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Secondhand fashion subscription boxes: A necessary condition analysis of purchase intention determinants

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ABSTRACT

Research indicates that the fashion industry can be made more environmentally friendly by introducing a closed-loop economy – also known as a circular economy – and implementing sustainable business models in areas such as clothing resale, rental, repair, and remake. Secondhand clothing is the sector to which research attributes the greatest potential for success in introducing new sustainable business models. This study examines the secondhand subscription box and eleven potential determinants from the secondhand fashion consumption literature. It complements a constraint-based approach (Necessary Condition Analysis – NCA) with an effect-based approach (regression analysis) to identify the necessary-but-not-sufficient conditions and the key (regression) factors shaping purchase intention. Using a sample of 215 German participants, we found that most determinants are necessity-based bottlenecks. They must be present and reach a certain threshold. Some are also key factors that drive purchase intention. The relevance of the determinants varies across sub-groups. This has implications for both academia and practice in designing secondhand subscription boxes. However, the study reveals that the determinants are context-dependent and no general principle can be transferred to other circular economy or sustainable consumption contexts.

1. Introduction

With a market value of $1.5 trillion, the clothing sector is one of the largest industries worldwide. The strong growth of this sector is a testament to the fast fashion industry, which operates according to the "take-make-waste" principle and follows a linear chain (Ikram, 2022; Levänen et al., 2021). Research indicates that the fashion industry can be made more environmentally friendly by introducing a closed-loop economy – also known as a circular economy – and the implementation of sustainable business models in areas such as clothing resale, rental, repair, and remake (Vehmas et al., 2018). When implementing circular business models in the market, consumer acceptance is important and, therefore, providers must adopt a customer-centric perspective (Becker-Leifhold and Iran, 2018; Kirchherr et al., 2017). The success of a new circular business model is greatest when consumers can maintain their previous behavior (Armstrong et al., 2016). According to Morrison et al. (2019), consumers are characterized by their desire for and expectation of variety, as well as regular access to new fashion products and novelties. Therefore, reuse practices are a good choice for an environmentally friendly business model (Dahlbo et al., 2017; Levänen et al., 2021; Simon, 2023). This is consistent with consumers showing an increased interest in reuse concepts (Vehmas et al., 2018).

One reuse option is subscription models for clothing rental (Baek and Oh, 2021; Bodenheimer et al., 2022; Helinski and Schewe, 2022; Lee-G. et al., 2019; Park and Armstrong, 2019; Rese and Baier, 2025; Tu and Hu, 2018). However, several providers in the clothing rental sector have failed to achieve success (Waldow, 2022; Yang, 2021). One of the reasons frequently mentioned in the literature is the lack of ownership of clothing (Bodenheimer et al., 2022; Camacho-Otero et al., 2018; Lang, 2018; Tukker and Tischner, 2006). This is due to the emotional value associated with owning clothes, as well as feelings of status, control, and individualism (Armstrong et al., 2016; Catulli, 2012; Joung, 2013). Other reasons may be linked to the design of the subscription services.

Nevertheless, business models in the resale or secondhand clothing sector have been identified as a driving force in advancing the circular economy in the fashion industry (Dahlbo et al., 2017; Levänen et al., 2021; Simon, 2023; Vehmas et al., 2018). The purchase of secondhand clothing is referred to as buying items "that are previously owned by

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others" (Fernando et al., 2018, p. 1414; Padmavathy et al., 2019, p. 20). More precisely, Evans et al. (2022) include items that have already been owned but not necessarily used and that are usually resold at lower prices. The current global secondhand fashion market size is valued at around $210 billion in 2025 (Moizant et al., 2025). The strong growth of the industry (compound annual growth rate – CAGR: 10.7%) points to a forecast market size of $521.5 billion in 2034 (Global Market Insights, 2025). The global secondhand apparel market is growing at three times the rate of the traditional market, with Generation Z consumers driving adoption (Benissan, 2023). The market is especially prevalent in Asia, Europe, and North America (ThredUP, 2024). Concerning e-commerce, the global online retail platform market size was $36.4 billion in 2024 and is expected to reach $100.2 billion in 2034 (CAGR: 12.2%). For Germany, the numbers are much smaller, with a platform market size of $11.6 billion in 2024 (Bleimaier et al., 2025) and a CAGR growth rate of 5.4% between 2024 and 2032 (Delavallée et al., 2025).

This study is placed within a broader research objective. It focuses on secondhand subscription boxes as a sustainable business model within the context of the circular economy, collaborative consumption, online secondhand clothing retail, the sharing economy, and retail models, providing in-depth insights. The existing literature on secondhand and subscription services predominantly examines the supporting factors and barriers to the consumption of such offers, but with mixed results (e.g., Becker-Leifhold and Iran, 2018; Brandão and da Costa, 2021; Lang, 2018; Wang et al., 2022; Woo & Ramkumar, 2018). This might be due to non-linear factors (Woodside, 2013) that interplay with linear factors. Helinski et al. (2025) adopted a dual perspective on different consumption values, investigating a price premium and purchase intention of circular fashion from recycled materials. However, the price for secondhand fashion items is low (Turunen and Gossen, 2024). Against the consumption values theory (Sheth et al., 1991) and a resource-based perspective (Dorsch et al., 2017), other benefits might be relevant for translating the costs of secondhand items in a subscription box into a purchase decision.

We compare the results of regression analysis with Necessary Condition Analysis (NCA) (Dul, 2016, 2018, 2019). The study can provide new insights into determinants that not only explain average outcome changes and stimulate purchase intention for secondhand subscription boxes but also must be at a certain level to achieve purchase intention (Dul et al., 2023). A sample of 215 German consumers serves as the basis to identify the critical determinants that are key (effect-based regression) factors and/or necessary-but-not-sufficient conditions. Necessary-but-not-sufficient conditions are clear bottlenecks or meaningful thresholds. They serve as constraints and indicate failure, since other constraints cannot compensate for them. The data is enhanced with qualitative insights from the participants on reasons for not using (secondhand) subscription services. Our analysis addresses the following research questions: RQ1: *What determinants are necessary-but-not-sufficient conditions and/or key factors for consumers to form purchase intentions for secondhand subscription boxes?* RQ2: *Are there differences with regard to socio-demographic characteristics of consumers, such as gender, familiarity with subscription boxes or sustainable behavior?*

Our study confirms several determinants as necessary-but-not-sufficient conditions. In particular, we identify utilitarian benefits and hedonic benefits (additionally, the most important key factor) as critical determinants. Socio-demographic characteristics of consumers can help to better design secondhand subscription boxes and related services. For example, for male consumers, avoiding *perceived hygiene* and *performance risk* is important. Environmental benefits and fashion consciousness are bottlenecks for consumers with higher sustainable behavior.

Our study contributes to the literature on online circular shopping (Kim, Jung & Lee, 2021; Sörum, 2025), purchase intentions concerning secondhand clothing (Evans et al., 2022; Prisco et al., 2025) in general, and the design of (secondhand) subscription boxes in particular (Bischof et al., 2020; Rese and Baier, 2025; van Droogenbroeck and Willems, 2025). Our study supports configuring secondhand subscription boxes to offer additional services, particularly for different consumer segments, such as individuals unfamiliar with the service, males, or those with varying levels of sustainability activity. Accordingly, we provide insights into the behavior of consumers and their decision to purchase secondhand subscription boxes.

In order to answer the research questions, we first discuss the concept of secondhand subscription boxes, providing information on existing services and box designs. Subsequently, we present a comprehensive literature overview of findings from the circular economy, secondhand fashion, and subscription box services. These serve as the theoretical basis for the determinants of purchase intention for secondhand subscription boxes. Second, we introduce the NCA as the methodological concept used in the study. Third, we report the results of the empirical analysis, enriched with group comparisons of different consumer groups. The discussion compares the results with the research questions, provides insights into theoretical and practical implications, and closes with the study's limitations and a research outlook.

2. Literature review

2.1. Conceptualization of secondhand subscription boxes

Subscription boxes describe a new way of distributing products in the consumer goods industry (Kerschbaumer et al., 2023; Needleman, 2012). In the literature, subscription boxes are characterized as a predefined, regular delivery of products within a specific product group (Mimoun et al., 2015; Woo & Ramkumar, 2018). Their design has several key characteristics: the items per cycle, the delivery interval, the price, and the degree of surprise (Bischof et al., 2020). Consumers pay for subscription boxes based on the delivery interval or the duration of the subscription (Roy and Ortiz, 2023), with the price of a box undercutting the value of its contents (Woo & Ramkumar, 2018). The degree of surprise increases from predefined subscription boxes selected by the consumer, curated subscription boxes taking consumer preferences into account, to surprise subscription boxes where consumers have no control over the content (Bischof et al., 2020).

In 2024, the global market size for subscription boxes was between $30 billion and $37.5 billion, with a growth rate of 13.3% to 14.2% from 2025 to 2034 (ResearchAndMarkets, 2025; imarc, 2025). According to forecasts, the market is expected to exceed a value of $100 billion in the early 2030s (imarc, 2025). Beauty and fashion markets are prominent examples of the profitability of subscription box models (Ramkumar and Woo, 2018). Secondhand fashion offers an alternative to traditional fashion (Ferraro et al., 2016), and also serves as the content of fashion subscription boxes. With regard to previously owned, but not necessarily used, items (Evans et al., 2022), the age of a garment at the start of its second life cycle is not specified (Cervellon-C. et al., 2012; Machado et al., 2019). The literature distinguishes between "secondhand" and "vintage", with some authors using the terms synonymously (Kawulur et al., 2022). Secondhand items are characterized by prior use and a lower monetary value compared to new products (Turunen and Leipämaa-Leskinen, 2015). Vintage products have not necessarily been used, but their financial value can exceed the original purchase price depending on condition, age, and rarity. Vintage products are therefore defined by the time from which they originate (Kessous and Valette-Florence, 2019). On the one hand, the term refers to the years between 1920 and 1980 (Gerval, 2008). On the other hand, it can include items from the early 2000s, particularly in relation to the Y2K fashion retro style (Yang, 2023).

2.2. Examples of secondhand subscription providers

Existing providers of subscription boxes for secondhand fashion can mainly be found in the United States. Examples include *A Curated Thrift, Number 46,* and *LA Circular Fashion*. Within Europe, *FUFF* is an example of a secondhand subscription box from the United Kingdom, *REJOES* is a

provider from the Netherlands, and the *Nachhaltigkeitsbox* (*Sustainability Box)* is available in Germany (see Table 1). In addition, several further providers have been identified in Germany, including *Strike Wardrobe*, *Vin&Tage,* and *PRE-OWNED-BOX*. However, the providers' websites were no longer accessible, indicating that their services have been discontinued. In the meantime, Second Life Fashion has suspended the *Nachhaltigkeitsbox*. It is clear, therefore, that this business model has yet to be successfully established in Germany.

When comparing the different providers, secondhand subscription boxes are found to have similar designs in practice. Based on a pre-completed survey, consumers receive an individually curated box of second-hand clothing delivered to their home at a predetermined delivery interval. The contents of the box are not known to the consumer until they receive it. The providers, *A Curated Thrift* and *Number 46,* also offer support and advice from a personal stylist before and after the customer receives a secondhand subscription box. The provider, *LA Circular Fashion,* allows consumers to use the box to send unused clean clothing owned by the consumer back to the company for reuse, in line with the circular economy. A secondhand subscription box can be delivered on a one-off, monthly, or seasonal basis. Except for the *Nachhaltigkeitsbox*, the delivery volume ranges from one to seven items. Regarding the first, the ten high-quality pieces were randomly selected, all in one pre-specified size. They came exclusively from returns or private individuals in Germany. To save costs, the items were not presented individually with photos and descriptions on a website (Second Life Fashion, 2019).

