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Proceedings of The Global Conference on Aging and Gerontology
Vol. 2, Issue. 1, 2025, pp. 21-30
DOI: https://doi.org/10.33422/agconf.v2i1.1026

ISSN: 3030-0746 online

Diamond Scientific Publishing

Impact of Packaging Design on the Independence of Older People

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Abstract

Packaging design plays an important role in the daily functioning of older people, particularly in extending their independence and reducing the need for external assistance. This study examines how various packaging features like font size, color contrast, ease of opening, and clarity of information affect the user experience of older individuals. A survey conducted on a sample of 404 residents of Zagreb revealed that 46% of respondents aged 51 to 65 and 77% of those over 66 experience difficulties with reading information on packaging due to font size, while 30% struggle to find key product details. Additionally, 14% of individuals who wear prescription glasses reported injuries caused by unclear instructions or difficulties with handling packaging.These findings highlight the need for more user-friendly packaging design that facilitates easier product use for older people. The study focuses on analyzing the specific challenges faced by older users and exploring potential solutions derived from the collected data. The research conclusions can serve as a foundation for further studies and improvements in packaging design aimed at enhancing the independence of older people.

Keywords: aging and technology; inclusive design; independence; product interaction; readability

1. Introduction

As the global population ages, the need for **age-friendly product design** becomes more and more important. By 2050, the proportion of individuals aged **65 and older is expected to double**, raising concerns about the accessibility of everyday consumer products (United Nations, 2020). Europe's population is also rapidly ageing, bringing increasing attention to the well-being and autonomy of older adults. As of 2024, over one-fifth of European Union residents are 65 years or older (Eurostat, 2025). Because of this demographic shift, it is important to support older adults in maintaining their independence, which is a relevant component of quality of life in later years (Bölenius et al., 2023). Research consistently links greater autonomy to better psychological well-being and the ability to make independent decisions is associated with higher life satisfaction and mental health among seniors (Oliver

et al., 2021). On the other hand, loss of autonomy in later life has been linked to lower self-esteem, cognitive decline, and reduced well-being (White, 2022).

Maintaining independence is not only a personal priority for seniors but also a policy focus in Europe. Green Paper on Ageing (2021) highlights that improved technologies and better product design may extend the autonomy, independence, and participation of older people (European Commission, 2021). Enabling older people to live autonomously and participate fully in their communities is a major goal of European ageing policies. In practice, this means creating environments that allow older individuals to perform daily tasks without external assistance, ultimately reducing the burden on healthcare and social services.

Functional ability and independence in old age are closely linked to the usability of everyday products. Even healthy older adults experience age-related changes such as declining vision, reduced grip strength, and cognitive impairments, which can make interaction with poorly designed products challenging (White, 2022). For example, difficulties with opening packaging, reading small-font labels, or understanding instructions can make even simple tasks frustrating (Ford et al., 2016). Such usability issues have been shown to erode an older person's confidence and sense of control, leading to greater dependency (Ford et al., 2016). In a UK study, older consumers reported that difficult packaging and hard-to-read labels left them feeling "powerless and vulnerable," ultimately undermining their sense of self-worth (Ford et al., 2016). If daily tasks that were once effortless become challenging, older adults may experience embarrassment, frustration, and a loss of autonomy (Bölenius et al., 2023).

Everyday products that are intuitive, ergonomic, and adapted to older users' needs allow them to perform daily activities without assistance (Oliver et al., 2021). Design improvements that assist older adults (such as larger text and simplified interfaces) often improve usability for all age groups, making universal design a beneficial approach for product manufacturers (European Commission, 2021).

