Research paper

From Fast Fashion to Sustainable Consumption: Consumer Behaviour from Purchase to Post-Use

Susanna Horn [1*], Teemu Meriläinen[1], Helena Dahlbo[1], Kiia Silvennoinen[1]

Handling Editor: Julian Kirchherr

Received: 19.06.2025 / Accepted: 16.08.2025

Abstract

The vast and growing environmental burden of the clothing sector is largely impacted by consumer choices, encompassing purchasing, use and disposal practices. Despite these factors being crucial for sustainable clothing consumption and progress towards the Circular Economy (CE), the focus on a consumer-centred perspective has been limited.

Consumer choices and consumption patterns are explored during purchase, use and post-use of clothing by gathering data from a consumer survey. Moreover, based on these responses, respondents were divided into three clusters. This revealed varying levels of CE behaviour and susceptibilities to possible interventions. The first group involved trend-affected, fast fashion consumers who could be influenced by, e.g., easier CE services and garment design, while the second and third groups exhibited more conscious consumption patterns and utilised different CE practices that could be further promoted with targeted strategies. These insights inform policymakers and businesses to develop targeted circular business models encouraging different consumer groups toward more sustainable decisions.

Keywords: Textiles · Garments · Consumption · Consumer Survey · Cluster Analysis · Circular Economy

1. INTRODUCTION

The global production and consumption of clothing continue to increase, thereby intensifying the associated environmental impacts of textile systems. In 2024, approximately 186 billion garments were sold worldwide (Statista, 2025b), and the textile industry was responsible for around 2% of the global yearly greenhouse gas emissions (Statista, 2025a). Further, the consumption of clothing is expected to grow by 5% from 2025 to 2029, with a 24% estimated increase in greenhouse gas emissions (Statista, 2024a, b). The environmental burden associated with the clothing sector is primarily attributable to its reliance on predominantly linear value chains (Chen et al., 2021), characterised by short garment lifespans and limited implementation of reuse, repair, and recycling practices (European Commission, 2022).

Nevertheless, clothing is a fundamental necessity for all individuals. With clothing, people can fulfil needs, such as keeping warm and protected, and express their personality, status, and style (Ellen MacArthur Foundation, 2017; O'Cass, 2000). Through their consumption choices, consumers can direct the sector's impacts towards a more sustainable or an increasingly unsustainable path (Koszewska, 2019). By applying responsible behaviour - such as the choice of sustainable products, reduction of consumption, careful use of products aimed at extending their life, and disposal oriented at reusing or recycling the product - a sustainable transition can be promoted (Peattie, 2010).

Sustainable clothing consumption entails choices in different parts of the garments' life cycles. Sustainability can be promoted, for example, by buying eco-labelled products, which may, e.g., reduce the use of harmful substances, utilise recycled or organic raw materials, or have a lower environmental footprint (Ziyeh & Cinelli, 2023). However, the variety of ecolabels for textiles is vast (Ecolabel Index, 2025) and it can be difficult for consumers to know the requirements behind the label. Given that the lifespan of a garment is a critical determinant

[1] Finnish Environment Institute, Latokartanonkaari 11, 00790 Helsinki, Finland
[*] Corresponding author: susanna.horn@syke.fi

https://doi.org/10.55845/jos-2025-1244

of its overall sustainability, sustainable consumer choices at the point of purchase also involve selecting clothing that is durable, repairable, and modifiable. Durable, resilient materials and products have the potential to lengthen product lifetime, which in turn reduces the need to acquire further garments (Fletcher, 2012). Durability is not merely a matter of using durable materials or constructing garments robustly – it is more often linked to the emotional connection to the garment (Fletcher, 2012; Haines-Gadd et al., 2018) and the consumer's decision to maintain the clothing and prolong its lifetime (Schiaroli et al., 2024). When clothing is no longer usable by the first consumer, it can be passed to a second user (Cruz-Cárdenas et al., 2019), or, if damaged, sent for textile recycling.

Previous studies have identified distinct consumer segments based on CE practices in textile consumption. These segments range from environmentally conscious consumers open to sustainable fashion and circular consumption patterns, to more traditional or apathetic shoppers, less engaged with sustainability (Aramendia-Muneta et al., 2022; Haines & Lee, 2021; Koszewska, 2013). While these studies have explored how environmental attitudes, sustainability and circularity issues segment consumers regarding textile consumption. This study goes beyond existing segmentations by integrating behavioural data across all phases of the consumption lifecycle, not just purchase behaviour. Research conducted across various geographical contexts – including Asian (Ma et al., 2012; Yoon et al., 2020), U.S. (Manchiraju & Sadachar, 2014), German (Betzler et al., 2022), and cross-cultural settings (Iran et al., 2019) – has identified a limited emphasis on sustainability and ethical considerations among fashion consumers, with an absence of focus on circularity (apart from Xu et al. (2022), who focus on second-hand clothing).

The environmental impacts of textile value chains have gained increasing interest in scientific literature (Horn et al., 2023; Sandin & Peters, 2018), for example, through various life cycle assessment (LCA) estimations. Until recently, research within the circular economy (CE) that actively considers a consumer-centred perspective has been limited, with most studies focusing on the more "technical narratives" of life cycle extension within CE systems (Haines-Gadd et al., 2018; Lundblad & Davies, 2016) and considering consumers as a homogenous group, neglecting recognition of their diverse characteristics, consumption patterns (Cruz-Cárdenas et al., 2019) and true product use times. In LCA-based assessments, the use phase – especially the frequency of garment use – has received comparatively little empirical investigation (Jerome & Ljunggren, 2025). This aspect is typically estimated through technical assumptions about the lifespan, due to the scarcity of data on actual consumer use patterns. Considering the ever-shortening life cycles of garments and the fast fashion trends, this technical assumption almost never holds, and empirical studies collecting data on the actual use phase length, or other behavioural choices of the consumers, are largely missing.

Based on the research gap described above, we seek answers to the following research questions:

RQ1: What kind of decisions do consumers make during the purchase, use and post-use phase of a garment that affect its sustainability?

RQ2: What type of consumption patterns can be recognised from the responses?

To answer these research questions, and to draw policy and business model recommendations on how to promote sustainable consumption habits within different consumer groups, we have gathered information on clothing consumption patterns through a survey. The survey was conducted in Finland. Although garment consumption behaviours may differ across Europe, and even more so beyond it, key drivers like fast fashion, emotional detachment, and social desirability are likely relevant in other high-consumption regions such as the USA and urban Asia. However, meaningful transfer requires accounting for local cultural norms, economic conditions, and garment use traditions through comparative studies. We combined general statistical analysis of the survey responses with hierarchical cluster analysis to uncover differences between respondents based on their stated pre-use, use, and post-use behaviours regarding garments. We also looked at the distributions of the different responses with and without grouping by gender and the cluster groups found in the analysis. These nuanced insights can inform policymakers in designing tailored strategies addressing specific behavioural patterns, and help businesses develop targeted circular business models, such as repair services, resale platforms, or personalised marketing that resonate with different consumer groups.

2. THEORETICAL FRAMING

2.1 Consumer Choices During the Clothing Life Cycle

Currently, the clothing sector operates predominantly through linear value chains, which usually entail manufacturing garments from virgin materials, for use by one consumer for a short time and disposing of them through landfilling or incineration (Chen et al., 2021). The sustainability of clothing consumption is affected by multiple choices that happen throughout the life cycle (see e.g. Chen et al., 2021; Koszewska, 2018; Schiaroli et al., 2024). The consumer makes consumption choices before and while purchasing, during use stages and when disposing of the garment, which are all integral parts of the product life cycle (Figure 1).