3. Determinants influencing the purchase of secondhand subscription boxes

From a resource-based perspective, if the perceived utility of a product or service exceeds the costs, a purchase decision is formed (Dorsch et al., 2017). Perceived utility is linked to the perceived value of a product or service in relation to its quality and price (Zeithaml, 1988). Other authors distinguish informational and experiential aspects of consumption (Holbrook and Hirschman, 1982), or hedonic and utilitarian shopping benefits (Babin et al., 1994) as two distinct higher-order concepts of shopping value orientation. However, these two dimensions were considered "too simplistic" (Sweeney and Soutar, 2001, p. 204). According to the consumption values theory (Sheth et al., 1991), multiple independent, but context-dependent values or product benefits together make up the perceived utility of a product choice (Sweeney and Soutar, 2001).

Several authors have proposed and measured a multi-dimensional shopping value structure (Sheth et al., 1991; Sweeney and Soutar, 2001), including dimensions such as convenience or price (economic benefits) as utilitarian benefits, and enjoyment and adventure as hedonic benefits (Arnold and Reynolds, 2003; Kim et al., 2014). In addition, consumer decision-making styles, reflected in the so-called Consumer Styles Inventory (CSI), are also related to shopping values such as fashion novelty, price, or quality (Sprotles and Kendall, 1986). The CSI has been extended to shopping for secondhand clothing with new value orientations, such as the need for uniqueness, the need for status, fashion involvement, or nostalgia (Cervellon-C. et al., 2012; Silva et al., 2022). The consumption values theory has been applied to investigate shopping values in the context of secondhand consumption (Lang et al., 2025), circular economy-related consumer behavior (Helinski et al., 2025), and subscription-based retail services (Ramkumar and Woo, 2018).

We conducted a thorough literature review to identify existing research in the fields of circular economy, secondhand fashion, and subscription boxes. We used search words such as "circular economy", "sustainable fashion", "collaborative consumption", "sharing economy", "subscription", "online fashion resale", "second hand", "critical factor", "key factor", "success factor", "benefit", and "motivation". Overall, we identified forty-six studies and eleven determinants (see Table 2 and Table A1 in the appendix). While four of the determinants are perceived benefits (*economic, utilitarian*, *hedonic, environmental)*, two represent personal characteristics (*fashion consciousness*, *desire for unique products*), two concern the providers and their services (*customized services*, *trust*), one is related to the products (*perceived quality value*), and two are risks or adoption barriers (*perceived performance risk*, *perceived hygiene risk)*. The papers included between two and three determinants on average. Five studies discussed four of the identified determinants (Aminah et al.,

Table 1
Market overview of secondhand subscription boxes in the US, the Netherlands, the UK, and Germany.

Brand	A Curated Thrift	Number 46	LA Circular Fashion	REJOES	FUFF	Nachhaltigkeitsbox
Business model	Secondhand subscription box	Secondhand subscription box	Secondhand/Circular subscription box	Secondhand box	Secondhand subscription box	Secondhand box
Country	USA	USA	USA	The Netherlands	UK	Germany
Offer – Details	One-off/monthly/ seasonal box	One-off/monthly/ seasonal box	One-off/monthly box	One-off box	Monthly box	One-off box
Procedure	1. Selection of a subscription model 2. Answering a survey on personal clothing style 3. Email contact with stylists 4. Receipt of the box at the beginning of the month 1. Free returns	1. Selection of a subscription model 2. Styling advice 3. Receipt of the box 4. Free exchange of items that do not fit or are not to the consumer's liking	1. Selection of a subscription box model 2. Answering a survey on personal clothing style 3. Receipt of the box 4. Possibility to hand in clothes that are no longer used	1. Choice of clothing style: vintage, casual, Y2K (early 2000s) 2. Specification of the clothing size 3. Receipt of the box 4. Free returns	1. Selection of a subscription model 2. Answering a survey on personal clothing style 3. Receipt of the box	1. Purchase of the box 2. Receipt of the box
Clothing style	Ten different selectable clothing styles; personalized style possible	Clothing style based on styling advice and stylist selection	Clothing style based on the completed survey	Clothing style based on consumer input	Clothing style based on the completed survey	Clothing style visible on product images
Number of items in a box	Three to five items	Three to seven items	Three items	Four to five items	One to three item(s)	Ten items of a specified size
Item selection by a stylist	Available	Available	Available	Available	Available	Not available
Styling advice	Based on a completed survey and e-mail contact of consumers with stylists	10–30-min consultation, even after receiving the subscription box	Selection of items based on the survey, no further consultation	Selection of items based on consumer information, no further consultation	Selection of items based on the survey, no further consultation	Not available

Table 2
Definition and frequency of the determinants identified in the studies.

Determinant	Definition	Number of studies
Economic benefits	"Economic motivations largely stem from price sensitivity or price consciousness and include the gratifying role of price, the search for a fair price and bargain hunting" (Ferraro et al., 2016, p. 263).	29
Utilitarian benefits (convenience)	"[T]ime and effort savings while shopping" (Padmavathy et al., 2019, p. 21). "Renting garments online through easy-to-navigate websites or applications, with the added benefit of home delivery, provides consumers with a seamless, efficient, and hassle-free experience" (Lang et al., 2025, p. 13).	8
Customized services	"[Adjustment of] products and services to the specific needs of individuals" (Kabalska, 2021, p. 187).	5
Desire for unique products	"[T]he trait of pursuing differentness relative to others through the acquisition, utilisation and disposal of consumer goods for the purpose of developing and enhancing one's self-image and social image" (Tian et al., 2001, p. 52).	10
Perceived quality value	"[C]onsumer's judgment about the overall excellence of a product" (Lou et al., 2022, p. 5).	6
Hedonic benefits	"Shopping for stimulation, adventure, and the feeling of being in another world (Chiu et al., 2014, p. 93). "The consumption is driven by the fun a consumer has in using the product, and the criteria for "success" are essentially aesthetic in nature" (Arnold and Reynolds, 2003, p. 78).	10
Environmental benefits	Awareness of (positive environmental) consequences (Borusiak et al., 2020) since secondhand fashion boxes "reduce the production and disposal of new fashion items, which in turn would reduce associated burdens on the environment" (Day et al., 2020, p. 1314).	6
Trust	"[C]ustomers' assessment of the institution/product based on its reliability, trustworthiness, and promises delivered" (Padmavathy et al., 2019, p. 23).	6
Fashion consciousness	"[T]he extent of individual consumer's interest and sensitivity to fashion, which is exhibited through his/her interest in keeping up with trends, shopping fashion products, managing appearance, accessing fashion-related media and resources" (Woo & Ramkumar, 2018, p. 124).	8
Perceived performance risk	"[U]ncertainty associated with the consequence of a product that does not function as expected" (Kim, Jung & Lee, 2021, p. 7).	6
Perceived hygiene risk	"[P]erception of anxiety that might disrupt one's life or harm one's health [through] […] fashion products [that] […] are not clean and are likely to have stains or dirt which could defile the body when wearing the products" (Kim, Jung & Lee, 2021, p. 14).	8

2021; Edbring et al., 2016; Lou et al., 2022; Padmavathy et al., 2019; Wang et al., 2022), and another three studies, five determinants (Ramkumar and Woo, 2018; Silva et al., 2021; Xu et al., 2014), and one study, six determinants (Lang et al., 2025). Economic benefits were the most frequently mentioned determinant, followed by the desire for unique products and hedonic benefits (see Table 2). We did not consider environmental awareness (sustainability values) as an additional personal characteristic, due to mixed results in previous studies (Hamari et al., 2016; Ki and Kim, 2016; Stolz, 2022; Xu et al., 2022; Zaman et al., 2019). Overall, we identified a set of well-established determinants for the context of secondhand subscription boxes. They were described in sufficiency logic with effect-based interpretations ("significant increase"), since structural equation modelling (SEM) is often used as an analysis method.

Several of the determinants are also referred to as barriers to the use of subscription or secondhand commerce (see Table A1 in the appendix). Therefore, we adopt a necessity perspective. Traditional methods look for continuous relationships and ask about the drivers of an action. NCA shifts the focus of consumer research to specific prerequisites (Dul, 2016). They cannot be compensated for by other determinants but serve as meaningful thresholds or bottlenecks in a constraint-based decision process. NCA identifies specific minimum levels of a determinant that are required before consumers will consider buying a product. In the following, the determinants we identified are discussed as constraints on a desired outcome.

Economic benefits result from economic motivations related to the product price (Ferraro et al., 2016). Slightly worn or even unused secondhand items in a secondhand box are cheaper than new items (Turunen and Gossen, 2024). Furthermore, the selling price of a subscription box undercuts the value of the goods contained (Cervellon-C. et al., 2012; Ramkumar and Woo, 2018). Price and price sensitivity have been described as important determinants influencing secondhand shopping motives (Padmavathy et al., 2019; Roux and Guiot, 2008), secondhand clothing consumption (Brandão and da Costa, 2021; Silva et al., 2021; Yan et al., 2015), and fashion renting and purchase intentions (Oscario, 2023; Prisco et al., 2025). Research studies found mixed results with no effect on consumer attitudes and usage intention in the context of subscription boxes (Aminah et al., 2021; Lee-G. et al., 2019) or online secondhand services (Kim, Woo & Ramkumar, 2021). A positive effect was shown in the context of secondhand clothing consumption (Roux and Guiot, 2008) and secondhand clothing in brick-and-mortar secondhand retail (Wang et al., 2022).

In addition to the pursuit of low prices as a motive for buying secondhand clothing and subscription boxes (Ramkumar and Woo, 2018; Tao and Xu, 2018a), achieving a favorable price-performance ratio plays a role in consumer thinking. This includes obtaining high-quality clothing from renowned brands at a low price (Bray et al., 2021; Chen et al., 2018; Hur, 2020; Liu et al., 2023; Park and Armstrong, 2019; Turunen and Pöyry, 2019). Based on the findings, we propose that secondhand subscription boxes must have a certain level of economic benefits. They serve as a constraint in the purchase decision process. We introduce the following hypothesis.

Hypothesis 1. The presence of an economic motive (economic benefits) is a necessary-but-not-sufficient condition for the formation of purchase intention for secondhand subscription boxes.

In the context of second-hand clothing purchases and the use of subscription box offers, utilitarian benefits (convenience) refer to "time and effort savings while shopping" (Padmavathy et al., 2019, p. 21). For subscription box services, Ramkumar and Woo (2018) found a positive effect of convenience on attitude and usage intention toward subscription services in the clothing sector. Utilitarian benefits are significant components of the subscription shopping experience, including easy-to-use interfaces, home delivery, and styling advice and consultation (Bhatt et al., 2021; Bray et al., 2021; Lang, 2018; Tao and Xu, 2018a). On the other hand, Charnley et al. (2022) identify inconvenience as one of the most significant barriers to the use of second-hand clothing. This is the case in online retailing (Padmavathy et al., 2019) due to potential savings in effort and time and the possibility of buying clothes at any time, independent of opening hours. The lack of or a low level of utilitarian benefits (convenience) may therefore be a constraint and impossible to compensate for. Based on the previous discussion, the following hypothesis is proposed.

Hypothesis 2. The presence of utilitarian benefits (convenience) is a necessary-but-not-sufficient condition for the formation of purchase intention for secondhand subscription boxes.

Customized services in the context of secondhand subscription boxes consist of personal advice from a stylist who selects the garments included in the subscription box (Kabalska, 2021). Stylist advice and the personalization that comes with it are the main reasons for adopting subscription boxes in the clothing sector (Bhatt et al., 2021; Sebald and Jacob, 2018). Psychological consumer benefits in terms of increased self-confidence can result from personalized styling advice (Tao and Xu, 2018b). Providing advice and clothing selection based on stated customer preferences also has a positive effect on the perceived service quality, satisfaction, trust, and loyalty of consumers (Coelho and Henseler, 2012). While not all studies show a significant effect (Aminah et al., 2021), customized services might be a constraint, and a certain level should be present to develop purchase intentions. Based on these considerations, we formulate the following hypothesis.