The challenges older adults face in interacting with everyday product packaging have been widely documented in gerontology, design research, and human-computer interaction literature. **Older adults frequently experience packaging as physically challenging, psychologically frustrating, and socially alienating, suggesting that poorly designed packaging can compromise not only usability but also seniors' autonomy, safety, and dignity in everyday life** (Sudbury-Riley, 2014). A central issue affecting older consumers is the readability of information presented on packaging. Small font sizes, low contrast between text and background, and densely packed labels hinder comprehension and increase the likelihood of product misuse (Wogalter & Vigilante, 2003). Wogalter and Vigilante (2003) emphasized that hierarchical information design—prioritizing critical details like dosage or expiration dates—reduces cognitive load. Bernard et al. (2002) found that increasing font size and ensuring high contrast significantly improved reading speed and comprehension among older adults. Bernard et al. (2002) demonstrated that increasing font size to at least 12-point and using high-contrast color schemes (e.g., black text on white) improved reading speed and accuracy by over 30% among participants aged 65+. This evidence reinforces the relevance of visual accessibility, but it also highlights the need to explore how these visual factors **interact with physical and cognitive demands** during real-world product use. Thus, readability should be considered as **part of a broader user experience**, where design must support multiple dimensions of accessibility. Reduced grip strength, arthritis, and diminished dexterity make tasks like opening resealable lids or tearing foil seals arduous (Ford et al., 2016). The study by Hou (2025) highlights that older adults often struggle to open packaging due to age-related physical, sensory, and cognitive limitations. The research demonstrates that combining **2D indicators** (such as textual instructions and diagrams) and **3D indicators**

(such as embossed shapes or tactile elements) significantly improves older users' understanding and ability to open packaging. The study identifies **three types of design cues** - full explanations, memory triggers, and partial cues—that help guide users through the opening process. The conclusion is that **integrated 2D and 3D user-centered design elements should be clearly visible, intuitive, and adapted to the sensory and cognitive needs of elderly consumers.** Reduced grip strength, arthritis, and diminished dexterity make tasks like opening resealable lids or tearing foil seals arduous (Ford et al., 2016). The literature consistently highlights three primary barriers to packaging accessibility for older individuals:

1. Readability challenges, including small font sizes and low-contrast text
2. Physical usability difficulties, such as hard-to-open seals and excessive force requirements
3. Limited adoption of digital assistive technologies in packaging solutions.

While prior research has examined readability and openability in isolation, few studies holistically analyze how these factors intersect with age-related impairments (e.g., vision, dexterity) to undermine independence. Given the importance of autonomy for well-being and the clear influence of product usability on independent living, this study aims to investigate the relationship between product design and independence in older adults. Understanding how independent use of consumer products affects older adults' autonomy and quality of life, this paper is providing valuable insights for gerontology, design, and public health.

1.1 Objectives and Aims of the Research

The primary objective of this research is to examine the impact of packaging design on the independence of older individuals by identifying usability challenges. The study aims to assess the readability of product information, focusing on font size, contrast, and layout to determine accessibility issues for aging consumers; investigate physical interaction challenges, such as difficulty opening or handling packaging due to design constraint; analyze the prevalence of negative experiences, including product misidentification, spills, or injuries, that result from poorly adapted packaging and to evaluate statistical correlations between age, visual impairments, and packaging accessibility perceptions based on survey data.

By addressing these research aims, the findings are expected to support the development of guidelines that enhance older adults' independence, ensuring greater usability and safety in product interaction.

2. Research Methods

2.1 Data Collection Method

This study utilized a telephone survey as the primary data collection method, employing a structured questionnaire to evaluate the accessibility and usability of packaging among older adults and individuals with sensory impairments, particularly visual impairments. The choice of a telephone survey was methodologically justified for several reasons, aligning with the study's focus on these populations. First, telephone surveys offer higher accessibility for participants who may face challenges with self-administered methods (e.g., written surveys or online forms) due to age-related or sensory limitations (Dillman et al., 2014). By eliminating the need for visual or physical interaction with survey materials, this approach reduces