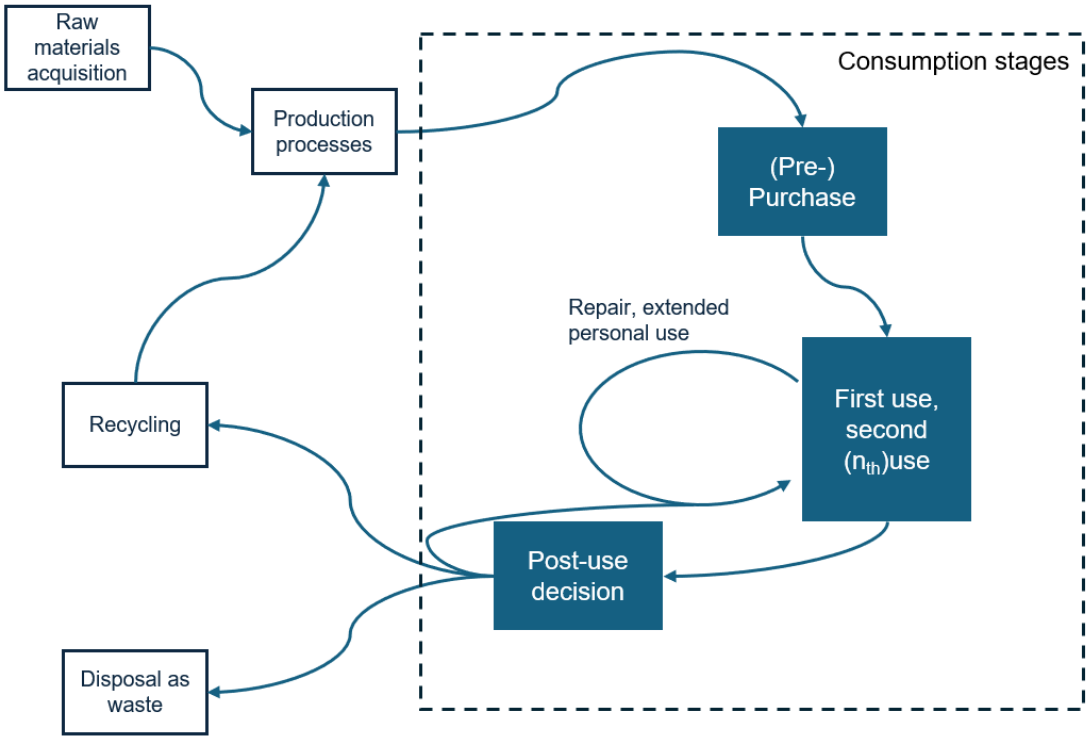

Figure 1. Consumption Stages as Part of the Full Life Cycle

2.1.1 Pre-Purchase and Purchase

Prior to the point of purchase, consumers establish their criteria for purchasing decisions and whether to purchase at all. The criteria in product selection are defined as characteristics that are concrete, observable, objectively measurable and relevant for choosing between alternatives, such as physical composition, price, colour, design, including information about people or celebrities who use the product (Barrera-Verdugo & Villarroel-Villarroel, 2022), or they may consider sustainability aspects (Rausch et al., 2021). Online shopping presents a more novel mode of purchase, in which Johnstone & Lindh (2022) studied how sustainability values translate into action when it comes to purchasing fashion garments online. Accordingly, in this context, purchase intent is often guided by unintentional, non-linear processes in which behaviour is determined by trust in intermediaries such as influencers, rather than the fashion retailers' sustainability approach. When basing the consumption decision fully or partially on environmental sustainability aspects, the consumer may look for a garment marketed with environmental labels, even though there is still a lack of understanding of their individual contents (Suikkanen et al., 2022). Consumers may also choose to purchase an item second-hand.

2.1.2 Use Phase (Incl. Subsequent Uses)

The use phase is a crucial stage during a garment's life cycle, during which several choices impact the product's sustainability. The longer consumers decide to wear the item, assuming that it is also washed and potentially tumble-dried more, the higher the absolute environmental impacts are throughout the garment's life cycle. The life cycle length can be estimated in years or in the number of wears and/or washes (Klepp et al., 2020), but for an LCA-based environmental impact calculation, the number of wears is more comprehensive. Hence, the environmental impacts per one wear time will decrease the more often it is worn, due to the upstream production phases being allocated over more use times. For example, if the total carbon emissions of a garment are distributed across 200 wears instead of 20, the per-use emissions decrease by nearly an order of magnitude. The consumer may opt to wash and dry the item less or in lower temperatures, in which case the use phase becomes more efficient, also from an environmental perspective (Horn et al., 2023; Steinberger et al., 2009). Also, if the garment is broken or old in style, repairing or redesigning it will improve its sustainability. The environmental benefits of a longer life cycle also arise from the need for new products.

2.1.3 Post-Use

When discontinuing the use of the garment, the consumer has options for extending the lifetime to a subsequent use phase by another user (leading the garment back to the use phase, as a "subsequent use stage"). When fully discontinuing the use of the garment as such, the consumer has options for extending the lifetime by repurposing it to serve a different function (Chen et al., 2021; Schiaroli et al., 2024). Finally, if there is no more use for the garment, the end-of-life phases include recycling and incineration (or landfill disposal mainly outside the EU). Textile fibres can be recycled into secondary raw materials for textile or other industries using mechanical, chemical, and thermal processes (e.g., Dissanayake & Weerasinghe, 2021). Currently, less than 8% of worldwide fibre production comes from recycled materials, mainly from plastic bottles for polyester (Textile Exchange, 2024). The most common reason for clothing disposal is damage to the item, while emotional reasons, changing trends and no longer using an item drive consumers to dispose of the product (Schiaroli et al., 2024). Other reasons are lack of fit and storage space, dislike and discontinuation of need for the garment.

Schiaroli et al. (2024) studied the drivers and barriers for sustainable consumer behaviour in different phases of consumption in the fashion industry. The drivers comprised new technologies and services, high-quality, comfortable and stylish products, as well as spreading awareness through social media. The main barriers consisted of high prices, scepticism, stereotypes, lack of knowledge and availability as well as access efforts. Also, environmental concerns were not the primary basis for decision-making.

2.2 Technical and Emotional Durability Affecting Life Cycle Length

To extend the life cycle to as long as possible, as one of the most beneficial circular economy solutions available (Horn et al., 2023; Mölsä et al., 2022; Ertz et al., 2019) – designers need to design products that are both technically and emotionally durable. Durability is a physical property of a product, and means that material choices, garment construction and component reinforcement are combined to create highly durable products that resist damage and wear over long periods of time. The concept of design for durability has been extensively studied from a technical standpoint (Haines-Gadd et al., 2018) and focusing on durability as originating from a product itself, instead of the social actions of users (Fletcher, 2012). However, recent research highlights the necessity of examining reduced emotional durability, defined as the excessive demand to consume products with increasingly shortened life cycles (Den Hollander et al., 2017), driven by a detachment of consumption from tangible needs (Fletcher, 2012). Emotional durability is, in the context of garments, a significant factor determining the life cycle length.

The emotional durability-related studies often focus on garments (Bjerregaard Jensen, 2021; Fletcher, 2012) and electronics (Haines-Gadd et al., 2018a), both of which represent short-lived, high-demand products to which excessive social dimensions or aesthetic changes, rather than functional needs, can be attributed. Den Hollander et al. (2017) suggest that designers can help prevent products from becoming obsolete by creating high physical and emotional durability, hence, extending the product's intrinsic long life cycles by forming consumer-product relationships and feelings of attachment. For example, Fletcher (2012) has questioned the assumption that by producing physically robust garments, people would continue to use them, or that the extra utility afforded to the product would translate into lower levels of consumption. Haines-Gadd et al. (2018) have studied how durability

can be enhanced by encouraging more durable, resilient relationships with products and by integrating emotion-building features into products. According to Marroncelli (2024), there also seem to be diverse perspectives between male and female consumers and their emotional attachment to fashion garments and different reasons for attributing emotional attachment to items of clothing. Table 1 expands on the factors that signify the presence of both technical and emotional durability.

Table 1. Examples of Factors Affecting Technical and Emotional Durability

Type of durability	Definition	Relevant factors/indicators
Technical durability	Ability of a product to resist damage and wear over time (Ellen MacArthur Foundation, 2017)	• Material choices (use of high-quality/high-strength materials) • Garment construction (use of reinforced or double-stitched seams) • Component reinforcement (adding strength to high-stress areas such as elbows or knees) • Ease of repair or modularity (design that allows damaged parts, such as zippers, to be repaired easily)
Emotional durability	Emotional attachment to the product results in product longevity	• Personal meaning or stories behind the product (given as a gift, represents a specific moment), (Fletcher, 2014) • Customizability or emotional investment (possibility to make it "yours", or to design/repair it personally) (Haines-Gadd et al., 2018) • Graceful ageing (signs of ageing that add value, such as patina on leather, wear patterns on denim), (Bjerregaard Jensen, 2021) • Aspirational identity or belonging (association of the product with a celebrity or influencer), (Barrera-Verdugo & Villarroel-Villarroel, 2022) • Aesthetic timelessness (design that lasts longer) (Flood Heaton & McDonagh, 2017)

LCA studies in the garment sector have largely concentrated on the production (Muthu, 2015; Zhang et al., 2018) and end-of-life stages (Sandin & Peters, 2018), while the use phase is often represented through standardised or technical assumptions, such as those in the European Commission's Product Environmental Footprint Category Rules (European Commission, 2021). As a result, critical factors like emotional durability and user behaviour are insufficiently addressed in these LCAs, despite circular economy research emphasising that extending product lifespans is among the most effective strategies for reducing environmental impacts (Bocken et al., 2016). Reported garment use frequencies vary widely in LCA – from as few as 26 wears (Sandin et al., 2019) to 400 wears (Horn et al., 2023) – reflecting differences in garment type, user profiles and lack of real use-phase data. These inconsistencies significantly affect environmental footprint estimates. As Jerome and Ljunggren (2025) note, LCAs that lack robust lifetime modelling ultimately underestimate the benefits of more durable garments. Incorporating realistic lifetime distributions, including factors like repair, reuse, and emotional attachment, can better reflect the value of extended-use strategies. In line with this, Klepp et al. (2020) advocate for the collection of empirical data on actual garment lifespans, rather than relying on generalised averages. Regarding data gaps, Munasinghe et al. (2021) have identified also gaps in the availability of supply data and, for example, first-hand and reliable data on raw materials acquisition and manufacturing phases is often difficult, if not impossible, to obtain from countries such as China, Bangladesh, or India (Finnish Textile and Fashion, 2022).

3. METHODS AND DATA

To collect data on behaviour in fashion consumption, a digital survey with 10 questions was conducted in the context of this study (see Table A1 in the appendix for survey questions). The questions covered topics on the respondents' clothing consumption behaviour for different consumption phases and garments. In each question, four or eight response alternatives to choose from were given. For the sake of ease in responding and simplifying statistical analysis of the results, no open answer fields were used.

The sample size was 629 respondents, of which 480 (76%) were female, 106 (17%) were male, 16 (3%) were others, and 27 (4%) did not want to disclose this information. Our gender question included an 'other' option without additional specification, which limits our ability to draw meaningful conclusions about gender-diverse participants. The survey was carried out in two phases. The first survey was conducted in the premises of Finnish Science Center Heureka as part of a sustainable garment exhibition between 1.6.2024 to 15.9.2024. The exhibition was part of the FINIX research project funded by the Strategic Research Council of Finland. Visitors to the exhibition participated in the survey through an electronic survey device. 287 responses were retrieved in this manner. The second survey was also carried out by the Finnish Science Center Heureka by adding a link to an online survey to their monthly newsletter. 343 further responses were retrieved during February 2025. To respond to the research question of finding different consumption patterns from the responses, hierarchical cluster analyses were conducted using R Statistical language (version 4.4.1; R Core Team, 2024) on Windows 11 x64 (build 22621). Specifically, we used agglomerative hierarchical clustering, where each data point starts as its own cluster and is iteratively merged with the closest pairs of clusters until all points are in a cluster. The R package NbClust (Charrad et al., 2014) and the dendrogram of the clustering were used to choose the optimal number of clusters (Figure 2). The consensus number reached by different metrics used by NbClust was three. The dendrogram resulting from the clustering is shown in Figure 2. It visually presents the hierarchical relationships between clusters, where the height at which clusters are merged indicates their dissimilarity.