Hypothesis 3. The presence of an individual service (customized services) is a necessary-but-not-sufficient condition for the formation of purchase intention for secondhand subscription boxes.

The consumer desire for unique products is particularly relevant in the context of secondhand clothing purchases. Secondhand clothing typically originates from past collections and is therefore no longer widely worn by consumers. In the US, female customers have bought bridal dresses at low prices in thrift stores that were later identified as previously high-priced designer wedding dresses from Vera Wang or Maggie Sottero (Garrison, 2025; Newsweek, 2024). Consumers' need for uniqueness positively influences their general motivation to buy secondhand clothing (Padmavathy et al., 2019; Roux and Guiot, 2008). Laitala and Klepp (2018) find that the aspect of uniqueness is more important to secondhand clothing buyers than to non-buyers. Unique products increased attitudes toward subscription boxes (Lee-G. et al., 2019), or the intention to use subscription-based online services (Ramkumar and Woo, 2018). The desire for unique products has been related to a motivation for individuality (Silva et al., 2022) and a sense of differentiation (Cervellon-C. et al., 2012). Therefore, a certain level of these motivations and, in turn, of a desire for unique products might be necessary to develop a purchase intention for secondhand subscription boxes (Helinski et al., 2025). On that basis, we derive the following hypothesis.

Hypothesis 4. The presence of a customer desire for unique products is a necessary-but-not-sufficient condition for the formation of purchase intention for secondhand subscription boxes.

The importance of quality in the context of secondhand purchases has been repeatedly confirmed in the literature (Ki et al., 2024; Lou et al., 2022; Turunen and Pöyry, 2019). Perceived quality represents a value for the customer in terms of the product's timeliness and longevity (Lou et al., 2022). Accordingly, Hur (2020) identifies the lack of availability of high-quality secondhand clothing as one of the biggest obstacles in the industry. However, the literature finds no significant effect on online resale platforms (Liu et al., 2023). In the context of subscription boxes, Lee-G. et al. (2019, p. 96) mention product quality as "the most important predictor of attitude towards (…) [subscription box retail services]". Similarly, Bray et al. (2021) describe the offering of products of insufficient quality as a barrier to subscription. Therefore, a low perceived quality value might be a constraint, and a certain level should be present for the development of a purchase intention (Helinski et al., 2025), leading us to propose the following hypothesis.

Hypothesis 5. The presence of high perceived quality value is a necessary-but-not-sufficient condition for the formation of purchase intention for secondhand subscription boxes.

In addition to low prices and utilitarian benefits, hedonic benefits are important for secondhand shopping and subscription box services. Hedonic benefits of curated subscription box services arise from consumers discovering the contents of the subscription box only on receipt (Ramkumar and Woo, 2018). The elements of surprise and fun are decisive when subscribers open a box (Bhatt and Kim, 2018). Studies show a significant positive effect of hedonic motivations on attitudes toward subscription-based online services, and in turn, usage intention (Ramkumar and Woo, 2018; Tao and Xu, 2018a). We do not consider the aspect of treasure hunting fun (Ki et al., 2024; Wang et al., 2022; Xu et al., 2014), as this type of enjoyment occurs when consumers actively search for unique items of clothing, especially in brick-and-mortar secondhand stores. The entertaining aspects of secondhand subscription boxes are related to the hedonic aspects of consumption, driving consumers' hedonic motivation. The presence of hedonic benefits is supposed to be necessary for the formation of purchase intention. This leads us to formulate the following hypothesis.

Hypothesis 6. The presence of hedonic benefits is a necessary-but-not-sufficient condition for the formation of purchase intention for secondhand subscription boxes.

Consumers have also become more aware of the impact of their purchasing behavior on the environment, which has led to a change in consumer attitudes and purchasing behavior (Borusiak et al., 2020; Edbring et al., 2016; Schultz et al., 2005; Yan et al., 2015; Xu et al., 2014). According to Evans et al. (2022), buyers of secondhand clothing have a higher level of environmental awareness. This also applies to buyers who make their secondhand purchases online (Evans et al., 2022; Zaman et al., 2019). Secondhand clothing and secondhand subscription boxes can provide environmental benefits by "reducing the production and disposal of new fashion items" (Day et al., 2020, p. 1314). The results of the studies are mixed in the area of secondhand or subscription services (Day et al., 2020; Kim, Woo & Ramkumar, 2021; Möhlmann, 2015; Xu et al., 2014). Borusiak et al. (2020) showed that perceived environmental benefits drive pro-social motivation, which, in turn, influences the purchase intention of secondhand clothing. While the effect of environmental benefits on purchase intention might not be strong (Silva et al., 2022), they might act as a constraint on consumers (Helinski et al., 2025) who become, in general, more environmentally conscious. We hypothesize the following.

Hypothesis 7. The presence of perceived environmental benefits is a necessary-but-not-sufficient condition for the formation of purchase intention for secondhand subscription boxes.

Customer trust in the reliability of the service has been described as decisive, influencing consumers' willingness to buy secondhand products, especially online (Kim, Woo & Ramkumar, 2021). Online secondhand subscription box services also involve online transactions, complementing trust in this issue (Ribbink et al., 2004). Trust is conceptualized as an ideological shopping motivation influencing the purchase of secondhand clothing (Padmavathy et al., 2019). Studies have consistently shown a positive effect (Kim, Woo & Ramkumar, 2021; Kawulur et al., 2022). In the context of secondhand subscription boxes, consumer trust is not only directed at the stylists and their clothing selection, but also at the service provider. Woo and Ramkumar (2018) found that users of online subscription box services displayed higher levels of trust in the service provider than non-users. However, compared to consumers who buy secondhand clothing in brick-and-mortar stores, online buyers of secondhand clothing have significantly less trust due to the potential for counterfeit products (Charnley et al., 2022). The different levels of trust indicate that, in connection with subscription boxes and secondhand clothing purchases, this determinant can be considered a constraint. This leads to the following hypothesis.

Hypothesis 8. The presence of trust is a necessary-but-not-sufficient condition for the formation of purchase intention for secondhand subscription boxes.

The use of a stylist's advice from a subscription box service is closely related to consumers' fashion consciousness. The subscription box service can help consumers interested in fashion stay up to date with the latest trends (Woo & Ramkumar, 2018). Turunen and Pöyry (2019)

found that secondhand customers exhibit this personal motivational factor that drives them emotionally (Cervellon-C. et al., 2012). Fashion consciousness positively affects consumers' decisions to adopt clothing subscription boxes (Ramkumar and Woo, 2018; Woo & Ramkumar, 2018). In line with these findings, Evans et al. (2022) and Zaman et al. (2019) found that buyers on online secondhand platforms display greater fashion consciousness than others who do not engage in such purchasing activities or who use other channels to buy clothing. Again, the different levels of fashion consciousness point to the determinant acting as a constraint. Based on these findings, we propose the following hypothesis.

Hypothesis 9. The presence of consumers' fashion consciousness is a necessary-but-not-sufficient condition for the formation of purchase intention for secondhand subscription boxes.

On the negative side, in the context of sustainable and circular fashion, perceived risk is a key consideration comprising several dimensions (Kang and Kim, 2013; Kim, Jung & Lee, 2021). Because the clothing in the subscription box has already been used, we focus on two dimensions: perceived performance risk and hygiene risk.

Kang and Kim (2013) define performance risk as a perceived risk concerning the quality of clothing. In the context of secondhand subscription boxes, performance risk describes the perceived risk that the clothing in a secondhand subscription box will have functional defects and signs of wear, and thus not be in optimal condition (Kim, Jung & Lee, 2021). Day et al. (2020) found a negative effect of the perceived risk on purchase intention of subscription boxes. This perceived risk is increased by the unknown content of the curated surprise box (Bischof et al., 2020). However, certain studies (Kim, Jung & Lee, 2021; Silva et al., 2021) show no significant negative effect of performance risk on consumer attitudes toward circular clothing and the shopping experience. Nevertheless, a high level of performance risk may therefore fail to achieve the desired customer purchase intention, and we propose the following hypothesis.

Hypothesis 10. The absence of a perceived performance risk is a necessary-but-not-sufficient condition for the formation of purchase intention for secondhand subscription boxes.

Perceived hygiene risk is based on the observation that secondhand fashion products, which have already been worn, may be unclean, unpleasant-smelling, or a carrier of infectious organisms (Kim, Jung & Lee, 2021). Secondhand clothing has commonly been associated with contamination (Yan et al., 2015). Studies found a negative relationship between perceived hygiene risk and consumer attitudes toward circular fashion (Kim, Jung & Lee, 2021), the experience of buying secondhand clothes (Silva et al., 2021), and the frequency of secondhand clothing purchases (Yan et al., 2015). Similarly, Hur (2020) identifies concerns among previous non-buyers of secondhand clothing about products' lack of cleanliness as a key barrier. Due to the recent COVID-19 pandemic, an increase in health and hygiene risks associated with secondhand clothing has been recorded (Xu et al., 2022). Therefore, a high level of hygiene risk may guarantee failure of the business model. Our final hypothesis reads as follows.

Hypothesis 11. The absence of a perceived hygiene risk is a necessary-but-not-sufficient condition for the formation of purchase intention for secondhand subscription boxes.

Fig. 1 presents the research model used in this study.

4. Methodology

4.1. Necessary condition analysis (NCA)

The NCA focuses on enabling factors/determinants (e.g., "the presence of X is necessary for the presence of Y", Dul et al., 2023, p. 699), which are defined as necessary (but not sufficient) and work in a multiplicative manner. The enabling determinants can consist of single factors (bivariate analysis) or multiple factors (multivariate analysis). If the determinant is not present or below a required value, the same holds for the outcome variable. This is independent of the level of other determinants. Therefore, when several determinants are present, all must fulfil the requirements to guarantee no failure. The presence of a necessary-but-not-sufficient condition or a set of conditions increases the probability of success – for example, the desired (level of) outcome can be achieved (Dul, 2016). This contrasts with a linear regression approach, which relies on key factors that additively produce an outcome variable. Increases in one key factor amplify the outcome and key factors can compensate for each other (Dul, 2016). Compared to multiple regression analysis, spotting large regression coefficients, NCA identifies critical determinants that represent a bottleneck to achieving the desired outcome – for example, purchase intention (Dul, 2016). Only an increase in the critical determinant achieves the desired outcome, regardless of any increase in the other determinants. A bottleneck, therefore, signals the importance of a condition and the need to prioritize actions. The method can be applied to dichotomous, discrete, or continuous variables. For the latter two, a level must be specified for a necessary-but-not-sufficient condition, indicating that a certain level of X is required for a certain level of Y: "Level of X is necessary for level of Y" (Dul, 2016, p. 40). The NCA has already been applied in several research areas that deal with enabling determinants (Dul et al., 2023) –

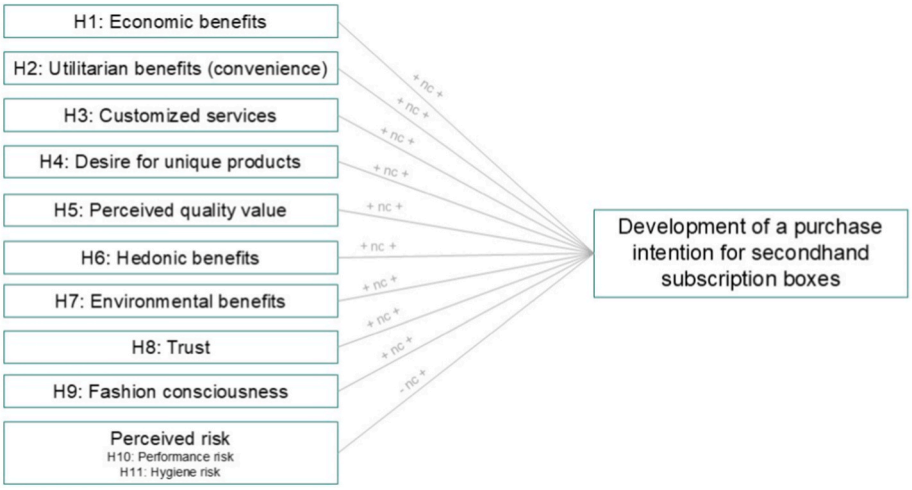


Fig. 1. Research model. + nc + : The presence of the determinant is necessary but not sufficient for the formation of purchase intention - nc + : The absence of the determinant is necessary but not sufficient for the formation of purchase intention.

for example, the intention to purchase clothes made from new sustainable materials (Kopplin and Rösch, 2021) or circular fashion from recycled materials (Helinski et al., 2025). NCA can complement other methods with a necessity logic. Dual-method approaches combine NCA with an additive logic method (regression analysis, SEM). Results reveal that a determinant can be effect-based, necessity-based, or both (Helinski et al., 2025; Sharma and Roy, 2026). An NCA effect size sensitivity extension (NCA-ESSE) enables investigation of the typicality of conditions relative to extreme response patterns (Becker et al., 2026).