barriers to participation, thereby improving response rates and inclusivity. Second, telephone interviews enable real-time clarification of questions, minimizing misunderstandings that could arise from ambiguous wording or complex scale-based items. This is especially critical when administering surveys involving Likert-scale questions or open-ended responses, where respondents might require additional context or examples to provide accurate answers (Dillman et al., 2014). The interactive nature of telephone surveys thus enhances the reliability and depth of the collected data, ensuring that responses reflect participants' true perspectives rather than misinterpretations. The questionnaire design incorporated three question formats: closed-ended questions, open-ended questions and scale-based questions (e.g., 5-point Likert scales assessing difficulty levels). These were structured to examine both sociodemographic indicators and packaging accessibility challenges (including readability, openability, and safety concerns). This dual focus allowed for a comprehensive analysis of how design flaws disproportionately affect vulnerable user groups. While the telephone survey method ensured high accessibility and inclusivity, future studies would benefit from incorporating **direct observational methods** or **usability testing.** Such approaches allow researchers to **capture behavioral responses and real-time challenges** older adults face when interacting with packaging, which self-reported data might not fully reveal.

2.2 Population and Sample

The target population consisted of residents aged 18 to 75. The research applied a probabilistic random sampling method stratified by age and gender to ensure representation. The final sample size was 404 respondents, meeting the statistical requirements for generalizability within a ±5% margin of error and a 95% confidence interval.

*Table 1.*The achieved total sample according to socio-demographic indicators **(N=404)**

Gender		**N**	**(%)**
	Male	202	50,0
	Female	202	50,0
Total		404	100,0
Age		N	(%)
	18 - 35	89	22,0
	36 - 50	107	26,5
	51 - 65	111	27,5
	66 and more	97	24,0
Total		404	100,0
Use of visual aid (glasses or lenses)		N	(%)
	Using glasses or lenses	210	52,0
	Not Using glasses or lenses	191	47,3
	Without reply	3	0,7
Total		404	100,0

The gender distribution is evenly balanced, with 202 male respondents, representing 50 % of the sample, and 202 female respondents, also making up 50 %. In terms of age distribution, 22 % of respondents fall within the 18 to 35 age group, 26.5% are between 36 and 50 years old, 27.5% belong to the 51 to 65 age group, while 24 % are aged 66 and above. When

examining the use of visual aids, 52 % of respondents reported using glasses or contact lenses, while 47.3% do not rely on any form of vision correction. Additionally, 0.7% of the respondents did not provide an answer to this question. Overall, this sample provides a well-distributed representation across key socio-demographic characteristics.

2.3 Data Analysis Methods

The results were analyzed using appropriate statistical tests that demonstrate relevant relationships between the measured variables. In addition to the frequency distribution of results according to the measured indicators and the proportion of results, the **chi-square (χ^2) test** was used for frequency comparison. The **t-test for independent samples** and the **ANOVA test** were applied for comparing mean results, while **Pearson's correlation coefficient** was used to examine the relationships between variables.

3. Results

3.1 Problems with Reading Information on Packaging due to Font Size

Participants were first asked whether they experience difficulties reading information on packaging due to font size. The question was closed-ended with the following response options: "yes / no / I don't know – I cannot assess." All participants (n = 404) answered the question. The findings indicate that the majority of respondents (n = 233 or 58%) reported *not* having problems reading packaging information due to font size. A total of n = 154 or 38% stated that they *do* have such difficulties, while n = 17 or 4% responded that they *do not know* or *cannot assess*.

Participants' responses significantly differed depending on age ($\chi^2 = 121.69$, df = 6; $p < .001$) and whether they wear prescription glasses ($\chi^2 = 103.02$, df = 1; $p < .001$). As expected, younger participants, compared to older ones, were less likely to report problems reading packaging information due to font size: with increasing age, the proportion of respondents reporting difficulties also increases. Only 10% of participants aged 18–35 reported such difficulties, compared to 18% in the 36–50 age group. In the older age groups, the proportions were significantly higher: 46% in the 51–65 group and as many as 77% among those over 66.