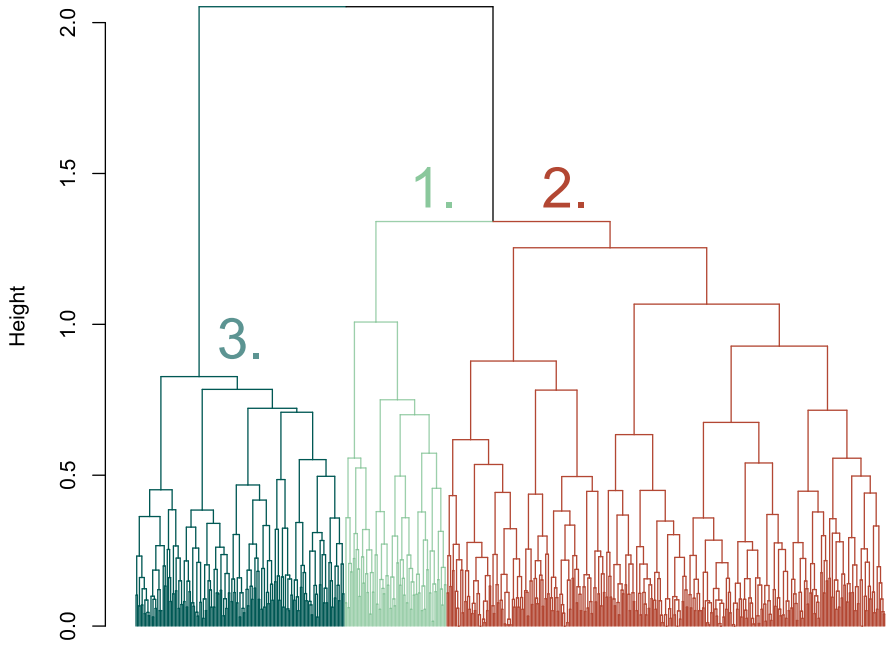

Figure 2. Dendrogram of the Clustering Results

Hierarchical clustering was conducted using Ward's (1963) clustering criterion (Murtagh & Legendre, 2014) and Gower distance metric, with the hclust function from the R Stats package used for agglomerative clustering (R Core Team, 2024) and daisy function from the cluster package for calculating distances used for the clustering (Maechler et al., n.d.). Where necessary, dummy variables were created for multiple-choice questions, and each option was

considered a separate variable with either 1 or 0. Numeric categories of use times were coded to be equal to the average of the category in question. Lastly, the survey responses were standardised using the scale-function in R. Additional analysis was conducted with Euclidean distance and Jaccard distance (see Miyamoto, 2022) to check for the stability of the solution. We also tested the stability of the clusters by doing cross-validation over the survey samples and random subsamples. For the second survey sample and some of the subsamples, a two-cluster solution was preferred over the three-cluster solution, but for the majority of the tested subsamples, the three-cluster solution was better. Among individuals, the cluster membership between groups one and two was by far the most likely to change between samples in testing. Overall, the three-cluster solution was a good fit for both stability and interpretability. The last question of the survey regarding returns was dropped from the final analysis as it was deemed to overlap with the previous question regarding online shopping, because only those buying online could, in theory, do returns. The individual clusters' characteristics were concluded from the analysis of each cluster and focusing on their differences. The final descriptive analysis of the clusters was carried out as a joint exercise between the authors during three workshop sessions. Statistical tests were conducted on the clusters to find statistically significant differences in answers between clusters. The results of the tests are shown in Appendix Table A2.

The use of exclusively closed-ended questions limited the nuance and interpretability of responses, reflecting a trade-off between analytical simplicity (allowing for easier comparison and generalisation) and respondent nuance (offering deeper insight but harder to analyse systematically). The data collection took place through a science centre, which may have skewed the sample toward individuals more interested in sustainability. The absence of age data limits both cluster interpretation and broader generalisability, particularly given the age-dependent nature of fashion behaviour. Additionally, the predominance of female respondents reduces the applicability of findings to male and other populations, reflecting common gender imbalances in voluntary fashion-related surveys. These limitations are addressed in the results, although we recognise that not all may be comprehensively identified.

4. RESULTS

The results of the survey are presented in three parts, each covering either the pre-/purchasing, use, or disposal stage of consumption.

4.1 Purchasing Factors, Disposal Options and Disposal Reasons

In the survey, the respondents were able to select up to three factors that affected their purchasing choice. Accordingly, most respondents purchased their garments on the basis of three main factors: fit, material and price. Colour was used slightly less as a decision-making factor, but other, more "non-physical" characteristics of the products, such as environmental labels, trends or the opinion of someone else, were reportedly seldom used (Figure 3). The gender-specific analysis revealed that female respondents valued the material most of all, and male respondents valued the fit mostly. The group of respondents that selected "other" as gender or didn't want to share their gender considered the price as most important, but also trends weighed in their decisions (see Table A1 in the appendix for gender details). Environmental labels played a minor role in the decision-making, with male respondents paying even less attention (only 7% of male respondents selected this), but among those who opted for other or did not disclose their gender, they rated the environmental labels higher (31%). 17% of female respondents selected environmental labels.

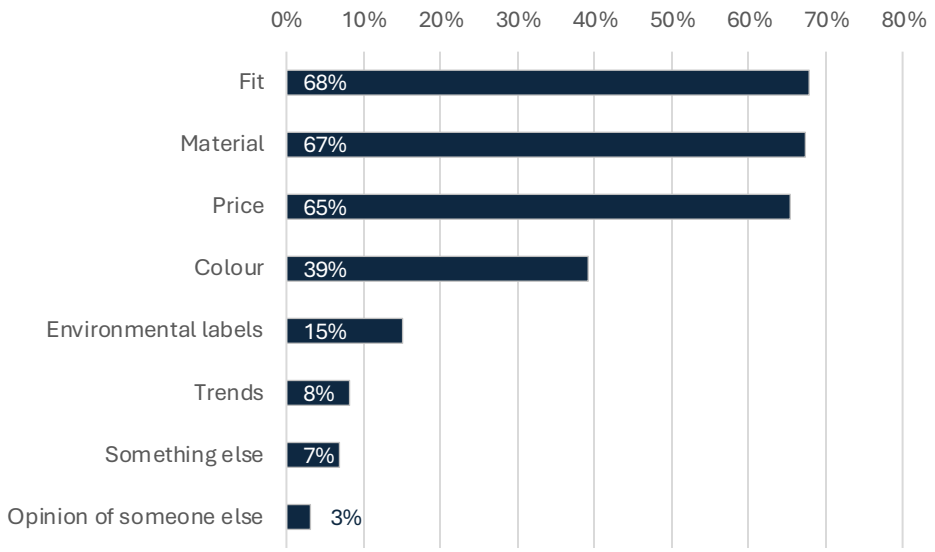

Figure 3. Purchasing Factors of the Respondents (n=610). Respondents were able to select 1-3 options

Further results indicate what the options for treating clothing at the end of its use phase are for the respondents. These are distinguished between clothing that is damaged and hence not usable (Figure 4), or clothing that is still intact, but simply not used anymore (Figure 5).

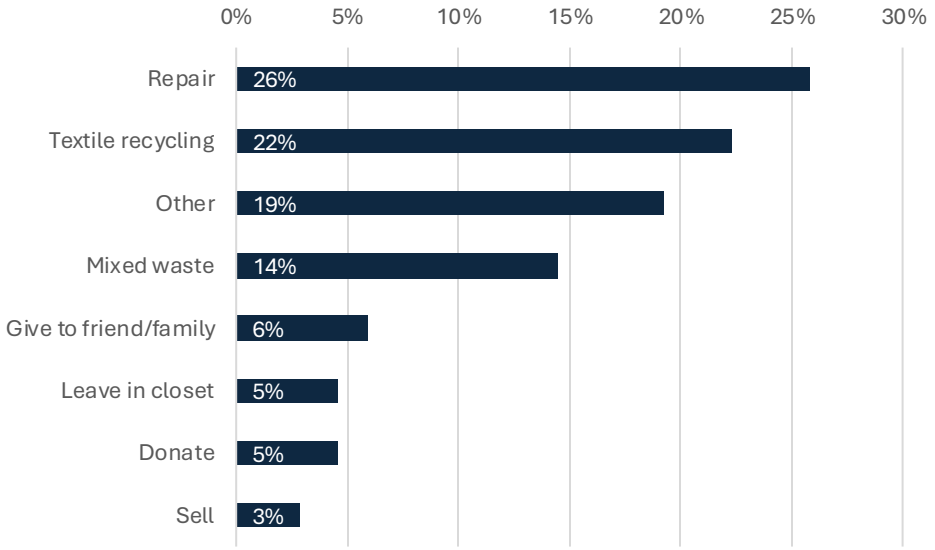

Figure 4. Options for Handling Damaged Clothing (n=588). Respondents were able to select 1 option

The most likely options for handling damaged clothing were repair or textile recycling (Figure 4). The third most popular response was "another purpose (e.g., as a rag)". Since there was no open answer field to be able to assess what this option more specifically is, further analysis is limited. But as indicated, damaged clothing can be used as a rag, or sometimes in Finland also as a material for carpet weaving. Additionally, people hand-damaged clothing– to a lesser degree – to friends or family, leave them in the closet, donate them to second-hand actors, or sell them. There is no substantial difference between genders, except that the group who chose other or non-disclosure for their gender were likely to sell the items (22% and 13%, respectively).