4.2. Questionnaire design

The questionnaire started with introductory questions on general clothing purchasing behavior including purchase frequency, number of items purchased, financial expenditure, and type of clothing purchased. Afterwards, the business model of subscription boxes was defined briefly. The respondents were asked whether they knew of subscription boxes, whether they had previously or currently used them, and what types of products they had ordered.

To enable all participants to answer the questions without prior knowledge and use of a secondhand subscription box service, a fictitious offer of a secondhand subscription box was presented to provide insights into the business model. We based the content of the offer on the market overview of secondhand subscription boxes (see Table 1). To ensure that all participants read the case in full, they had to view it for at least 10 s before proceeding with the questions. The main part of the questionnaire followed, including the item scales and three attention checks ("This is an attention test. Please check 'I agree' here."). The item scales were operationalized and adapted using existing items that had already been tested in the circular economy, secondhand or subscription box literature (see Table A2 in the appendix). We employed a 7-point Likert scale from 1 = "completely disagree" to 7 = "completely agree". To evaluate attitudes toward the subscription box service, we used a semantic differential. The questionnaire concluded by asking participants about their past sustainable behavior related to clothing (Lang and Joyner Armstrong, 2018) and socio-demographic data. We conducted a pretest in December 2023 to remove potential ambiguities and misunderstandings in the questionnaire. We collected complete responses from 30 young (mean age: 26.4 years) and mostly female individuals (76.67%) representing the target population. Changes concerned the fictitious offer of the secondhand subscription box, which was supplemented with information on the right of termination and the price – €40-€50 for three items of clothing. In addition, the offer was illustrated with an exemplary image of a secondhand subscription box.

The respondents answered both the dependent and independent variables (Podsakoff et al., 2003). We used two statistical tests for investigating common method bias. The Harman's single-factor model test, which has all items loading on one factor, resulted in a variance explained of 24.38, which was well below 50 percent (Podsakoff et al., 2003). In addition, we employed SmartPLS for a full collinearity assessment approach. The VIFs for the latent variables in the inner model were in a similar range to those in regression analysis (see Table 4), from 1.31 (economic benefits) to 2.34 (hedonic benefits), and therefore well below the threshold of 3.3 (Kock, 2015).

4.3. Sampling approach

Similar to the pretest, the main study was created online using Qualtrics. The survey took place between December 19, 2023, and May 14, 2024. The questionnaire was distributed to potential consumers of secondhand subscription boxes living in Germany. We relied on a purposive sampling approach to ensure the inclusion of participants with specific characteristics who could provide appropriate information (Campbell et al., 2020). The approach has also been used in the context of secondhand online platforms (Prisco et al., 2025). We focused on young, well-educated women from Generation Z and the Millennial

Table 3
Evaluation of measurement scales.

	Mean[a] (std.)	Number of items	α	Variance explained	CR	AVE
Economic benefits	5.18 (0.99)	5(6)	0.80	55.86	0.79	0.43
Utilitarian benefits (convenience)	5.41 (1.10)	5	0.84	61.07	0.84	0.52
Customized services	4.35 (1.24)	3(4)	0.85	76.90	0.83	0.56
Desire for unique products	4.21 (1.33)	5	0.90	71.37	0.90	0.64
Perceived quality value	4.60 (1.05)	3(5)	0.76	67.95	0.77	0.52
Hedonic benefits	4.26 (1.24)	4	0.85	68.69	0.86	0.60
Environmental benefits	5.18 (1.23)	4	0.90	77.58	0.90	0.70
Trust	4.68 (1.00)	4	0.87	72.49	0.84	0.56
Fashion consciousness	4.16 (1.38)	4(5)	0.88	74.04	0.87	0.57
(No) Perceived performance risk	3.93 (1.35)	3(5)	0.85	77.10	0.86	0.67
(No) Perceived hygiene risk	4.65 (1.26)	4	0.92	80.64	0.92	0.74
Purchase intention	3.57 (1.57)	4	0.95	86.39	0.95	0.82
Attitude	4.98 (0.98)	6	0.88	63.49	0.89	0.57
Sustainable behavior	3.83 (1.51)	3(4)	0.64	58.59	0.65	0.38

α = Cronbach's alpha and variance explained were calculated using SPSS 29; CR = composite reliability and AVE = average variance extracted were calculated using AMOS 29.
[a] Scale: 1 = completely disagree, 7 = completely agree.

cohort. On the one hand, a full cohort of students took part for class credit (n = 99, 42%; valid: n = 96). On the other hand, respondents interested in (secondhand) fashion were addressed on fashion and secondhand fashion platforms (n = 139, 58%; valid: n = 119). The proportion of respondents familiar with subscription box services did not differ significantly between the two sub-samples (fashionistas vs. students: 65 vs. 47; 58.0% vs.42.0%). However, regarding these respondents, the fashionista sub-sample included more users of secondhand subscription boxes (27 vs. 6; 41.5% vs. 12.8%).

In 2024, 43% of Germans bought secondhand clothing, about a quarter online (23.3%). Women (49%) are more likely than men (37%) to buy secondhand clothing (Momox Fashion, 2024). Previous statistics have found an even higher percentage of female secondhand shoppers (2019: 67%, 2021: 80%) (Momox Fashion, 2020, 2022). Taking the three percentages for females together, the resulting mean value is 65.3%. Younger age groups are more inclined to engage in secondhand shopping (18-29: 43.3%, 30-39: 50.8%, 40-49: 51.1%, 50-64: 43.5%, 65+: 33.3%%) (Momox Fashion, 2024). However, the percentage of young second-hand shoppers (18-29) is lower and corresponds to that of best agers (50+). This is in line with young consumers heavily purchasing affordable and trendy fast fashion items (Zimand-Sheiner and Lissitsa, 2024). Income does not influence second-hand purchasing behavior (Momox Fashion, 2022).

We collected a total of 238 online questionnaires. The dataset was adjusted for eighteen participants – not members of the student cohort – who failed to complete the survey. Five respondents answered two or more of the three attention checks incorrectly, three of them in the student cohort. The respondents took an average of 18.4 min to complete the questionnaire, longer than those who failed the attention check (3.8 min) or did not complete the survey (3 min). This yielded a final sample size of 215 respondents. The deleted responses, as well as the remaining speeders (n = 8) and slow-pokes (n = 6), who needed twice as

Table 4
Results of multiple regression analysis.

Predictors	B	SE	β	t	p	r	VIF
Constant	−2.75	0.52	–	−5.26***	<0.001		
Economic benefits	0.03	0.07	0.02	0.35	0.73	0.29	1.29
Utilitarian benefits (convenience)	−0.01	0.07	−0.01	−0.18	0.86	0.44	1.50
Customized services	0.27	0.07	0.21	3.84***	<0.001	0.60	1.82
Desire for unique products	−0.07	0.06	−0.06	−1.16	0.25	0.22	1.38
Perceived quality value	0.17	0.09	0.10	1.89+	0.06	0.54	1.79
Hedonic benefits	0.55	0.08	0.43	7.10***	<0.001	0.71	2.24
Environmental benefits	0.02	0.06	0.01	0.30	0.76	0.36	1.39
Trust	0.25	0.09	0.16	2.92***	<0.001	0.61	1.81
Fashion consciousness	0.03	0.05	0.03	0.62	0.54	0.34	1.37
(No) Perceived performance risk	0.26	0.06	0.23	4.13***	<0.001	0.40	1.81
(No) Perceived hygiene risk	−0.04	0.07	−0.03	−0.59	0.55	0.36	1.93
Dependent variable: purchase intention; adjusted $R^2 = 0.65$ ($F = 36.53$, $p < 0.001$)							

B = unstandardized regression weight; SE = standard error, β = standardized regression weight; t = t statistics; p = p-value; r = zero-order correlation; VIF = variance inflation factor.
Significance levels: + $p < 0.10$, ** $p < 0.01$, *** $p < 0.001$.

much or less time, showed no differences in general clothing consumption. Furthermore, we ensured that participants were at least 18 years of age and contractually capable of opening bank accounts and credit cards. The sample adequately reflects the targeted population of Gen Z and Millennials. It consists of 145 female participants (67.4%) and 70 male participants (32.6%). The proportion of females closely matches the mean value of German female secondhand buyers (65.3%). They display a higher shopping frequency. A quarter (24.8%) of female respondents go shopping once a week or more often compared with 10% of male respondents. The sample largely includes members of Gen Z aged between 18 and 29 years (84.7%). The participants' ages range from 18 to 62 years, with an average age of 27.5 years. In line with the age distribution, most participants are students (69.8%) or employees (25.6%). Over half of the respondents (57.2%) have a bachelor's degree. The sample is skewed toward those with higher education, which other studies have also found (Steffen, 2017). This reflects, in part, the increasingly higher qualification level of the general German young population. Since 2011, the rate of first-year students has been over 55% (Statistisches Bundesamt, 2026). The percentage of bachelor's degree holders stands at 39% of those aged 25 to 34 (OECD, 2024). In terms of household income, most often between €1000 and €1999 (29.8%) is reported, which is below the average net income of €2.300. Overall, our sample provides a good representation of the younger, highly educated segment of the target population.

4.4. Quality check of the constructs

In order to carry out a hypothesis evaluation using an NCA, it is necessary to prove the reliability and validity of the item scales, relying on existing quality criteria (Dul et al., 2023). To align the direction of the determinants and improve interpretability, the items measuring perceived hygiene and performance risk were inversely coded. We examined the internal consistency reliability, convergent validity, and discriminant validity (Hair Jr. et al., 2014) using SPSS 29 and AMOS 29. Cronbach's alpha values and, correspondingly, internal consistency, were high with all values exceeding 0.7, except for sustainable behavior (Nunally, 1978). The same holds for composite reliability – that is, for all constructs above the threshold value of 0.6 (Bagozzi and Yi, 1988) and below 0.95 (Hair et al., 2019). The latter indicates the absence of item redundancy and the presence of desirable response patterns. All scale items loaded on the respective factor with a variance explained above 50%, confirming unidimensionality. Concerning convergent validity, most AVE values were above 0.5, except for sustainable behavior and economic benefits (see Table 3). Finally, discriminant validity was established, taking the Fornell-Larcker criterion into account – all correlations of the constructs were smaller than the square root of the AVE; the HTMT criterion was below 0.85 (Henseler et al., 2015) (see Table A4 in the appendix).

We calculated mean values to represent the latent variables. *Utilitarian benefits* (5.41) were highest, while purchase intention (3.57) and *(no) perceived performance risk* (3.93) were lowest. As regards purchase intention, about a third of the respondents stated Y = 5 (n = 69, 32.1%). The numbers decreased for Y = 6 (n = 30, 14.0%), and Y = 7 (n = 9, 4.2%). Participants also rated their sustainable behavior relatively low with a mean of 3.89 (see Table 3).