Also in line with expectations, those who wear prescription glasses were more likely to report problems reading packaging information due to font size compared to those who do not wear glasses. Among respondents who wear glasses, 63% reported such difficulties, compared to only 12% in the group that does not wear prescription glasses.

3.2 Problems with Reading Information on Packaging due to Similar Background and Text Colors

Participants were then asked whether they experience difficulties reading information on packaging due to similar background and text colors. This was also a closed-ended question with the response options: "yes / no / I don't know – I cannot assess." All participants (n = 404) answered the question. The proportion of participants reporting such difficulties increases with age. Only 6% of respondents aged 18–35 reported experiencing this problem, and the proportion remained low in the 36–50 age group (7%). However, in older age groups, the percentages were significantly higher: 23% of those aged 51–65 and 53% of those over 66 years reported difficulties reading packaging due to insufficient color contrast between background and text. Although the majority of respondents reported *not* having problems

with reading packaging information for this reason, those who wear prescription glasses were significantly more likely to report such difficulties compared to those who do not wear glasses. Among glasses wearers, 35% reported experiencing problems due to similar background and text colors, compared to only 8% of respondents who do not wear prescription glasses. The results also show that the majority of participants (n = 274 or 68%) reported *not* having problems reading packaging information due to similar background and text colors. A total of n = 89 or 22% said they *do* experience such problems, while n = 41 or 10% stated they *do not know* or *cannot assess*. Responses differed significantly based on age ($\chi^2 = 94.52$, df = 6; $p < .001$) and on whether respondents wear prescription glasses ($\chi^2 = 45.32$, df = 2; $p < .001$).

3.3 Importance of the Clarity and Prominence of Product Information on Packaging

Participants were next asked to rate, on a scale from 1 to 5, how important it is for them that product information such as expiration date, allergens, storage temperature, and similar details is clearly displayed on packaging. All participants (n = 404) provided their ratings.

The distribution of responses shows that a large majority of participants consider it important or extremely important that such information is clearly presented on packaging. In total, n = 345 participants (85%) rated this aspect as important or extremely important, with 240 participants (59%) indicating that it is extremely important. A further n = 50 participants (12%) stated that it is neither important nor unimportant to them, while only 2% considered it unimportant. The average rating across the entire sample was relatively high (M = 4.42), further supporting the conclusion that the clarity of product information on packaging is indeed important to respondents.

Using t-test and ANOVA, we found that there are statistically significant differences in importance ratings depending on participants' age and whether or not they wear prescription glasses.

First, an independent samples t-test showed a significant difference between those who wear glasses and those who do not ($t = 3.3799$; df = 399; $p < .001$). Although the average ratings in both groups were high, participants who wear glasses (M = 4.56, SD = 0.66) rated the importance of clearly displayed product information significantly higher than those who do not wear glasses (M = 4.29, SD = 0.89).

Next, a one-way ANOVA test revealed significant differences based on age group ($F = 11.83$; $p < .001$). Although average ratings were high across all four age groups, post-hoc tests showed that the youngest group, aged 18–35 (M = 4.01, SD = 0.96), rated the importance of clearly displayed product information significantly lower than the older age groups: 36–50 years (M = 4.49, SD = 0.78), 51–65 years (M = 4.50, SD = 0.69), and 66+ years (M = 4.60, SD = 0.63). This indicates that younger respondents consider the clarity of product information on packaging significantly less important compared to all other older age groups.

Pearson's correlation was used to determine whether there is an association between age and importance rating. Pearson's correlation between age and importance rating was $r = 0.248$. This value indicates a weak positive relationship between the two variables. In other words, as age increases, the perceived importance of clearly displayed product information tends to slightly increase. The p-value associated with this correlation was .000, indicating that the correlation is statistically significant at the 1% level. In other words, there is a statistically significant positive relationship between age and the importance placed on product information, and it is unlikely that this relationship occurred by chance.