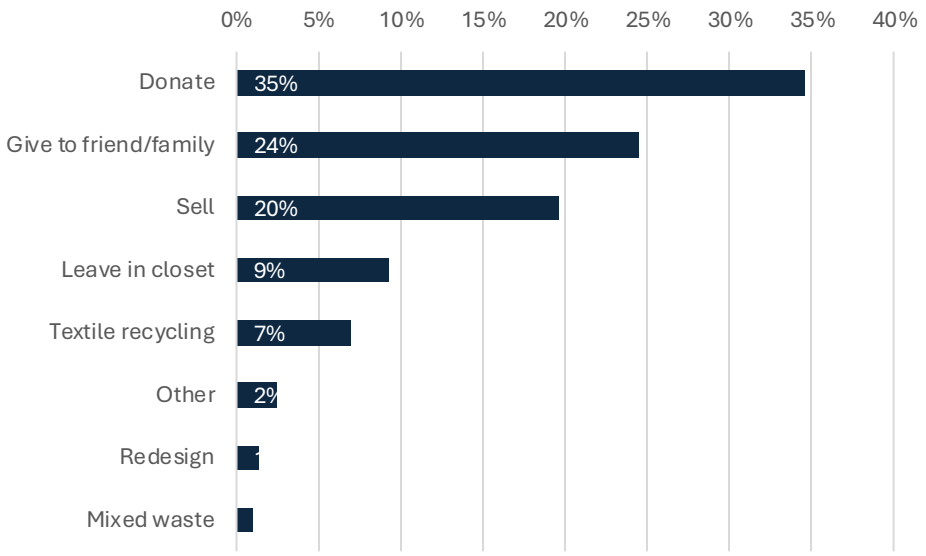

Figure 5. Options for Handling Intact Clothing That Is Not Used Anymore (n=572). Respondents were able to select 1 option

Regarding clothes that are intact, but not used for some reason, most respondents reported donating them to second-hand actors (Figure 5). In Finland, there are several donation options available for citizens, which are mostly non-profit organisations that sell used textiles and other products. Intact clothing is also given to friends or family or sold. For selling, either online or in person, second-hand markets can be used. Some respondents also answered that they leave intact clothing in their closets, or to textile collection points, where textiles are collected, sorted and the materials recycled. A very small portion reported that they would redesign or modernise them. Assessing gender differences revealed that female respondents were more likely to donate the clothing (37%), as opposed to male respondents (22%), and female respondents were less likely to throw the intact clothing to textile recycling than males (5% and 16%, respectively).

In addition to considering what different options the respondents have for clothing they do not use anymore, the end-of-life phase of a garment can also be viewed from the perspective of why the respondents dispose of their garments (Figure 6).

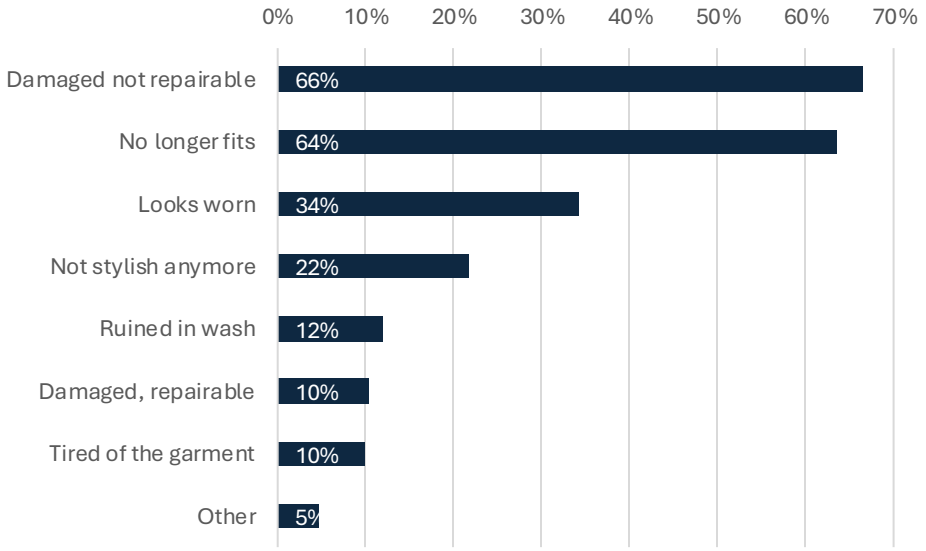

Figure 6. Reasons for Disposing of Garments (n=569). Respondents were able to select 1-3 options

The main reason for disposing of clothing is that the item is damaged and not repairable. What is considered not repairable may be arbitrary, but the responses reflected the view of the respondents on repairability and were not a specific topic of this study. Another typical reason for disposing of a garment is that it no longer fits, especially among female respondents (68% of female, 54% of male respondents selected this option). Differences between genders were also detected for selecting the worn appearance as a disposal reason. 37% of female respondents but only 23% of male respondents selected this option. Regarding emotional durability, particularly the response options "looks worn", "not stylish anymore" and "tired of the garment" emphasise a lack of emotional connectedness to the garment; 56% of all respondents selected one or several of these.

4.2 Life Cycle Lengths

The length of a garment's life cycle, defined by the total number of times it is worn, is a critical determinant of its environmental sustainability. Extended use reduces the production-related environmental impact attributed to each individual wear and is therefore a critical parameter for LCA.

The results suggest that garment type influences the number of uses, but there is also a considerable variability within the empirical data regarding use frequency. The results indicate that underwear gets used the longest (i.e. most wears), and in both underwear and shirts, more than half of the respondents reported to wear them over 100 times (the highest option in the survey was given as "more than 100 times"). For underwear, 88% of respondents reported wearing them more than 50 times, and for shirts, this figure was 87%. On the other hand, only 34% reported wearing festive garments more than 50 times, which indicates that it is not necessarily the material, but the function of the garment, that determines the life cycle length. To support further LCA-based estimations, a rough, quantitative average for each garment type was also estimated. Since the highest class was given as "more than 100 times", for estimating the total sample's average, 130 was used as the highest class mean; for the others, a class mean was used. Underwear and shirts were worn nearly 100 times, but festive garments' average wear times remained half as low (49 times). Assessing the differences between genders (Table A1 in the appendix) suggests that there is not much difference between female and male respondents in the average underwear life cycle (average 100 and 98 times, respectively), but other respondents used them considerably less (average 81.5 times). Shirts were used slightly longer by male respondents (102 times) than by female respondents (97 times). But in festive garments, the difference grew larger; male respondents used them 67 times, and female respondents only 46 times.

Table 2. Responses for Garment Wear Times

Wear times per type of garment	**Response shares**
Underwear	99.5 (average use times)
- less than 10 times	4 %
- 10-50 times	8 %
- 50-75 times	31 %
- more than 100 times	57 %
Shirt	97.5 (average use times)
- less than 10 times	2 %
- 10-50 times	11 %
- 50-75 times	34 %
- more than 100 times	53 %
Festive garment	48.5 (average use times)
- less than 10 times	13 %
- 10-50 times	53 %
- 50-75 times	22 %
- more than 100 times	12 %

4.3 Cluster Analysis

Agglomerative hierarchical clustering was used to cluster the survey responses. A three-cluster solution was chosen for our final analysis (see methods and data for selection criteria). The six-cluster solution was also analysed to see whether interesting sub-clusters emerged. Statistical tests for the significance of differences between the three clusters were conducted for the resulting clusters to aid in the analysis of the most significant contributors to cluster differences. P-value adjustment was done to correct for multiple testing using Benjamini & Hochberg (1995) correction in the adjust_pvalue function of the rstatix package. Results of the tests are reported in Table A2 in the appendix.

By analysing the most significant factors contributing to cluster differences, a characterisation of the three most significant clusters can be seen in Table 3.

Table 3. Characteristics of the Clusters of Consumers

<table>
<tr><th>Cluster 1:
Trend-affected, fast-fashion consumers</th><th>Cluster 2:
Circular, modern consumer with economic incentives</th><th>Cluster 3:
Circular, traditional consumer with long use times</th></tr>
<tr><td rowspan="2">• Trends weigh more in the purchasing choice
• Utilisation of easy disposal options such as mixed municipal waste for damaged items and donations, or leaving in the closet for usable clothes
• Reasons for giving up clothing relate, relatively speaking, more to style and boredom.
• Use times are the shortest
• Online platform shopping is more frequent, as well as returns.
• In comparison to other clusters, this contains relatively more “other” genders, or people who don’t want to disclose their gender.</td><td colspan="2">• Clusters 2 and 3 are similar in their purchasing factors; both value material, fit and price the most in their purchasing decisions, and seldom consider other factors.
• Clusters 2 and 3 are actively repairing broken garments, and report the category of “other” uses as well (possibly wash cloths, carpet weaving)
• Reasons for giving up clothing are mostly rational ones, e.g. the garment being damaged or the wrong size.</td></tr>
<tr><td>• Uses online platforms for purchasing
• Frequent disposal of damaged garments in MSW
• Active in selling their used garments</td><td>• Never use online platforms for purchasing.
• The longest use times.
• Leaving more unused garments in the closet
• In comparison to other clusters, this contains more male respondents.</td></tr>
</table>

5. DISCUSSION

This study aimed to shed light on consumer behaviour across the stages of garment purchase, use, and disposal, with the objective of capturing the diversity and complexity of consumer practices, as well as understanding how circular economy strategies could be integrated into consumer decision-making processes. Different types of consumer clusters were constructed, and as an additional focus, wear times of garments were studied, given the significance in LCA-based studies.

