from older adults.

The study also brings the concept of inclusive design into the packaging literature. Inclusive design is about maximizing the market potential of products. This makes obvious business sense, but this concept has until now been limited to the design and ergonomics literature. Chinese Pharmaceutical Packaging Association in 2015 reported that over 95% of pharmaceutical packaging did not have Child Resistant Cap (CRC) closures; however, CRC was always ranked as the hard-to-open packaging in previous studies (Dong, 2013; Marks et al., 2012; Rowson et al., 2014; Ward, Buckle, & John Clarkson, 2010), this study did not include this type of packaging. An obvious cultural difference was observed: corks for red wine were considered by older Chinese adults as the hardest packaging to open. When the participants were asked about cork packaging, most of them thought it was too hard to open, even with corkscrews. We surmise that this may be because they were not acquainted with the tool, which not only made the opening process tedious but also required considerable strength.

It was interesting that when participants were asked for their perspectives on packaging openability, there was an interplay between subjective and ergonomic factors. For example, textured surfaces which offer a better grip can be taken to indicate that the bodies of bottles are difficult to remove from packaging, whereas smooth, rounded shapes, which are less easy to grasp, may be preferred because they appear more soft and friendly. Therefore, ergonomic factors are not the sole determinants of customer-friendliness and ease of use. Participants also showed a negative attitude towards packaging that had strange shapes; for example, in this study, the bottle with a ring pull was the least popular shape. Most (86%) thought its shape had an adverse influence on grasping, and they could hardly hold the package during the opening process due to its irregular shape.
Prior studies mainly focused on discussing the strength people need while open packaging (Table 5). However, opening packaging requires more than just physical ability. Besides manual function, cognitive and perceptual factors (hand-eye coordination and sensitivity) are important when opening consumer products. It is easy to see from the results that factors such as the visibility and simplicity of the opening mechanism play important roles in the ease of opening a packaging. For instance, in this study, opening skills were considered the biggest problem when opening a difficult package. From the results of this study, opening skills needed to open packaging should also be studied and be given priority when designing packaging.

Table 5 Previous studies on the subject of packaging openability

<table>
<thead>
<tr>
<th>Ability</th>
<th>Percentage</th>
<th>Literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceptual ability</td>
<td>17.2%</td>
<td>(Chihara &amp; Yamazaki, 2012; Chihara, Yamazaki, Itoh, &amp; Han, 2009; Clement, Kristensen, &amp; Grønhaug, 2013; Han, Nishiyama, Yamazaki, &amp; Itoh, 2008; Keates, 2006; Luo, Fu, &amp; Korvenmaa, 2012)</td>
</tr>
<tr>
<td>Cognition</td>
<td>13%</td>
<td>(Caner, 2010; Duizer, Robertson, &amp; Han, 2009; Kozak &amp; Terauchi, 2003; &quot;Opening Up&quot; and “Closing Down”, 2008; Winder et al., 2002)</td>
</tr>
<tr>
<td>Physical ability</td>
<td>67%&gt;*</td>
<td>(Bush, Bix, Bello, &amp; Fair, 2013; Caner &amp; Pascall, 2010; Carse, Thomson, &amp; Stansfield, 2011; Chang, Ho, &amp; Su, 2008; De la Fuente, 2013; Clement et al., 2013; Crawford, Wanibe, &amp; Nayak, 2002; Rahman, Thomas, &amp; Rice, 2002; Kozak &amp; Terauchi, 2003; Kuo et al., 2009; Lewis et al., 2007; Marks et al., 2012; Fowler, 2001; Saha, 2005; Su et al., 2009; Torrens, 2001; Voorbij &amp; Steenbekkers, 2001; Winder et al., 2002; Yiangkamolsing, Bohez, &amp; Bueren, 2010; A. Yoxall, Luxmoore, Rowson, Langley, &amp; Janson, 2008; A. Yoxall et al., 2013; B. A. Yoxall, Langley, Janson, Wearn, &amp; Manson, 2006)</td>
</tr>
</tbody>
</table>

*There are actually more articles for physical ability; we have not listed them all.

Packaging that was defined as “difficult” usually needed between 14.76 s and 28.84 s to open. This may suggest that if the opening time for packaging is beyond 14 s, it will probably be identified as “difficult” packaging.

Similar to previous studies (Thomson, Carse, & Stansfield, 2007; Dong, 2013; McConnell, 2004), older people use many sharp tools, such as scissors and screwdrivers, to help open packaging. Some of the alternative strategies mentioned involved a high level of danger.
Unfortunately, during our research, three out of 130 participants hurt themselves when using knives and scissors for package-opening tasks. Shrink-wrap packaging (50%) often requires tools and was given the highest average mark (1.76) for being hard to open. But this type of packaging also took the least time to open. It seems that the opening time does not have as much influence on people’s judgement of “difficult” packaging as does the issue of whether people have to use tools to open it.

The ageing population in China requires greater attention than it currently receives from the market. Fifty-six per cent of participants said that openability had some influence on their purchasing decisions (Table 4), and some even said that it might make them switch brands. Eight per cent said that openability had a great influence on their purchasing decisions, and they refused to buy the frustrating products again.

Compared with the Baby Boomers, who are less tolerant of brands that fail to cater to their needs than were previous generations (Sudbury-Riley, 2014), older Chinese adults are much more lenient with all packaging. When asked about the difficulties when opening packaging, many of them said they should prepare a tool such as scissors for opening the packaging, and they were satisfied with most products. “Compared with old days, when we lacked basic living substances, we are already lucky today!” said one respondent. Most of them accepted the fact that there would be certain tasks they struggled with as they aged. When problems occurred, they thought that they should blame themselves first rather than the products.

The concept of “avoiding extremes” had a great influence on participants’ responses. Having a moderate attitude is an ancient Chinese concept of the Confucian school, which advocates that people should be neutral and hold their opinions when dealing with issues. When the participants were asked what they thought of the packaging openability, many of them would say, “Oh, I know this one, it was so difficult to open”, but when they were asked to rank the difficulty, they would choose “has some difficulty”; only a few of them would choose “very difficult” to describe their feelings.

Although the prime function of packaging is to protect contents, with the ageing society, manufacturers are encouraged to produce consumer-friendly packaging that will promote greater overall consumer satisfaction. Difficult packaging will put off ageing consumers, while easy-to-open packaging will benefit all.

5. References


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About the Authors:

**Xuezi Ma** is a master student at the College of Design and Innovation, Tongji University. Her research interests involve: inclusive design, packaging and healthcare.

**Hua Dong** is a professor at the College of Design and Innovation, Tongji University. She has extensive experiences of cross-cultural and interdisciplinary design research in the fields of inclusive design, healthcare, and co-design.