3.4 Difficulties in Finding Product Information and Instructions on Packaging

We then asked the respondents whether they had experienced difficulties finding instructions and product information on the packaging, offering the response options "yes/no/don't know," along with the possibility of providing specific examples of the difficulties encountered. All respondents answered this question (n=404).

The results indicate that the majority of respondents did not experience difficulties finding instructions and product information on the packaging (n=254 or 63%). A total of n=78 respondents (19%) reported such difficulties, while a similar number were unsure or unable to assess (n=72 or 18%).

Respondents' answers varied significantly depending on their age (χ^2=72.06, df=6; p<0.001) and whether or not they wore prescription glasses (χ^2=36.52, df=2; p<0.001).

In addition, respondents were asked to provide examples of such difficulties (Table 2).

Table 2. Examples of difficulties in finding product information and instructions on packaging

Examples of difficulties	**Number**	**Share (%)**
small packages (small letters)	16	21%
canned food (cans, pates, tomato sauce, beans)	9	12%
medicines	9	12%
jars (ajvar, cucumbers)	9	12%
dairy products (milk/cheese/cooking cream)	7	9%
3 pasted-over label (label covers information)	7	9%
4 sweets (chocolate, cakes)	6	8%
5 mayonnaise	5	6%
no answer	4	5%
6 cosmetics	4	5%
7 expiration date difficult to see	3	4%
8 all	3	4%
9 dehydrated products (cereals/cereals)	2	3%
10 hygiene products (soaps, shampoos, toothpaste)	2	3%
11 eggs	2	3%
paper packaging (pudding, whipped cream, vanilla sugar)	2	3%
12 cured meat products (salami)	2	3%
13 dietary supplements	1	1%
14 food in general	1	1%
15 too much text on labels	1	1%
frozen vegetables	1	1%
16 dark letters on dark packaging	1	1%
17 cooking instructions	1	1%
18 Total (n=78 who had difficulties)	78	100%

Those who reported having difficulties finding information on packaging (n=78) were asked to provide examples of such packaging. The examples are presented in the table as reported by the respondents, and the percentages were calculated based on the total number of respondents who experienced such difficulties (n=78). The results show that respondents most frequently mentioned problems with small packages (text too small), canned foods/tins (e.g., pâté, tomatoes, and beans), medicines, jars (e.g., ajvar and pickles), dairy products (milk/cheese/cooking cream), as well as cases of overlapping labels—i.e., when a label covers important information.

3.5 Injuries due to Unclear Instructions on Packaging

At the end of the section on questions related to the communication of information, respondents were also asked whether they had ever been injured due to unclear instructions on packaging, with response options "yes/no/don't know, can't remember." All respondents answered this question (n=404).

The results show that the majority of respondents have never been injured due to unclear instructions or product information on the packaging (n=364 or 90%). A total of n=30 respondents (7%) reported that they had been injured, while n=10 (2%) said they didn't know or couldn't remember.

Respondents' answers differed significantly depending on age (χ^2=35.62, df=6; p<0.001) and whether or not they wore prescription glasses (χ^2=26.03, df=2; p<0.001). Although most respondents did not report injuries due to unclear instructions or information on packaging, the highest number of such cases was found in the oldest age group (19%), while significantly fewer were found in the younger age groups. In addition, while most respondents did not experience injuries due to unclear packaging information, such cases were significantly more common among respondents who wear prescription glasses (14%) compared to those who do not (1%).

4. Discussion

Current packaging design often fails to meet the needs of older consumers, particularly in the domains of readability, usability, and safety. Despite growing recognition of inclusive and universal design principles, a substantial portion of the aging population continues to experience difficulties with accessing product information and physically interacting with packaging.