The findings indicate that clothing reuse is a prevalent practice among respondents. A majority reported donating garments that remain in good condition but are no longer used personally. Donations to charitable organisations were more common (35%) than giving items to friends or family members (24%). Additionally, approximately 20% of respondents reported selling their unused clothing as a means of reuse. This is in line with previous findings, e.g. by Koszewska (2019) who found the most popular alternative for disposing of clothing to be directing them to reuse, and by Persson & Hinton (2023) about the acceptance of second-hand clothing slowly becoming a widespread practice in developed regions. According to D’Adamo et al. (2022) this is true especially among environmentally and socially conscious consumers. Nonetheless, the market for second-hand clothing is still small (Dahlbo et al., 2019), and the surplus of discarded items exceeds its demand in developed economies, causing the establishment of alternative markets, i.e. exporting the second-hand clothing to developing countries (Encino-Munoz & Yilan, 2025). This generates both negative effects in the importing countries (lack of proper waste treatment infrastructure, uneven distribution of environmental impacts throughout the life cycle, uneven distribution of economic profits

between exporting and in the receiving country), as well as positive ones (extending clothing's lifespan reducing environmental footprints, provision of affordable items and creating jobs and supporting livelihoods in the Global South) (Encino-Munoz & Yilan, 2025).

Consistent with the findings of Marroncelli (2024), this study identified notable gender-based differences. Female respondents demonstrated a higher prioritisation of most criteria, such as environmental labels, material, and colour. In contrast, male respondents exceeded female respondents only in the importance attributed to the "opinion of somebody else". It is plausible that this "somebody else" may often be a female, suggesting that similar product attributes could still influence the final decision. Additionally, male respondents were slightly more likely to engage in clothing repair, aligning to some extent with McQueen et al. (2022), who reported that men more frequently employ unpaid methods of garment repair. Female participants, on the other hand, were more inclined to sell intact but unused clothing, with the most commonly cited reason for garment disposal being that the item no longer fits.

The findings indicate that garment life cycle length varies significantly by garment type, which is of particular interest to life cycle-based environmental impact calculations (LCAs). Next-to-skin garments (see Laing, 2019) such as underwear and T-shirts are used frequently and washed often, averaging over 100 uses regardless of gender. In contrast, festive clothing is worn less than half as often. These results align with Klepp et al. (2020), but differ notably from Sandin et al. (2019) who report average use frequencies of 30 wears and 15 washes for T-shirts, and 26 wears and 9 washes for dresses. Sandin et al.'s (2019) estimates, based on market demand data, likely reflect broader consumer variability and garment subtypes. Similarly, the European Commission (2021) outlines standardised use estimates for LCAs – 45 for T-shirts, 60 for underwear, and 70 for dresses – that deviate from our data. These inconsistencies highlight the challenge of applying average garment lifespans in LCAs, particularly when impacts are calculated per use. This underscores the need for more realistic, empirically grounded assumptions about garment use in LCA modelling, emphasised also by Klepp et al. (2020). The absolute results of wear times (and of any other responses in this survey) may, however, be triggered by a social desirability bias, in which the respondents reply in a more socially acceptable way than what their true behaviour is (Villar, 2008).

The cluster analysis reveals distinct consumer patterns, underscoring that consumers are not a homogenous group and may respond differently to circular solutions. The most evident contrast exists between Cluster 1, trend-driven fast fashion consumers who use garments for relatively short periods of time, and Clusters 2 and 3, representing more circular consumers who extend garment use through repair and only discard items when reasons are insurmountable. However, also Clusters 2 and 3 are distinct: Cluster 2 includes more modern, economic conscious consumers, who are active in selling their used garments and purchase more from online stores, while Cluster 3 is the more traditional (male-dominated) group, who never buy from online, and are clearly the ones who use garments for the longest. These findings echo Koszewska's (2013) study of Polish consumers, which identified six clusters based solely on the purchasing factors. Similar to our Cluster 1, it distinguished a group called "fashionistas" who follow trends and disregard environmental factors as such. However, they did care about the material composition and place of production. Both studies highlight a division between consumers using either environmental or economic reasons for buying used items, and consumers disregarding fast trends.

The reason why the information on different consumer types is important for implementing circular consumption patterns is the acknowledgement that there is no one-size-fits-all approach, according to which all consumers could be affected. Cluster 1, as the group more appreciative of trends and ease of consumption, requires accordingly planned circular solutions to become impactful: utilising brands or influencers as slow-trend setters, utilising digital interventions (e.g., gamified wardrobe apps or digital product passports) and promoting easy repair services. Simultaneous focus on fresh design options to support restyling a garment, in case of boredom, may also become more intriguing for this cluster. Especially for this group, emotional connectedness of the consumer and feelings of attachment (Den Hollander et al., 2017) to the garment needs to be strengthened by new means, as proposed by Fletcher (2014) through individual stories and individual, but shared responsibility. Also, the other emotional durability factors could be leveraged to propose ways to sway Cluster 1 consumers to alter their consumption patterns: allowing for customisable products, supporting aesthetic timelessness, or even associating the product with celebrities supporting long life cycles instead of additional consumption. The remote, untransparent supply chains of garments only support limited valuation of the product and disconnect from the impacts of producing it. Finally, higher pricing of garments and regulating ultra-cheap fashion may be needed to shift consumption behaviour.

On the other hand, both Clusters 2 and 3 report already at current as being quite sustainable and circular consumers; both repair clothing, use them more, and throw them away only when they are no longer repairable or the incorrect size. Regarding durability, these clusters may benefit from technical durability improvements, such as material or other product integrity-related improvements. Also, they could benefit from further product information relating to material and fit, but also from other rational and functional solutions that may improve the products' sustainability, like care and repair instructions. However, the economically conscious consumers in Cluster 2 could benefit from economic instruments being used to support repairs and second-hand markets. Since they also use online stores, information regarding various circular garment solutions and sustainability issues on the internet (especially online stores) may be more accessible. As for Cluster 3, disclosing product-related sustainability information through online stores can be deemed inefficient, and other means for information sharing need to be considered. Cluster 3, which (together with Cluster 1) also tends to leave unused clothes in the closet, would require some sort of promotion or incentive to go through their old clothes to use them more efficiently or circulate them to new users. Cluster 1 and Cluster 2 are also disposing of damaged items in MSW, and thus, economic incentives and placement of textile collection for recycling could help mitigate this behaviour. These solutions for individual clusters are presented in Figure 7.

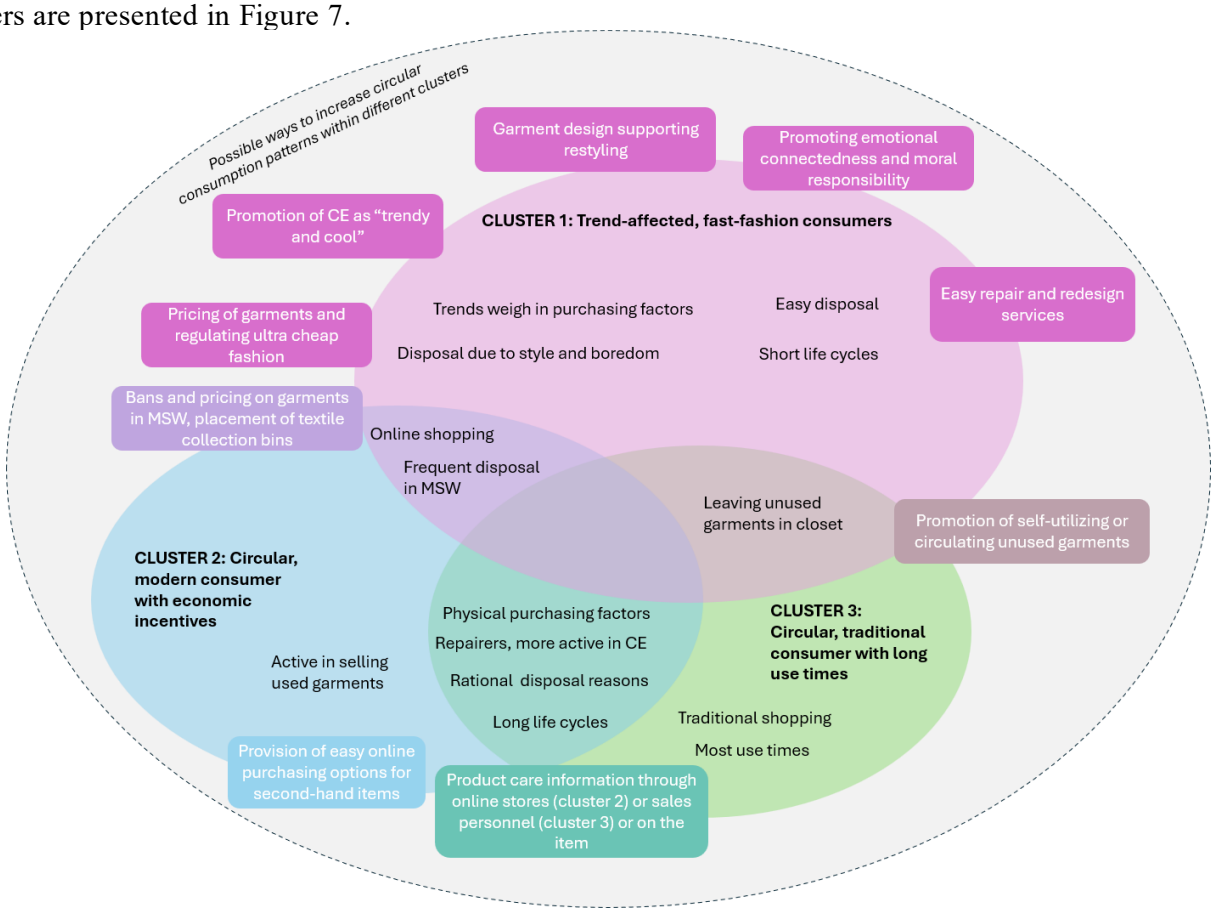

Figure 7. Clusters and Their Characteristics, Highlighting Potential Solutions Targeting These Clusters