5. Results of the study

5.1. Descriptive statistics on clothing consumption

Concerning clothes shopping behavior, about two-thirds of the respondents (65.6%) purchase clothing at intervals of one to three months, often buying two to three items (60.5%). Frequently, the amount spent on clothing is between €101 and €200 per purchase. The vast majority of participants (92.1%) reported buying clothes in new condition often or very often. Secondhand clothing is rarely purchased by 32.6% of participants and never purchased by 36.7%. In contrast, 21.4% of participants purchase secondhand clothing occasionally, and 7.0% do so frequently or very frequently (2.3% very frequently). In particular, male respondents (52.9%) never purchase secondhand clothing, while 40% of female respondents purchase it occasionally or more frequently. The frequency of buying secondhand clothing is significantly correlated with respondents' perception of sustainable behavior ($r = 0.52$, $p < 0.001$) as well as their attitude toward secondhand subscription boxes ($r = 0.37$, $p < 0.001$). Almost all respondents (98.6%) never rent clothes. About half of the respondents are familiar with subscription box services (49.3%), while 29.2% have been subscribers either in the past or currently. In particular, subscriptions were made for cosmetics (n = 18) and food (n = 19).

5.2. Evaluation of the hypotheses

We first employed multiple regression analysis. The results show that *customized services*, *hedonic benefits*, *trust*, and the absence of *perceived performance risk* have a significant positive effect on the intention to purchase secondhand subscription boxes. There is also a slightly significant effect of *perceived quality value*. The zero-order correlations indicate that all key factors directly interact with the dependent variable, purchase intention, when the influence of the other key factors is not controlled for. The VIFs are well below five, pointing to a moderate correlation among the key factors (Shrestha, 2020) (see Table 4).

Next, we conducted a multivariate NCA following the procedures

outlined by Dul (2016) and the NCA software version 4.0.1 in R (Dul, 2018). The ceiling line, separating the area with no occurrence of purchase intention for a given value X is considered an indicator of a necessary-but-not-sufficient condition for purchase intention (Dul, 2016). The dividing line between the empty space and the observed XY combinations is either a piecewise linear line (CE-FDH – ceiling envelopment – free disposal hull) or a straight line (CR-FDH – ceiling regression – free disposal hull). The ceiling line accuracy values for the CR-FDH ceiling line exceed 95% for all constructs. Only a few observations were above the ceiling line in the case of CR-FDH. We tested the significance of the effect sizes d (at $p < 0.05$) with 10,000 resamples (Dul et al., 2023). They mostly ranged between 0.1 and 0.3, which corresponds to a medium effect (Dul, 2016). The effect size of desire for unique products – and in the case of CR-FDH, also (no) perceived hygiene risk – is below this value, representing a small effect. *Utilitarian benefits* and *perceived quality value* exhibit a large effect size. The effect sizes based on the CE-FDH ceiling line show some differences. For *economic benefits* and *hedonic benefits*, the effect is large, while for *(no) perceived hygiene risk*, it is medium (see Table 5). Both dividing lines provide empirical support for the proposed necessary-condition relationships except for hypothesis 4. Hypothesis 11 was confirmed only for the piecewise linear line (CE-FDH).

In addition, we calculated threshold values and percentiles to provide information about the required level of a necessary-but-not-sufficient condition X for the occurrence of a certain level of outcome Y. We examined Y values from five to seven, as these values indicate purchase intention (see Table 6). For the case of a purchase intention of Y = 5 (“*tend to agree*”) to occur, threshold values above a neutral evaluation (>4) concern *utilitarian benefits* only. The other threshold values are smaller, but greater than zero. If the threshold value of a determinant is not reached, the purchase intention does not come into effect. The threshold values of the determinants increase as the Y value increases. For a maximum purchase intention to occur, equivalent to the value Y = 7 (“*completely agree*”), threshold values above a neutral evaluation (>4) of the variable must be achieved, except for *(no) performance risk* for all necessary-but-not-sufficient conditions. For Y-values of levels five, six, and seven, the *utilitarian benefits* (convenience) have the highest threshold values. The lowest threshold values are those for *(no) performance risk*.

The percentiles indicate the proportion of cases that did not meet the given threshold for a necessary-but-not-sufficient condition, signaling its importance. *Hedonic benefits* displayed the highest threshold values that are not reached for a purchase intention of five (16.7%) and six (32.6%). For the purchase intention Y = 7 (“*completely agree*”), *utilitarian benefits (convenience)* recorded the highest number of unmet thresholds with 135 out of 215 cases (62.8%). In this category, *hedonic benefits*, *customized services*, *perceived quality value,* and *fashion consciousness* also ranged over 50%, not meeting the threshold value (see Table 6).

5.3. Group comparisons

We compared the NCA results of several sub-groups (see Troiville et al., 2025): females (67.4%, n = 145) were compared with males (32.6%, n = 70); participants familiar with subscription box services (49.3%, n = 106) were compared with those unfamiliar with such an offer (50.7%, n = 109); and participants displaying a higher sustainable behavior with mean values greater and equal to five on the 7-point Likert scale (25.1%; n = 54) were compared with those displaying lower sustainable behavior (74.9%, n = 161). The exact figures are in the additional material (Tables Add1 to Add7). For males and those familiar with subscription box services, no case reached a purchase intention of Y = 7. Correspondingly, these sub-samples run at a lower level.

Concerning relevant effect sizes, in the male sample, more determinants were classified into higher effect size categories – for example, as large (*customized services, hedonic benefits, environmental benefits, (no) perceived performance risk*) or medium (*desire for unique products, (no) perceived performance risk*). For females, only *trust* falls into a higher effect size category, while *perceived quality value* is classified as medium, placing it in a lower category. Participants familiar with subscription box services again largely matched the total sample. In contrast, for participants with no knowledge, several determinants – *desire for unique products*, *hedonic benefits, trust,* and *(no) perceived hygiene risk* – had higher effect sizes connected with a category change, whereas *perceived quality value, environmental benefits and economic benefits* were classified into a lower category. Finally, for participants with higher sustainable behavior, the effect size of *customized services* and *hedonic benefits,* along with *perceived quality value,* increased into the “large” category. The same applies to participants with lower sustainable behavior and the determinants *economic benefits*, *utilitarian benefits, hedonic benefits,* and *trust.* For both groups, *(no) perceived performance risk* showed a decrease in the category. In addition, *utilitarian benefits* displayed a non-significant effect for participants with higher sustainable behavior (see Table A4 in the appendix).

The *utilitarian benefits* condition has the highest threshold values for both female and male participants, but also for those familiar with subscription box services (Table A5 in the appendix). For a maximum purchase intention to occur (Y = 7), for males, almost all necessary-but-not-sufficient conditions except fashion consciousness display threshold values above a neutral evaluation (>4). For females, this is only the case

Table 5
Necessary condition analysis of the determinants.

	Ceiling zone	Obs. above	Accuracy	Effect size d based on CE-FDH	p-value based on CE-FDH	Effect size d based on CR-FDH	p-value based on CR-FDH	Type of effect
Economic benefits	9.95	4	98.1	0.31	0.01	0.28	<0.001	L/M
Utilitarian benefits (convenience)	14.39	5	97.7	0.45	<0.001	0.40	<0.001	L/L
Customized services	7.66	1	99.5	0.29	<0.001	0.21	<0.001	M/M
Desire for unique products	2.15	2	99.1	0.08[a]	0.21	0.06[a]	0.23[a]	S/S
Perceived quality value	10.80	3	98.6	0.33	<0.001	0.30	<0.001	L/L
Hedonic benefits	9.26	2	99.1	0.31	<0.001	0.26	<0.001	L/M
Environmental benefits	7.83	3	98.6	0.27	<0.001	0.22	<0.001	M/M
Trust	8.01	2	99.1	0.29	<0.001	0.24	<0.001	M/M
Fashion consciousness	6.09	7	96.7	0.19	<0.001	0.17	<0.001	M/M
(No) Perceived performance risk	4.27	2	99.1	0.15	<0.001	0.12	<0.001	M/M
(No) Perceived hygiene risk	3.00	0	100.0	0.17	0.03	0.08[a]	0.27[a]	M/S

Obs. above = observations above the ceiling line.
L = large, M = medium, S = small, insignificant.
[a] Exclusion due to small, irrelevant effect sizes and/or lack of significance.

Table 6
Threshold values of necessary-but-not-sufficient conditions to be achieved (values, percentile values) – total sample.

Y	EB		UB		CS		DUP*		PQ		HB	
	value	% (n)	value	% (n)	value	% (n)	value	% (n)	value	% (n)	value	% (n)
5	3.63	6.0 (13)	**4.20**	11.6 (25)	2.91	11.6 (25)	1.32	2.3 (5)	3.49	12.1 (26)	3.21	**16.7 (36)**
6	4.14	1.0 (28)	**5.01**	31.6 (68)	3.93	28.4 (61)	2.04	7.0 (15)	4.19	30.2 (65)	3.93	**32.6 (70)**
7	4.66	30.2 (65)	**5.81**	**62.8 (135)**	4.95	57.4 (124)	2.76	13.0 (28)	4.89	58.1 (125)	4.64	56.7 (122)
Y	**EnvB**		**TR**		**FC**		**(No) PPR**		**(No) PHR***			
	value	% (n)	value	% (n)	value	% (n)	value	% (n)	value	% (n)		
5	2.96	4.2 (9)	3.44	8.8 (19)	2.51	14.9 (32)	2.02	11.2 (24)	NN (0)	NN (0)		
6	3.89	13.0 (28)	4.12	31.6 (68)	3.42	31.2 (67)	2.80	21.4 (46)	2.50	4.7 (10)		
7	4.82	32.6 (70)	4.80	49.8 (107)	4.34	56.3 (121)	3.59	39.5 (85)	4.00	23.7 (51)		

In bold: highest value.
*Exclusion due to small, irrelevant effect sizes and/or lack of significance.
NN = not necessary.
EB = economic benefits, UB = utilitarian benefits (convenience), CS = customized services, DUP = desire for unique products, PQ = perceived quality value, HB = hedonic benefits, EnvB = environmental benefits, TR = trust, FC = fashion consciousness, PPR = Perceived performance risk, PHR = Perceived hygiene risk, Y = purchase intention.

for *utilitarian benefits*, *hedonic benefits*, and *trust*. For consumers unfamiliar with subscription box services, the determinant *trust* recorded the highest mean and percentile threshold values. Threshold values for the determinant *fashion consciousness* were highest for participants with higher sustainable behavior. Participants with lower sustainable behavior achieved the highest threshold values for the determinant *customized services*. Percentile thresholds for participants with higher sustainable behavior referred to *hedonic benefits*, *economic benefits, environmental benefits*, *fashion consciousness* and *(no) perceived hygiene risk*. Among participants with lower sustainable behavior, the percentile threshold was most often not met – besides *fashion consciousness* and *hedonic benefits* – for *utilitarian benefits, customized services, perceived quality value* and *trust* (see Table A5 in the appendix).

5.4. Robustness check

The results of the NCA are more susceptible to outliers compared to traditional evaluation methods, as the CE-FDH and CR-FDH ceiling lines are measured by the external observations on the scatterplot. Therefore, outliers can significantly change the course of the ceiling lines and strongly influence the evaluation accordingly (Dul, 2016). We used the effect size sensitivity extension of the NCA (NCA-ESSE) to investigate whether the CE-FDH effect sizes were confirmed (Becker et al., 2026). The NCA-ESSE extension relies on the CE-FDH ceiling line and uses sensitivity thresholds, allowing up to 5% of the observations (in 0.5% steps) to be located above the ceiling line. For our sample, the permutation p-value was significant for increases in the empirical effect size compared with the theoretical effect size for all conditions. This indicates typical observations and the typicality of the necessary-but-not-sufficient conditions.