Findings in this research show that many older adults struggle with everyday packaging—not just because of declining eyesight or physical ability, but because packaging design often overlooks their needs. When a person cannot read the expiration date on their food or safely open a container, it directly affects their health, safety, and independence. The issue of readability stood out most strongly. Over three-quarters of respondents aged 66 and older reported difficulty reading packaging due to small font sizes. Additionally, poor contrast between text and background was another common issue. This aligns with earlier studies (e.g., Bernard et al., 2002; Wogalter & Vigilante, 2003), which stress that increasing font size and contrast improves comprehension for older adults. These design shortcomings are not minor—they can lead to misreading dosage instructions, missing allergen information, or discarding perfectly good food because the expiration date is illegible. Some participants also described struggling to open jars or tear seals, these physical barriers—often underestimated in design—can contribute to frustration, a sense of dependence, or even injury. Our survey found that 7% of respondents had been hurt because of unclear instructions or packaging difficulties. Among older adults and those who use prescription glasses, this number was even higher.

Taken together, these results suggest that packaging is not just a product protection, in a way it's also an interface. If that interface is difficult to navigate, especially for aging users, it can diminish a person's sense of autonomy. This supports what researchers such as Ford et al.

(2016) and Bölenius et al. (2023) have found: poorly designed everyday items can erode confidence, reinforce dependence, and negatively impact mental well-being.

There's also a larger societal dimension. As the European Commission (2021) and United Nations (2020) have emphasized, enabling older people to maintain independence is both a public health priority and a matter of social justice. Design plays a critical role in that effort. For example, packaging solutions such as **resealable containers with textured grips, color-coded expiration indicators**, and **standardized icons** for allergens and instructions can significantly improve usability. **QR codes that provide audio or visual instructions** and **tactile elements like embossed labels** may enhance accessibility for older adults, particularly those with visual or cognitive impairments. Features like legible labels, intuitive opening mechanisms, and clear information hierarchies are not just helpful—they're necessary. They not only benefit senior consumers but also promote universal design principles for broader populations.

While this study provides useful insights, it has its limitations. Relying solely on a telephone survey meant we couldn't directly observe user interactions with packaging. Future studies could benefit from incorporating in-person interviews, usability tests and eye-tracking to understand how older adults engage with different types of packaging in real time. A cross-cultural perspective would also be potentialy valuable, as design expectations and habits vary between regions and countries. The data suggest a clear and statistically significant correlation between age, visual aid usage, and the reported challenges. This reinforces the need for regulatory bodies and packaging designers to prioritize inclusive design frameworks that accommodate the sensory and cognitive needs of older adults.

5. Conclusion

The findings reveal significant age- and vision-related disparities in the readability, usability, and safety of product packaging. Older adults—particularly those aged 66 and above and individuals who use prescription glasses—are disproportionately affected by small font sizes, poor contrast, and complex or poorly labeled packaging. These barriers carry the risk of injury and contribute to a sense of dependence, ultimately undermining quality of life.

Design strategies that prioritize legibility (e.g., larger fonts, high contrast), clarity of information hierarchy, and ergonomic handling features can substantially reduce these challenges. The adoption of universal design principles can make packaging more accessible not only to older adults but also to the general population. As global populations continue to age, the development of user-centered packaging solutions becomes an essential component of public health policy and product innovation. Future research should incorporate cross-cultural comparisons, experimental methodologies, and multidisciplinary collaboration among gerontologists, designers, and policy makers to drive meaningful improvements in product accessibility and senior independence.

Going forward, manufacturers, designers, and policy makers should treat packaging not just as a marketing tool, but as a functional element that can support autonomy. Inclusive design should be the norm, not the exception. Research should continue, expanding into more hands-on, observational studies, and collaborations across disciplines—from design and public health to gerontology and engineering. **Interdisciplinary collaboration** could lead to more holistic and effective packaging solutions. Integrating perspectives from multiple fields will be essential to developing user-centered innovations that truly meet the needs of aging populations. Ultimately, good packaging design has the power to do more than protect a product—it can protect dignity, independence, and quality of life.

Acknowledgment

This research is part of the project IP-2022-10-3864, *"Improvement of Packaging Products by Application of Eco-Friendly Materials and Inclusive Design",* supported by Croatian Science Foundation.

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