As for the implicit question framing the research, i.e. what a sustainable consumption pattern is, the response is still limited. Garment consumption has surged in the last 20 years (Ellen MacArthur Foundation, 2017), far exceeding basic human needs (Max-Neef, 1991). As Roos et al. (2017) suggest, the sustainable consumption of clothing can be reflected against planetary boundaries to assess whether commonly proposed circularity actions are sufficient in relation to the impact reduction necessary according to the planetary boundaries (instead of a mere product-level assessment), requiring a complex and dynamic global demand model. However, approaching the question from a CE perspective, the high consumption levels may be sustained through reuse, repair and recycling (see e.g., Potting et al., 2017), though better implementation of refusal strategies is needed for systemic change. In

other words, some CE solutions are relatively easy to implement (but may yield limited impact), such as recycling or basic repair services, while others require more systemic and long-term transformations, such as shifts in consumption behaviour, self-utilisation of unused garments, redesign of online shopping platforms, and promoting CE as "trendy and cool". Our results suggest that consumers pay some, albeit limited, attention to functional or emotional durability during purchase. More impactful, however, are consumer behaviours during use (large variability between garment use phases) and post-use (selection of repair, reuse, recycling). The sustainability of different circularity options depends on their effect on the overall textile system. If the supply of new textiles keeps increasing despite of, e.g., increased reuse or longer use times of single garments, the sustainability of textile systems doesn't increase. Also, we have examples of responsible textile value chain operators, who offer second-hand textiles side by side with new textiles and offer repair and recycling services. However, most consumer behaviour is influenced by substantial external pressures and economic incentives favouring new purchases, due to which future research should clarify how responsibility is shared between consumers and other actors in the CE.

Further limitations of this study relate to the unbalanced gender representation to ensure broader applicability of the results, as well as to the lack of information about the age distribution. The results of the cluster analysis may be explained by an uneven age distribution among female, male, other and undisclosed gender categories, but since this data was not collected, the age impact remains uncertain. Future studies could strengthen our findings by triangulating self-reported sustainability behaviours with objective data sources such as textile collection, recycling statistics or even trackers and mobile apps, providing a more accurate picture of actual consumer practices. Also, gender- and age biases should be accounted for through more robust sampling methods.

6. CONCLUSION

This study addresses consumer decisions during the different stages of consumption, as well as different types of consumption patterns. According to the survey and its statistical analysis, there is a large variability between consumers regarding the choices they make during purchase, use and post-use phases of a garment. Material, fit and price are highly valued when a garment is purchased, and repair, recycling and reuse options are used when discontinuing the use of a garment. The use times of garments depend on the garment type (e.g. next-to-skin versus festive garment) as well as gender, and the wear times range from 35 wear times to well beyond 100 wear times, leading to often unrepresentative environmental footprint estimations. Three clusters of consumers are distinguished, all of which require differently tailored or differently shared CE solutions to become most impactful. For the first group involving trend-affected, fast fashion consumers, e.g., easy CE services and garment design could be investigated. For the second and third groups that exhibited more conscious consumption patterns and utilised CE practices on different levels, their actions could be further promoted through different strategies, like sharing garment repair instructions and supporting second-hand markets. Importantly, the findings underline that while consumers play a role in enabling circularity, systemic sustainability will only be realised through coordinated actions across the textile value chain, including regulation, business innovation, and broader cultural shifts, rather than relying solely on individual behavioural change.

AUTHOR CONTRIBUTIONS

Susanna Horn – conceptualisation, methodology, formal analysis, investigation, writing, visualisation
Teemu Meriläinen – methodology, formal analysis, writing
Helena Dahlbo – conceptualisation, methodology, investigation, writing
Kiia Silvennoinen – conceptualisation, methodology, investigation, writing, visualisation

DECLARATIONS

Competing interests - The authors declare no competing interests.

REFERENCES

Aramendia-Muneta, M. E., Ollo-López, A., & Simón-Elorz, K. (2022). Circular Fashion: Cluster Analysis to Define Advertising Strategies. *Sustainability*, *14*(20), Article 20. https://doi.org/10.3390/su142013365

Barrera-Verdugo, G., & Villarroel-Villarroel, A. (2022). Influence of product selection criteria on clothing purchase and post-purchase behaviours: A gender and generational comparison. *PLOS ONE*, *17*(6), e0267783. https://doi.org/10.1371/journal.pone.0267783

Benjamini, Y., & Hochberg, Y. (1995). Controlling the false discovery rate: a practical and powerful approach to multiple testing. Journal of the Royal Statistical Society Series B, 57, 289–300. https://doi.org/10.1111/j.2517-6161.1995.tb02031.x.Betzler, S., Kempen, R., & Mueller, K. (2022). Predicting sustainable consumption behavior: Knowledge-based, value-based, emotional and rational influences on mobile phone, food and fashion consumption. *International Journal of Sustainable Development & World Ecology*, *29*(2), 125–138. https://doi.org/10.1080/13504509.2021.1930272

Bjerregaard Jensen, M. (2021). *Emotional Durability: Strategies and Future Integration – A Case Study* [Master's Thesis, University of Borås, Faculty of Textiles, Engineering and Business]. urn:nbn:se:hb:diva-26342

Bocken, N. M. P., De Pauw, I., Bakker, C., & Van Der Grinten, B. (2016). Product design and business model strategies for a circular economy. *Journal of Industrial and Production Engineering*, *33*(5), 308–320. https://doi.org/10.1080/21681015.2016.1172124

Chen, X., Memon, H. A., Wang, Y., Marriam, I., & Tebyetekerwa, M. (2021). Circular Economy and Sustainability of the Clothing and Textile Industry. *Materials Circular Economy*, *3*(1), 12. https://doi.org/10.1007/s42824-021-00026-2

Cruz-Cárdenas, J., Guadalupe-Lanas, J., & Velín-Fárez, M. (2019). Consumer value creation through clothing reuse: A mixed methods approach to determining influential factors. *Journal of Business Research*, *101*, 846–853. https://doi.org/10.1016/j.jbusres.2018.11.043

D'Adamo, I., Lupi, G., Morone, P., & Settembre-Blundo, D. (2022). Towards the circular economy in the fashion industry: The second-hand market as a best practice of sustainable responsibility for businesses and consumers. *Environmental Science and Pollution Research*, *29*(31), 46620–46633. https://doi.org/10.1007/s11356-022-19255-2

Dahlbo, H., Rautiainen, A., Savolainen, H., Oksanen, P., Nurmi, P., Virta, M., & Pokela, O. (2019). *Textile flows in Finland 2019* (No. 276; Reports from Turku University of Applied Sciences). Turku University of Applied Sciences. https://www.theseus.fi/bitstream/handle/10024/818466/isbn9789522167873.pdf?sequence=2&isAllowed=y

Den Hollander, M. C., Bakker, C. A., & Hultink, E. J. (2017). Product Design in a Circular Economy: Development of a Typology of Key Concepts and Terms. *Journal of Industrial Ecology*, *21*(3), 517–525. https://doi.org/10.1111/jiec.12610

Dissanayake, D. G. K., & Weerasinghe, D. U. (2021). Fabric Waste Recycling: A Systematic Review of Methods, Applications, and Challenges. *Materials Circular Economy*, *3*(1), 24. https://doi.org/10.1007/s42824-021-00042-2

Ecolabel Index. (2025). *All ecolabels*. https://www.ecolabelindex.com/ecolabels/

Ellen MacArthur Foundation. (2017). *A New Textiles Economy: Redesigning fashion's future*. https://www.ellenmacarthurfoundation.org/a-new-textiles-economy

Encino-Munoz, A. G., & Yilan, G. (2025). Second-hand clothing and sustainability in the fashion sector: Analysing visions on circular strategies through SWOT/ANP method. *Journal of Cleaner Production*, *493*, 144909. https://doi.org/10.1016/j.jclepro.2025.144909

Ertz, M., Leblanc-Proulx, S., Sarigöllü, E., & Morin, V. (2019). Advancing quantitative rigor in the circular economy literature: New methodology for product lifetime extension business models. *Resources, Conservation and Recycling*, *150*, 104437. https://doi.org/10.1016/j.resconrec.2019.104437

European Commission. (2021). *Product environmental footprint category rules (pefcr) apparel and footwear*.