In the total sample, the empirical effect size resulting from NCA-ESSE was equal to the NCA value except for *economic benefits* (NCA-ESSE: 0.38, NCA: 0.31) and *trust* (NCA-ESSE: 0.35, NCA: 0.29). For the latter, the category changed from moderate to large. The female sample showed the same results. In the male sample, there was only congruence in the effect size for hedonic benefits. The delta between the effect sizes (NCA-ESSE – NCA) for the other necessary-but-not-sufficient conditions ranged from −0.03 to 0.14. Category changes from moderate to large were observed for *fashion consciousness* (NCA: 0.26, NCA-ESSE: 0.32) and *(no) perceived hygiene risk* (NCA: 0.29, NCA-ESSE: 0.41). For the sub-sample familiar with the services, the NCA-ESSE empirical effect size was the same for five necessary-but-not-sufficient conditions (*customized services, desire for unique products, environmental benefits, (no) perceived performance risk,* and *(no) perceived hygiene risk*). There was a change in category from moderate to large for *economic benefits* (NCA: 0.22, NCA-ESSE: 0.46) and *trust* (NCA: 0.29, NCA-ESSE: 0.35). For the sub-sample unfamiliar with the services, the same effect size value was obtained for *customized services*. The other necessary-but-not-sufficient conditions displayed a delta between −0.02 and 0.09 (effect size NCA-ESSE – effect size NCA), but no changes in category were observed. In the sub-sample of respondents with higher sustainable behavior, five effect sizes were congruent and largely similar to the sub-sample familiar with the service (*customized services, desire for unique products, hedonic benefits, (no) perceived performance risk,* and *(no) perceived hygiene risk*). The delta was between 0.07 and 0.28, and included four changes in category from moderate to large (*economic benefits*: NCA: 0.21, NCA-ESSE: 0.40; *utilitarian benefits*: NCA: 0.23, NCA-ESSE: 0.51; *environmental benefits*: NCA: 0.27, NCA-ESSE: 0.42; *trust*: NCA: 0.15, NCA-ESSE: 0.40). In the sub-sample of less sustainable respondents, these conditions included *utilitarian benefits, customized services, desire for unique products, perceived quality value*, and *environmental benefits*. Here, the delta between effect size NCA-ESSE and effect size NCA was small, ranging from −0.02 to 0.06, with no changes in category.

The sensitivity-based NCA largely confirmed the category classification of the CE-FDH effect sizes in the sample and sub-samples. *Economic benefits* displayed the most changes in category, with three, followed by *fashion consciousness* with two. The empirical NCA-ESSE effect size was congruent with the NCA value in the sample and the six sub-samples, most often for *customized services* with six, and *desire for unique products* with five.

6. Discussion

Concerning RQ1, the results of the NCA show that *economic benefits*, *utilitarian benefits (convenience)*, *customized services*, *perceived quality value*, *hedonic benefits*, *environmental benefits*, *trust,* and *fashion consciousness* in their presence and *perceived performance risk* in its absence are necessary-but-not-sufficient conditions for the formation of an intention to purchase secondhand subscription boxes. These results are consistent with findings in the literature (see Table A1 in the appendix), which situate the study within a broader research objective (circular economy, collaborative consumption, online secondhand clothing retail, sharing economy, and retail models) for Germany. While we considered secondhand fashion consumption in general, the main relevance of the findings is for comparable secondhand and subscription-based services.

Perceived quality value and *utilitarian benefits* are necessary-but-not-sufficient conditions with a large effect size. Only the *desire for unique products* and *(no) perceived hygiene risks* displayed insignificant effects. Our results empirically support the proposed relationships as necessary conditions, except for hypothesis 4 and partly hypothesis 11. For maximum purchase intention to occur (Y = 7) and taking threshold values above 4 and percentage values over 50% into account, *utilitarian benefits (convenience)* displayed the highest values and represented a clear bottleneck. *Hedonic benefits, customized services, perceived quality value,* and *fashion consciousness* also served as bottlenecks.

Hedonic benefits were also the key factor with the highest impact in

the regression analysis. Bhatt and Kim (2018) emphasized the surprise effect related to the *hedonic benefits* of a subscription box. Similarly, respondents argue, "The surprise is ultimately the exciting part". One possible explanation for *hedonic benefits* also being a bottleneck is the absence of the physical shopping experience (Arnold and Reynolds, 2003). This is confirmed by statements such as "I prefer to go second-hand shopping in person because the social aspects also play a big role for me and I like to discover clothes myself. A subscription box would take away the fun". "Apart from that, you miss out on the shopping experience in a local store". "I enjoy the process of shopping for new clothes."

Economic benefits displayed a medium effect size and mixed results in the literature (see Table A1 in the appendix). Bray et al. (2021) identified perceived value for money as a potential barrier to subscription commerce. Respondents questioned the value of the offer: "I would rather use the money for other things". Another participant added: "There are too many products in the box that I don't use. The price is too high for that". In particular, *economic benefits* of secondhand subscription boxes were a threshold for consumers with higher sustainable behavior. For this consumer group, *environmental benefits* are also a bottleneck: "With the subscription box, I have the feeling that the closet fills up with things that you don't actually need. So, it's anything but sustainable". For consumers with lower sustainable behavior, *trust* presents a threshold: "The promise of getting clothes worth over €100 at €40-50 makes me suspicious. What value is assumed? New price? This 'promise' casts doubt on the business model, as the providers of the boxes also must cover their costs".

As one of two determinants, the *desire for unique products* was not supported as a necessary-but-not-sufficient condition due to a small, irrelevant effect. This finding is in contrast to research results, which attribute high importance to the desire for unique products in the context of secondhand and subscription box consumption and a significant influence on the use of these offers (e.g., Kawulur et al., 2022; Lee-G. et al., 2019; Ramkumar and Woo, 2018; Roux and Guiot, 2008). However, for male participants and those unfamiliar with subscription box services, unique products in a secondhand subscription box are a medium-sized necessary-but-not-sufficient condition. The other partly insignificant condition is *(no) perceived hygiene risk*. This determinant serves as a bottleneck for males and for those familiar with subscription services.

Concerning RQ2 and the different sub-groups, major differences exist for males, those unfamiliar with the service, or those displaying higher sustainable behavior, which give rise to various recommendations for action. For example, men should be given greater prominence to increase their share of the second-hand market (47.3%, mean of the male shopping rates of 49% in 2019, 56% in 2021, and 37% in 2024, Momox Fashion, 2020, 2022, 2024).

6.1. Theoretical implications

Past research has identified significant linear effects of the determinants investigated in this paper on purchase intention in the context of second-hand or subscription box purchases, using various methodologies, often SEM (see Table A1 in the appendix). In addition, we integrated a necessity perspective to differentiate between drivers of purchase intention and those that must be present. Our study shows that most determinants, except *desire for unique products* and *(no) perceived hygiene risk,* must reach a certain level for purchase intention to occur. Some determinants – *customized services, hedonic benefits, trust* and *(no) perceived functional performance risk* - are additionally effect-based. However, *utilitarian benefits,* which have the largest effect size, are only necessity-based and do not significantly affect purchase intention. Established effect-based approaches such as regression-based models would not have revealed this insight. This study, therefore, provides a new understanding of the complementary interaction of the determinants investigated in achieving purchase intention of a secondhand subscription box. As in Helinski et al.'s (2025) study on circular fashion from recycled materials, or in Sharma and Roy's (2026) study on green food, the determinants present a nuanced picture of consumer decision-making. Some are solely necessary but not sufficient for purchase intentions, and others are additional key drivers.

However, the distinction between bottlenecks and compensatory drivers is context-dependent and cannot be easily transferred to other circular economy or sustainable consumption contexts. A comparison with the findings of Helinski et al. (2025) shows that at least in Germany, e*nvironmental benefits* are necessary but not sufficient. Therefore, the environmental appeal of a fashion subscription box should be moderate. In contrast to Helinski et al. (2025), customers' *desire for unique products* must be present, but it is not a key driver. Customers expect the items not to differ too greatly from conventional new ones. The functional value of secondhand items and benefits such as *(no) perceived performance risk* are, in this context, also additional key drivers when forming purchase intention. For premium-priced circular fashion, further functional improvements do not increase purchase intention. The specifics of subscription box services, such as *customized services, trust,* and *hedonic benefits,* are key drivers, and enhancements increase purchase intention. Overall, the results do not suggest a more general principle whereby sustainable business models must fulfil certain utilitarian or hedonic determinants before consumers will consider adopting them. In addition, the determinants show higher variability across groups in effect sizes and as bottlenecks. The key factors, functioning in a compensatory way, are consistent across groups but display differences in impact strength.

6.2. Practical implications

From a management perspective, this study delivers important insights for practice. First, it provides practitioners with information on the necessary-but-not-sufficient conditions that must be met in order for customers to form purchase intention, including the threshold values required to fulfill this condition. If these conditions are not met, a purchase intention does not occur. Therefore, the priority should be to remove bottlenecks. In addition, critical factors, especially those related to Customer Experience (CX), can be strengthened. The threshold values can serve as an importance ranking for management activities.

Starting with the design of a business model (see Table 1), a result of the overall sample analysis is the practical implication of taking care of the bottlenecks in *utilitarian benefits* and *perceived quality value*. These two determinants represent true non-negotiable prerequisites. *Utilitarian benefits (convenience)* concern service efficiency throughout the whole customer journey. The technological infrastructure and the digital presentation of items should be of a high standard. The *perceived quality value* in terms of fabric and variety depends on inventory management. In addition, *hedonic benefits* serve both as a bottleneck and a key factor. Therefore, high-level communication should focus on the emotional thrills associated with a secondhand subscription box.

Service providers must bear in mind that Customer Experience (CX) for secondhand fashion subscription boxes is more difficult to manage due to mismatched expectations regarding used items. CX management includes, among others, product expectations and *customized services*. Consumer hesitation towards used items must be addressed through a clear, standardized grading framework for evaluating their quality. In addition, customer onboarding should be combined with the collection of detailed preference profiles. More data on fit and curation can be collected on each item after box delivery for algorithm training purposes to improve box curation. The unboxing experience could be enhanced by sustainable packaging and tags that tell the story of the items.

Males are particularly skeptical of subscription box services. Eight of the eleven determinants are meaningful bottlenecks. For males, greater attention should be paid to *perceived performance risk* and *perceived hygiene risk*. Relying on and communicating the use of cleaning, sanitizing, and repair processes, and a neutral, odour-free, and premium

presentation can decrease these *perceived risks*. Information on cleaning, sanitization, and refurbishment processes, as well as on quality control, should be explicitly provided on the landing page. The service providers could also consider communicating the items' *environmental benefits* in more detail. This concerns sustainability metrics to promote circularity. Strategic messages highlighting *economic benefits* in the form of affordable access to expensive styles or designer brands that are kept in circulation seem less relevant. Like males, consumers unfamiliar with subscription box services stand out for their strong skepticism underpinned by numerous clear bottlenecks. For both segments, *trust* in the service is a meaningful bottleneck that concerns personalization, brand transparency, or return policies. Personalized strategies include deep-dive questionnaires covering body measurements, clothing fit, style and color preferences, services provided by a human stylist, or customer approval of box previews to avoid returns. Item details should address the clothing origin and quality as well as environmental impact metrics. Return policies should focus on sending proactive product swap reminders and implementing frictionless returns.

In contrast, and similar to females, the hurdles to overcome are fewer for consumers familiar with the service. For them, the focus should be on *economic benefits,* highlighting discounts or affordable access to high-quality clothing. More sustainable consumers also value *economic benefits,* but *fashion consciousness* is their biggest bottleneck. For them, there is an additional need to increase trend-driven curation and styling services. They also expect to communicate *environmental benefits*. Circular communication could prioritize personalized impact metrics that include gamification elements, such as annual breakdowns of customers' environmental savings and milestone rewards like loyalty benefits and digital badges.

In addition, the perfect condition of the clothes, with no functional risks, is a key driver. When addressing consumers with lower sustainable behavior, *customized services* pose the highest threshold. Therefore, personalized strategies are important.

6.3. Limitations and research outlook

This paper is not free of limitations. We used a hypothetical scenario for the subscription box model in the study, which is not common in Germany but is predominant in Anglo-Saxon countries (see Table 1). Even though these models could serve as role models for the German market, we did not develop specific design recommendations. In this regard, other methodologies such as conjoint analysis would be better approaches (Bischof et al., 2020; Rese and Baier, 2025).

While the NCA results included critical conditions not identified by regression analysis, the NCA does not indicate sufficient or generalizable determinants. In particular, the purposive sampling approach might hamper generalizability due to not well representing and underestimating unsuccessful cases (Dul, 2016). In the student cohort, fewer respondents familiar with subscription box services used secondhand subscription boxes (students vs. fashionistas: 47 vs. 65; 5 vs. 26; 11.1% vs. 42.6%). Here, some determinants were small – *economic benefits* and both risk factors – while *customized services* were large. We relied on self-reported, cross-sectional data collected at a single point in time to examine consumer patterns. These might be prone to social desirability bias regarding pro-environmental behavior (Dursun et al., 2019). In addition, there might be a potential behavior gap in the data, as we recorded stated intentions rather than real purchasing behavior.

The sample appears appropriate for the intended segment of secondhand shoppers, consisting predominantly of the target group (well-educated young women), but some sample descriptives, e.g., the large share of students, are not representative of the whole population. Young consumers – despite often being fast-fashion shoppers –have also been investigated regarding their preferences for premium-priced circular fashion (Helinski et al., 2025). However, the purchase intention determinants of older consumers may differ. While second-hand shopping helps control costs, to foster circularity, older people should be offered the opportunity to hand in unused, well-preserved, or vintage clothes via an online platform similar to LA Circular Fashion. We also focused only on German consumers. Other cultural contexts might provide guidance for designing a secondhand subscription box and the range of services it offers, depending on the geographical area.

The application of Necessary Condition Analysis (NCA) and regression analysis to purchase intention of secondhand subscription boxes is subject to several limitations. For both methods, causal directionality must be assumed; a strict cause-and-effect chain is not proven; omitted variables can lead to third-variable bias; there is no evidence that changes in the determinant occur before changes in purchase intention. While we included all determinants in both methods, sequential testing – apply NCA, remove necessary-but-not-sufficient conditions, apply regression, and identify critical influencing factors – can also be used as a strategy. The NCA ceiling zone shows the minimum score needed, but is no guarantee of purchase. There are no clear rules on the choice of ceiling lines (Chouchane and L'Écuyer, 2026), suggesting the need for further development of the NCA. While we used the CR-FDH ceiling line for category classification, the CE-FDH ceiling line is the basis for the sensitivity-based NCA-ESSE extension. The latter revealed inconsistencies related to *economic benefits* and *trust* in the total sample, which might be partly the result of a lack of item scale quality. Here, the results need to be interpreted with caution. In particular, the limited convergent validity (AVE below the recommended threshold) is problematic if the method (NCA) is sensitive to measurement quality. It must also be considered that the subgroup analyses are based on relatively small group sizes, which may limit the robustness of the results obtained. This holds, for example, also when purchase intention is $Y = 7$.

The NCA-ESSE did not result in any change in most of the empirical effect sizes for the total sample ($n = 215$) and the large female subsample ($n = 145$). This indicates that a minimum sample size is required to obtain meaningful results. On the other hand, the deltas in the smaller sub-samples were, for the most part, minor and did not result in a change in category. The latter occurred with a delta of at least 0.06. Here, threshold values could be introduced and validated, for example, at 0.06. In this regard, even the small sub-group of less sustainable consumers ($n = 54$) showed rather robust results except for *economic benefits*. The male sample ($n = 70$) was the least robust. Therefore, group comparisons with smartPLS should always be complemented by NCA and NCA-ESSE. In addition, NCA could be enhanced by other methods investigating causal patterns of multiple-conjunctural causation, such as fsQCA (Dul et al., 2023; Pappas and Woodside, 2021).

7. Conclusion

This study aimed to identify the necessary-but-not-sufficient conditions, as well as influencing factors, for purchase intention regarding secondhand subscription boxes. The necessity perspective adds important thresholds for this business model that must be overcome and are not effect-based. However, the importance of the determinants is group-based and depends on the context. Therefore, the determinants, but not their effects, can be transferred to other sustainable business models in the fashion industry.

CRediT authorship contribution statement

Alexandra Rese: Writing – original draft, Validation, Supervision, Methodology, Investigation, Formal analysis, Conceptualization, Writing – review & editing. **Daniela Weber:** Writing – original draft, Validation, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix

Table A1
Literature review.

Reference	Research object	Determinant	Results	Theory	Methodology	Sample
Economic benefits						
Aminah et al. (2021)	Subscription Box	Value for money	Value for money has no significant effect on customer satisfaction.		Survey, SEM	n = 176
Bhatt and Kim (2018)	Subscription services	Actual value	The relationship between the perceived value and the price of the product is a key utilitarian motivation for using subscription services.	Model of Hedonic Shopping Motivations	Semi-structured interviews; Grounded Theory, comparative method	n = 14
Brandão and da Costa, 2021	Sustainable fashion consumption	Price sensitivity	The higher the price sensitivity, the lower the attitude towards consuming sustainable fashion and the perception that it is easy to demonstrate such behavior.	TPB	Survey, SEM	n = 669
Bray et al. (2021)	Subscription retailing	Value for money	Value for money was identified as both a motivator and a potential barrier to using a subscription service.		Inductive research design (exploratory focus group, survey)	n = 3 n = 1356
Day et al. (2020)	Subscription services	Perceived cost benefit	The perceived customer cost advantage of subscription services has a significant positive effect on purchase intention.	Prospect Theory	Experiment, SEM	n = 524
Edbring et al. (2016)	Circular economy	Economic reasons	The main motivation for secondhand products is economic in nature.		Mixed methods	Qualitative semi-structured interviews, n = 9; Survey n = 1159
Ferraro et al. (2016)	Secondhand	Economic motivations	A small consumer segment is identified that is driven by economic motivations.		Survey, Latent Class Analysis	n = 340
Hamari et al. (2016)	Collaborative consumption	Economic outcomes	Perceived extrinsic reward (in this case, economic) has a positive influence on the intention to participate in collaborative consumption.	SDT	Survey, SEM	n = 168
Hur (2020)	Secondhand	Value for money	From the perspective of both consumers and non-consumers of secondhand clothing, a lack of value for money was identified as a barrier to the consumption of secondhand clothing.	The Means-End-Chain Theory Schwartz's 10 Value Domains	Qualitative semi-structured interviews, survey, hierarchical value map	n = 20 n = 272
Kawulur et al. (2022)	Secondhand	Price orientation	Customer price orientation has a significantly positive effect on the intention to buy secondhand products.		Survey, regression analysis	n = 105
Kerschbaumer et al. (2023)	Subscription commerce	Utilitarian motivations	Utilitarian motivations have a significant positive influence on attitudes toward the adoption of subscription-based online services.	Attachment Theory	Survey, SEM	n = 259
Kim et al. (2021), b	Online secondhand clothing retail services	Economic benefit	Product history strengthens the perceived economic benefits of circular fashion services, but the perceived economic benefit has no significant positive effect on consumer attitudes toward circular fashion services.	Narrative Competence Theory	Online experiment, SEM	n = 238
Lee-G. et al., 2019	Beauty subscription box retail services	Product price	No significant effect of product price on consumer attitudes toward subscription boxes is identified.	SOR framework	Survey, SEM	n = 357
Liu et al. (2023)	Online fashion resale	Value for money	The price-performance ratio of resale has neither a significant influence on the attitude toward clothing resale activities nor on the intention to continue using them.	CPV	Survey, SEM	n = 257

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Table A1 (*continued*)

Reference	Research object	Determinant	Results	Theory	Methodology	Sample
		Budget benefit	Budget benefits for resale have neither a significant influence on the attitude toward clothing resale activities nor on the intention to continue using them.			
Lou et al. (2022)	Secondhand Luxury Products	Perceived economic value	The perceived economic value does not influence the consumer's intention to buy secondhand luxury products.	CPV	Survey, regression analysis	n = 340
Möhlmann (2015)	Sharing Economy	Cost saving	The possibility of cost savings has a positive influence on satisfaction with a sharing option, which in turn has a significant effect on the likelihood of repeated use.		Survey, SEM	Study 1: n = 236 Study 2: n = 187
Oscario (2023)	Secondhand	Price	Before buying secondhand clothing, consumers weigh up the price aspect.		Qualitative semi-structured interviews, survey, correlations	n = 51, n = 100
Padmavathy et al. (2019)	Secondhand	Price Orientation	Price orientation is one of the economic motivations for buying secondhand products online.		Focus group, expert panel surveys, SEM	Study 1: n = 14, Study 2: n = 11, Study 3: n = 223, Study 4: n = 425, Study 5: n = 479
Park and Armstrong (2019)	Collaborative Consumption Retail Models	Saving money	The most frequently identified motivation for buying secondhand products is to save money.	Grounded theory approach	Qualitative semi-structured interviews	n = 38
Prisco et al. (2025)	Secondhand	Price value	The price value plays a significant positive role in influencing the purchase intention.	TRA, Norm Activation Model	Survey, SEM	n = 457
Ramkumar and Woo (2018)	Fashion & beauty subscription-based online services	Utilitarian motivation (cost saving)	Utilitarian motivations (cost savings) have a significant positive influence on the attitude toward clothing and beauty subscription services, which in turn has a positive effect on the intention to use them.	TRA	Survey, SEM	n = 385
Roux and Guiot (2008)	Secondhand	Price sensitivity	Price sensitivity is positively related to general motives for secondhand shopping, which in turn have a significant positive effect on purchase frequency and the number of channels used for secondhand purchases.		Qualitative semi-structured interviews, survey, SEM	n = 15, Study 1: n = 224, Study 2: n = 484
Silva et al. (2021)	Secondhand	Price	Price is not a significant key factor in the shopping experience of secondhand clothing.		Survey, mean comparison, logistic regression	n = 127
Stolz (2022)	Secondhand Luxury	Economic motivation	Economic motivation has a significant, positive effect on consumer attitude, which has a significant, positive effect on purchase intention.	TPB	Survey, SEM	n = 469
Tao and Xu (2018a)	Fashion Subscription Retailing	Economic benefit	The resulting economic benefits for consumers had a significant positive influence on the intention to use subscription offers in the clothing sector.	TPB	Survey, mean comparison, regression analysis	n = 300
Turunen and Pöyry (2019)	Secondhand Luxury	Price per quality	A shopping behavior that can be classified as increasingly product- and price-related and which places awareness of the price-performance ratio in the foreground is identified among secondhand shoppers in the luxury segment.		Semi-structured interviews	n = 22
Wang et al. (2022)	Secondhand	Economic motivation	Economic motivation has no significant influence on purchase frequency.	Shopping Motivation Theory	Survey (logistic regression), content analysis, word cloud analysis	n = 127
Xu et al. (2014)	Secondhand	Economic value	American consumers saw higher economic and hedonic value in secondhand clothing than Chinese consumers. The price difference between new and used garments was not significant enough for Chinese consumers to derive an economic benefit from purchasing used clothing.	TRA	Survey, mean comparison, regression analysis	US sample: n = 188, China sample: n = 262

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Table A1 (*continued*)