European Commission. (2022). *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the committee of the Regions. EU Strategy for Sustainable and Circular Textiles.* https://environment.ec.europa.eu/publications/textiles-strategy_en

Fletcher, K. (2012). Durability, Fashion, Sustainability: The Processes and Practices of Use. *Fashion Practice*, *4*(2), 221–238. https://doi.org/10.2752/175693812X13403765252389

Fletcher, K. (2014). In the Hands of the User: The Local Wisdom Project and the Search for an Alternative Fashion system. *The Journal of Design Strategies*, *2014*(7(1)). https://issuu.com/journalofdesignstrategies/docs/the_journal_of_design_strategies_vo_088cf55a6bc566

Flood Heaton, R., & McDonagh, D. (2017). Can Timelessness through Prototypicality Support Sustainability? A Strategy for Product Designers. *The Design Journal*, *20*(sup1), S110–S121. https://doi.org/10.1080/14606925.2017.1352671

Gwozdz, W., Steensen Nielsen, K., & Müller, T. (2017). An Environmental Perspective on Clothing Consumption: Consumer Segments and Their Behavioral Patterns. *Sustainability*, *9*(5), Article 5. https://doi.org/10.3390/su9050762

Haines, S., & Lee, S. H. (Mark). (2021). One size fits all? Segmenting consumers to predict sustainable fashion behavior. *Journal of Fashion Marketing and Management: An International Journal*, *26*(2), 383–398. https://doi.org/10.1108/JFMM-08-2020-0161

Haines-Gadd, M., Chapman, J., Lloyd, P., Mason, J., & Aliakseyeu, D. (2018a). Emotional Durability Design Nine—A Tool for Product Longevity. *Sustainability*, *10*(6), 1948. https://doi.org/10.3390/su10061948

Haines-Gadd, M., Chapman, J., Lloyd, P., Mason, J., & Aliakseyeu, D. (2018b). Emotional Durability Design Nine—A Tool for Product Longevity. *Sustainability*, *10*(6), Article 6. https://doi.org/10.3390/su10061948

Horn, S., Mölsä, K. M., Sorvari, J., Tuovila, H., & Heikkilä, P. (2023). Environmental sustainability assessment of a polyester T-shirt – Comparison of circularity strategies. *Science of The Total Environment*, *884*, 163821. https://doi.org/10.1016/j.scitotenv.2023.163821

Iran, S., Geiger, S. M., & Schrader, U. (2019). Collaborative fashion consumption – A cross-cultural study between Tehran and Berlin. *Journal of Cleaner Production*, *212*, 313–323. https://doi.org/10.1016/j.jclepro.2018.11.163

Jerome, A., & Ljunggren, M. (2025). Product lifetime in life cycle assessments of circular economy strategies—A review and consolidation of methodology. *The International Journal of Life Cycle Assessment*. https://doi.org/10.1007/s11367-025-02470-7

Johnstone, L., & Lindh, C. (2022). Sustainably sustaining (online) fashion consumption: Using influencers to promote sustainable (un)planned behaviour in Europe's millennials. *Journal of Retailing and Consumer Services*, *64*, 102775. https://doi.org/10.1016/j.jretconser.2021.102775

Kassambara, A. (2023)._rstatix: Pipe-Friendly Framework for Basic Statistical Tests. R package version 0.7.2, https://CRAN.R-project.org/package=rstatix.

Klepp, I. G., Laitala, K., & Wiedemann, S. (2020). Clothing Lifespans: What Should Be Measured and How. *Sustainability*, *12*(15), 6219. https://doi.org/10.3390/su12156219

Koszewska, M. (2013). A typology of Polish consumers and their behaviours in the market for sustainable textiles and clothing. *International Journal of Consumer Studies*, *37*(5), 507–521. https://doi.org/10.1111/ijcs.12031

Koszewska, M. (2018). Circular Economy—Challenges for the Textile and Clothing Industry. *Autex Research Journal*, *18*(4), 337–347. https://doi.org/10.1515/aut-2018-0023

Koszewska, M. (2019). 9—Circular economy in textiles and fashion—The role of a consumer. In S. S. Muthu (Ed.), *Circular Economy in Textiles and Apparel* (pp. 183–206). Woodhead Publishing. https://doi.org/10.1016/B978-0-08-102630-4.00009-1

Laing, R. M. (2019). Natural fibres in next-to-skin textiles: Current perspectives on human body odour. *SN Applied Sciences*, *1*(11), 1329. https://doi.org/10.1007/s42452-019-1388-1

Lundblad, L., & Davies, I. A. (2016). The values and motivations behind sustainable fashion consumption. *Journal of Consumer Behaviour*, *15*(2), 149–162. https://doi.org/10.1002/cb.1559

Ma, F., Shi, H., Chen, L., & Luo, Y. (2012). A Theory on Fashion Consumption. *Journal of Management and Strategy*, *2012*(3(4)), 84–92.

Manchiraju, S., & Sadachar, A. (2014). Personal values and ethical fashion consumption. *Journal of Fashion Marketing and Management*, *18*(3), 357–374. https://doi.org/10.1108/JFMM-02-2013-0013

Marroncelli, R. (2024). *The emotional durability of fast fashion: Male and female perspectives* [PhD Thesis, Nottingham Trent University]. https://irep.ntu.ac.uk/id/eprint/51249/

Max-Neef, M. (1991). *Human Scale Development: Conception, Application and Further Reflections*. Apex Press.

McQueen, R. H., McNeill, L. S., Huang, Q., & Potdar, B. (2022). Unpicking the Gender Gap: Examining Socio-Demographic Factors and Repair Resources in Clothing Repair Practice. *Recycling*, *7*(4), 53. https://doi.org/10.3390/recycling7040053

Miyamoto, S. (2022). *Theory of Agglomerative Hierarchical Clustering* (Vol. 15). Springer. https://doi.org/10.1007/978-981-19-0420-2

Mölsä, K. M., Horn, S., Dahlbo, H., & Rissanen, M. (2022). Linear, reuse or recycling? An environmental comparison of different life cycle options for cotton roller towels. *Journal of Cleaner Production*, *374*, 133976. https://doi.org/10.1016/j.jclepro.2022.133976

Munasinghe, P., Druckman, A., & Dissanayake, D. G. K. (2021). A systematic review of the life cycle inventory of clothing. *Journal of Cleaner Production*, *320*, 128852. https://doi.org/10.1016/j.jclepro.2021.128852

Murtagh, F., & Legendre, P. (2014). Ward's Hierarchical Agglomerative Clustering Method: Which Algorithms Implement Ward's Criterion? *Journal of Classification*, *31*(3), 274–295. https://doi.org/10.1007/s00357-014-9161-z

Muthu, S. S. (2015). *Handbook of Life Cycle Assessment (LCA) of Textiles and Clothing*. Elsevier Science & Technology.

O'Cass, A. (2000). An assessment of consumers product, purchase decision, advertising and consumption involvement in fashion clothing. *Journal of Economic Psychology*, *21*(5), 545–576. https://doi.org/10.1016/S0167-4870(00)00018-0

Park, H., Lee ,Min-Young, & and Koo, W. (2017). The four faces of apparel consumers: Identifying sustainable consumers for apparel. *Journal of Global Fashion Marketing*, *8*(4), 298–312. https://doi.org/10.1080/20932685.2017.1362988

Peattie, K. (2010). Green Consumption: Behavior and Norms. *Annual Review of Environment and Resources*, *35*(1), 195–228. https://doi.org/10.1146/annurev-environ-032609-094328

Persson, O., & Hinton, J. B. (2023). Second-hand clothing markets and a just circular economy? Exploring the role of business forms and profit. *Journal of Cleaner Production*, *390*, 136139. https://doi.org/10.1016/j.jclepro.2023.136139

Potting, J., Hekkert, M., Worrell, E., & Hanemaaijer, A. (2017). *Circular Economy: Measuring Innovation in the Product Chain* (No. Policy Report 2544). PBL Netherlands Environmental Assessment Agency.

R Core Team. (2024). *R: The R Project for Statistical Computing* (Version 4.4.1) [R; Windows 11 x64 (build 22621)]. R Foundation for Statistical Computing. https://www.r-project.org/

Rausch, T. M., Baier, D., & Wening, S. (2021). Does sustainability really matter to consumers? Assessing the importance of online shop and apparel product attributes. *Journal of Retailing and Consumer Services*, *63*, 102681. https://doi.org/10.1016/j.jretconser.2021.102681

Roos, S., Sandin, G., Zamani, B., Peters, G., & Svanström, M. (2017). Will Clothing Be Sustainable? Clarifying Sustainable Fashion. In S. S. Muthu (Ed.), *Textiles and Clothing Sustainability* (pp. 1–45). Springer Singapore. https://doi.org/10.1007/978-981-10-2182-4_1

Sandin, G., & Peters, G. M. (2018). Environmental impact of textile reuse and recycling – A review. *Journal of Cleaner Production*, *184*, 353–365. https://doi.org/10.1016/j.jclepro.2018.02.266

Sandin, G., Roos, S., Björn Spak, Zamani, B., & Peters, G. (2019). *Environmental assessment of Swedish clothing consumption—Six garments, sustainable futures* (Vol. 2019). RISE.

Schiaroli, V., Fraccascia, L., & Dangelico, R. M. (2024). How can consumers behave sustainably in the fashion industry? A systematic literature review of determinants, drivers, and barriers across the consumption phases. *Journal of Cleaner Production*, *483*, 144232. https://doi.org/10.1016/j.jclepro.2024.144232

Statista. (2025a). *Apparel industry CO2e emissions projection 2019-2030*. Statista. https://www.statista.com/statistics/1305696/apparel-industry-co2e-emissions/

Statista. (2025b). *Global: Apparel volume 2019-2029*. Statista. https://www.statista.com/forecasts/1307850/worldwide-consumption-of-clothing-items

Steinberger, J. K., Friot, D., Jolliet, O., & Erkman, S. (2009). A spatially explicit life cycle inventory of the global textile chain. *The International Journal of Life Cycle Assessment*, *14*(5), 443–455. https://doi.org/10.1007/s11367-009-0078-4

Suikkanen, J., Saarinen, I., & Näyhä, A. (2022). Practices and perceptions on ecolabels of Finnish companies with circular economy business models. *E3S Web of Conferences*, *349*, 01005. https://doi.org/10.1051/e3sconf/202234901005

Textile Exchange. (2024). *Materials Market Report* (No. September 2024; p. 76). https://textileexchange.org/app/uploads/2024/09/Materials-Market-Report-2024.pdf

Villar, A. (2008). Response Bias. In *Encyclopedia of survey research methods* (Vol. 0, pp. 752–753). Sage Publications, Inc. https://doi.org/10.4135/9781412963947.n486

Xu, J., Zhou, Y., Jiang, L., & Shen, L. (2022). Exploring Sustainable Fashion Consumption Behavior in the Post-Pandemic Era: Changes in the Antecedents of Second-Hand Clothing-Sharing in China. *Sustainability*, *14*(15), 9566. https://doi.org/10.3390/su14159566

Yoon, N., Lee, H. K., & Choo, H. J. (2020). Fast Fashion Avoidance Beliefs and Anti-Consumption Behaviors: The Cases of Korea and Spain. *Sustainability*, *12*(17), 6907. https://doi.org/10.3390/su12176907

Zhang, Y., Kang, H., Hou, H., Shao, S., Sun, X., Qin, C., & Zhang, S. (2018). Improved design for textile production process based on life cycle assessment. *Clean Technologies and Environmental Policy*, *20*(6), 1355–1365. https://doi.org/10.1007/s10098-018-1572-9

Ziyeh, P., & Cinelli, M. (2023). A Framework to Navigate Eco-Labels in the Textile and Clothing Industry. *Sustainability*, *15*(19), 14170. https://doi.org/10.3390/su151914170

APPENDIX

Table A1. List of Survey Questions and Summary of Responses

	All (n=629)	Female (n= 480), percentage in questions 2-10 indicate percentage of all female respondents	Male (n=106), percentage in questions 2-10 indicate percentage of all male respondents	Other (n=16), percentage in questions 2-10 indicate percentage of all other respondents	Prefer not so say (n=27), percentage in questions 2-10 indicate percentage of all respondent not disclosing gender
1. What is your gender?					
Female		76 %			
Male			17 %		
Other				3 %	
Prefer not to say					4 %
2. What do you pay attention to when purchasing clothing? Choose 1-3 options.					
• Environmental labels	15 %	16 %	9 %	0 %	22%
• Material	65 %	71 %	51 %	38 %	41 %
• Color	38 %	40 %	28 %	31 %	37 %
• Trendiness	8 %	9 %	5 %	19 %	4 %
• Fit	66 %	70 %	59 %	25 %	48 %
• My companion's opinion	3 %	2 %	6 %	13%	4 %
• Price	63 %	66 %	57 %	56 %	52 %
• Something else	7 %	6 %	9 %	13 %	7 %
(no response)	*3 %*				
3. What do you usually do with damaged clothing? Choose 1 option.					
• I repair it	24 %	24 %	25 %	19 %	30 %
• I give it to someone I know for reuse	6 %	5 %	8 %	0 %	11 %
• I donate it to a second-hand actor	4 %	4 %	7 %	0 %	4 %
• I sell it myself	3 %	1 %	5 %	19 %	7 %
• I use it for another purpose (e.g., as a rag)	18 %	19 %	16 %	0 %	11 %
• I bring it to textile recycling	21 %	24 %	16 %	6 %	0 %

• I throw it to regular waste	13 %	14 %	10 %	13 %	11 %
• I do nothing, just leave it in my closet	4 %	4 %	7 %	13 %	4 %
•					
(no response)	*7 %*				
4. What do you usually do with usable clothing that you don't want to wear anymore? Choose 1 option.					
• Hand it over for reuse by someone I know	22 %	24 %	19 %	13 %	19 %
• Donate it to a second-hand actor	31 %	35 %	21 %	6 %	26 %
• Sell it	18 %	20 %	9 %	19 %	4 %
• Redesign it	1 %	1 %	1 %	0 %	4 %
• Bring it to textile recycling	6 %	5 %	13 %	0 %	4 %
• Throw it to regular waste	1 %	1 %	2 %	6 %	0 %
• Leave it in my closet	8 %	7 %	14 %	19 %	4 %
• Other	2 %	1 %	7 %	0 %	7 %
(no response)	*9 %*				
5. What are the most common reasons for you to give up clothing? Choose 1-3 options.					
• The garment is damaged and cannot be repaired.	60 %	62 %	63 %	31 %	37 %
• The garment is damaged. It would be fixable, but I don't feel like doing it.	9 %	10 %	9 %	0 %	0 %
• The garment has been ruined in the wash.	11 %	12 %	8 %	0 %	4%
• The garment no longer fits.	57 %	63 %	44 %	31 %	30 %
• The garment looks worn.	31 %	35 %	20 %	19 %	15 %
• The garment is no longer appropriate in style.	20 %	22 %	10 %	25 %	19 %
• I'm bored of the garment.	9 %	10 %	6 %	13 %	7 %

• Other	4 %	3 %	5 %	6 %	19 %
(no response)	*10%*				
6. On average, how many times do you use the same piece of underwear before getting rid of it?	Average 99,5 times	Average 100,2 times	Average 98,3 times	Average 81,5 times	Average 90,3 times
Less than 10 times	4 %	2 %	6 %	19 %	7 %
10–50 times	8 %	8 %	7%	0 %	0 %
50–100 times	31 %	29 %	24 %	13 %	26 %
More than 100 times	57 %	53 %	49 %	31 %	30 %
7. On average, how many times do you use the same shirt before getting rid of it?	Average 97,5 times	Average 96,6 times	Average 102,4 times	Average 84 times	Average 102 times
Less than 10 times	2 %	2 %	2 %	13 %	0 %
10–50 times	11 %	10 %	9 %	6 %	7 %
50–100 times	34 %	34 %	21 %	13 %	15 %
More than 100 times	53 %	47 %	52 %	31 %	37 %
8. On average, how many times do you use the same festive or party clothing before getting rid of it?	Average 48,5 times	Average 45,6 times	Average 66,6 times	Average 35 times	Average 43,7 times
Less than 10 times	13 %	14 %	3 %	25 %	7 %
10–50 times	53 %	51 %	34 %	19 %	33 %
50–100 times	22 %	18 %	26 %	6 %	19 %
More than 100 times	12 %	10 %	19 %	6 %	0 %
9. How often do you order new or second-hand clothes from the internet?					
Never	30 %	25 %	40 %	6 %	4 %
A few times a year	61 %	58 %	42 %	44 %	41 %
Monthly	8 %	8 %	2 %	0 %	11 %
Several times a month	1 %	1 %	1 %	0 %	4 %
10. Do you return new or second-hand clothes you have ordered from the internet?					
I usually don't return the products I order	39 %	35 %	33 %	13 %	30 %
I sometimes return the products I buy	33 %	32 %	17 %	13 %	26 %
I return a large portion of the products I buy	5 %	4 %	3 %	13 %	4 %
I don't buy products from online stores	24 %	20 %	31 %	6 %	0 %

Table A2: Chi-square testing of differences between clusters

variable	statistic	p. value	parameter	method	p.value.adj	p.value.adj. signif
Language	67.90	0.00	6	Pearson's Chi-squared test	0.00	****
Q1: What is your gender?	50.07	0.00	6	Pearson's Chi-squared test	0.00	****
Q2: What do you pay attention to when purchasing clothing? Environmental labels	0.90	0.64	2	Pearson's Chi-squared test	0.64	ns
Q2: Material	67.36	0.00	2	Pearson's Chi-squared test	0.00	****
Q2: Color	12.73	0.00	2	Pearson's Chi-squared test	0.00	**
Q2: Trendiness	62.39	0.00	2	Pearson's Chi-squared test	0.00	****
Q2: Fit	21.33	0.00	2	Pearson's Chi-squared test	0.00	****
Q2: My companion's opinion	8.80	0.01	2	Pearson's Chi-squared test	0.02	*
Q2: Price	23.86	0.00	2	Pearson's Chi-squared test	0.00	****
Q2: Something else	8.00	0.02	2	Pearson's Chi-squared test	0.02	*
Q3 What do you usually do with damaged clothing?	105.64	0.00	16	Pearson's Chi-squared test	0.00	****
Q4 What do you usually do with usable clothing that you don't want to wear anymore?	54.85	0.00	14	Pearson's Chi-squared test	0.00	****
Q5: The garment has been ruined in the wash.	5.57	0.06	2	Pearson's Chi-squared test	0.07	ns
Q5: The garment no longer fits.	15.54	0.00	2	Pearson's Chi-squared test	0.00	***
Q5: The garment looks worn.	6.39	0.04	2	Pearson's Chi-squared test	0.05	ns
Q5: The garment is no longer appropriate in style.	4.59	0.10	2	Pearson's Chi-squared test	0.11	ns
Q5: I'm bored of the garment.	5.58	0.06	2	Pearson's Chi-squared test	0.07	ns
Q5: Other	1.85	0.40	2	Pearson's Chi-squared test	0.41	ns
Q6 On average, how many times do you use the same piece of underwear before getting rid of it?	134.14	0.00	6	Pearson's Chi-squared test	0.00	****
Q7 On average, how many times do you use the same shirt before getting rid of it?	162.73	0.00	6	Pearson's Chi-squared test	0.00	****
Q8 On average, how many times do you use the same festive or party clothing before getting rid of it?	35.72	0.00	6	Pearson's Chi-squared test	0.00	****
Q9 How often do you order new or second-hand clothes from the internet?	486.71	0.00	6	Pearson's Chi-squared test	0.00	****
Q10 Do you return new or second-hand clothes you have ordered from the internet?	453.83	0.00	6	Pearson's Chi-squared test	0.00	****

Differences between clusters were tested in R using the chisq.test -function from the stats-package and p-values were adjusted for multiple testing using adjust_pvalue –function from the rstatix-package (version 0.7.2; Kassambara (2023)), using the Benjamin-Hochberg (1995) correction. Question 10 and language were not used in the clustering of the respondents.