Reference	Research object	Determinant	Results	Theory	Methodology	Sample
Yan et al. (2015)	Secondhand	Price sensitivity	Student secondhand shoppers are more price-sensitive compared to non-buyers. Price sensitivity has a significant positive effect on purchase frequency in secondhand clothing shops.		Survey, mean comparison, regression analysis	n = 152
Utilitarian benefits						
Aminah et al. (2021)	Subscription Box	Perceived convenience	Perceived convenience had a significant positive effect on customer satisfaction and, in turn, on consumer continuance intention.		Survey, SEM	n = 176
Bhatt and Kim (2018)	Subscription Services	Convenience	Perceived convenience is a key utilitarian motivation for using subscription services.	Model of Hedonic Shopping Motivations	Semi-structured interviews	n = 14
Bhatt et al. (2021)	Fashion subscription services	Convenience	Convenience, time savings, and cost savings motivate the subscriber to accept the subscription offer and continue with it.		Semi-structured interviews	n = 14
Charnley et al. (2022)	Secondhand fashion	Inconvenience	Discomfort is identified as one of the most relevant barriers to the use of secondhand clothing.		Mixed methods	Organizations that operate second-hand models: n = 40 Survey n = 1200 Interviews n = 20
Padmavathy et al. (2019)	Secondhand	Ease of Use	Ease of use/user-friendliness is one of the motivations for buying secondhand products online.		Mixed methods, SEM	Study 1: n = 14, Study 2: n = 11, Study 3: n = 223, Study 4: n = 425, Study 5: n = 479
		Convenience motivation	Convenience is identified as a component of the overall motivation for buying secondhand products online.			
Park and Armstrong (2019)	Collaborative Consumption Retail Models	Saving time	Time is saved in the context of collaborative consumption by the use of a subscription service.	Grounded theory approach	Semi-structured interviews	n = 38
Ramkumar and Woo (2018)	Fashion & beauty subscription-based online services	Utilitarian Motivation (Convenience)	Utilitarian motivations (convenience) have a significant positive influence on attitudes toward clothing and beauty subscription services, which in turn have a positive effect on the intention to use them.	TRA	Survey, SEM	n = 385
Tao and Xu (2018a)	Fashion Subscription Retailing	Convenience	The intention to use subscription offers in the clothing sector was significantly positively influenced by the resulting convenience for consumers.	TPB	Survey, mean comparison, regression analysis	n = 300
Customized services						
Aminah et al. (2021)	Subscription Box	Personalization	No significant effect of personalization on customer satisfaction could be demonstrated.		Survey, SEM	n = 176
Bhatt et al. (2021)	Fashion subscription services	Personalization	The selection of products by an algorithm or a stylist increases the experience value.		Semi-structured interviews	n = 14
Coelho and Henseler (2012)	Several industries	Customization	Personalization has a significantly positive effect on service quality, customer loyalty, and customer satisfaction.	European Customer Satisfaction Index Model	Survey, SEM	n = 2104
Sebald and Jacob (2018)	Curated retailing	Customized solution	Customized solutions are identified as the predominant motivation for using curated services.		Semi-structured interviews	n = 21
Tao and Xu (2018b)	Fashion Subscription Retailing	Personalization	Personalization was identified as an advantage of subscription services in the clothing sector.		Focus group	n = 17
Desire for unique products						
Cervellon-C. et al., 2012	Vintage & Secondhand	Need for uniqueness	The need for uniqueness has a significant positive effect on treasure hunting, which in turn has a significant positive influence on the intention to buy vintage clothing.		Survey, SEM	n = 103
Edbring et al. (2016)	Circular Economy	Desire for uniqueness	The desire for uniqueness is identified as the second biggest motivator for secondhand consumption.		Mixed methods	Qualitative semi-structured interviews, n = 9; Survey n = 1159

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Table A1 (*continued*)

Reference	Research object	Determinant	Results	Theory	Methodology	Sample
Helinski et al. (2025)	Circular Fashion	Functional value	Functional value is a necessary-but-not-sufficient condition and a key factor.	Theory of Consumption Values, resource-based perspective	Survey, SEM, NCA	n = 272
Kawulur et al. (2022)	Secondhand with Gen Z	Uniqueness	Uniqueness or the desire to appear unique has a significantly positive effect on the intention to buy secondhand products.		Survey, regression analysis	Survey n = 105
Laitala and Klepp (2018)	Secondhand	Uniqueness	A comparison of non-buyers and buyers of secondhand clothing shows that the latter consumer group places more importance on the aspect of uniqueness		Survey, group comparison	n = 1019
Lee-G. et al., 2019	Beauty Subscription Box Retail Services	Product uniqueness	The uniqueness of the products has a significant positive influence on consumer attitudes toward subscription boxes, which in turn has a positive effect on recommendation behavior and repurchase intentions.	SOR framework	Survey, SEM	n = 357
Padmavathy et al. (2019)	Secondhand	Need to be unique	The customer's need for uniqueness is one of the ideological motivations for buying secondhand products online.		Mixed methods, SEM	Study 1: n = 14, Study 2: n = 11, Study 3: n = 223, Study 4: n = 425, Study 5: n = 479
Ramkumar and Woo (2018)	Fashion & beauty subscription-based online services	Desire for unique products	The desire for unique products has a significant, positive effect on the intention to use clothing and beauty subscription services.	TRA	Survey, SEM	N = 385
Roux and Guiot (2008)	Secondhand	Need for uniqueness	The need for uniqueness is positively related to the general motives for secondhand shopping, which in turn have a significant positive effect on purchase frequency and the number of channels used for secondhand purchases.		Qualitative semi-structured interviews, survey, SEM	n = 15, Study 1: n = 224, Study 2: n = 484
Xu et al. (2014)	Secondhand American vs. Chinese consumers	Uniqueness	Because American consumers live in a culture that values individualism, they see more value in finding unique products by buying secondhand clothing.	TRA	Survey, mean comparison, regression analysis	US sample: n = 188, China sample: n = 262
Perceived quality value						
Helinski et al. (2025)	Circular Fashion	Epistemic value	Epistemic value is a necessary-but-not-sufficient condition.	Theory of Consumption Values, resource-based perspective	Survey, SEM, NCA	n = 272
Ki et al. (2024)	Online Secondhand Luxury Shopping	Craftmanship	The aspect of craftsmanship influenced the perception of the purchase of luxury secondhand products as a wise, socially status-enhancing, and sustainable consumption choice. This in turn has a significant effect on purchase intention.		Content analysis of a Q&A platform in China, survey, ordinal probit regression	n = 311
Lee-G. et al., 2019	Beauty Subscription Box Retail Services	Product quality	Product quality has a significant positive influence on consumer attitudes toward subscription boxes, which in turn has a positive effect on recommendation behavior and repurchase intentions.	SOR framework	Survey, SEM	n = 357
Liu et al. (2023)	Online Fashion Resale	Quality	The quality of resale products has neither a significant influence on the attitude toward clothing resale activities nor on the intention to continue using them.	CPV	Survey, SEM	n = 257
Lou et al. (2022)	Secondhand Luxury	Perceived quality value	The perceived quality value has a significant positive influence on the purchase intention for luxury secondhand products.	CPV	Survey, regression analysis	n = 340
Turunen and Pöyry (2019)	Secondhand Luxury	Price per quality	A shopping behavior that can be classified as increasingly product- and price-related and which places awareness of the price-performance ratio in the foreground is identified among secondhand shoppers in the luxury segment.		Semi-structured interviews	n = 22

(*continued on next page*)

Table A1 (*continued*)

Reference	Research object	Determinant	Results	Theory	Methodology	Sample
Hedonic benefits						
Aminah et al. (2021)	Subscription Box	Perceived enjoyment	Perceived enjoyment had a significant positive effect on customer satisfaction and, in turn, on consumer continuance intention.		Survey, SEM	n = 176
Bhatt and Kim (2018)	Subscription Services	Hedonic shopping motivations	Hedonic motivations were associated with the consumer's shopping experience. The element of surprise is particularly noteworthy.	Model of Hedonic Shopping Motivations	Semi-structured interviews	n = 14
Kerschbaumer et al. (2023)	Subscription commerce	Hedonic motivations	Hedonic motivations have a significant positive influence on attitudes toward the adoption of subscription-based online services.	Attachment Theory	Survey, SEM	n = 259
Ki et al. (2024)	Online Secondhand Luxury Shopping	Treasure hunting pleasure	The treasure-like aspect of clothing discoveries influences the perception of purchasing luxury second-hand products as a wise, socially status-signaling, and sustainable consumption choice. This in turn has a significant effect on purchase intention.		Content analysis of a Q&A platform in China, survey, ordinal probit regression	n = 311
Kim, Woo & Ramkumar, 2021	Online secondhand clothing retail services	Hedonic benefit	Product history strengthens the hedonic advantage gained from a circular fashion service. This hedonic advantage has a significant, positive effect on consumer attitudes toward the fashion service.	Narrative Competence Theory	Online experiment, SEM	n = 238
Hamari et al. (2016)	Collaborative Consumption	Enjoyment	The perceived pleasure of participating in collaborative consumption has a positive influence on attitudes toward it and on the intention to participate.	SDT	Survey, SEM	n = 168
Ramkumar and Woo (2018)	Fashion & beauty subscription-based online services	Hedonic Motivations	Hedonic motivations have a significantly positive influence on attitudes toward clothing and beauty subscription services, which in turn have a positive effect on the intention to use them.	TRA	Survey, SEM	n = 385
Tao and Xu (2018a)	Fashion Subscription Retailing	Perceived enjoyment	The intention to use subscription offers in the clothing sector was significantly and positively influenced by the perceived pleasure.	TPB	Survey, mean comparison, regression analysis	n = 300
Wang et al. (2022)	Secondhand	Treasure hunting fun	The fun of searching for treasure-like clothing discoveries has a significant positive influence on the consumption of secondhand goods.	Shopping Motivation Theory	Survey (logistic regression), content analysis, word cloud analysis	n = 127
Xu et al. (2014)	Secondhand American vs. Chinese consumers	Hedonic value	Hedonic value proved to be the most important key factor influencing the purchase intention of second-hand clothing for young American consumers.	TRA	Survey, mean comparison, regression analysis	US sample: n = 188, China sample: n = 262
Environmental benefits						
Borusiak et al. (2020)	Sustainable Consumption	Awareness of negative consequences for the environment	Awareness of the consequences of buying secondhand products has a positive effect on consumers' sense of responsibility toward the environment. This sense of responsibility has a significant positive influence on the personal norm, which has a positive influence on the intention to buy secondhand products.	TRA	Survey, SEM	n = 333
Day et al. (2020)	Subscription services	Perceived environmental benefit	No significant effect of perceived environmental benefit on purchase intention was identified.	Prospect Theory	Survey, SEM	n = 524
Helinski et al. (2025)	Circular Fashion	Environmental value	Environmental value is a necessary-but-not-sufficient condition.	Theory of Consumption Values, resource-based perspective	Survey, SEM, NCA	n = 272
Kim, Jung & Lee, 2021	Circular Fashion	Environmental value	The ecological value has a significant positive influence on attitudes toward products in the circular fashion economy.		Survey, SEM	n = 850
Möhlmann (2015)	Sharing Economy	Environmental impact	The environmental impact of the sharing option has neither a		Survey, SEM	Study 1 n = 236 Study 2 n = 187

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Table A1 (*continued*)

Reference	Research object	Determinant	Results	Theory	Methodology	Sample
			significant effect on satisfaction with the service nor on the likelihood of using it again.			
Xu et al. (2014)	Secondhand American vs. Chinese consumers	Environmental value	Chinese respondents perceived a high ecological value in the purchase of secondhand clothing.	TRA	Survey, mean comparison, regression analysis	US sample: n = 188, China sample: n = 262
Trust						
Charnley et al. (2022)	Secondhand fashion	Inconvenience	The aspect of a lack of trust is identified as one of the most relevant barriers to the use of secondhand clothing.		Mixed methods	Organizations that operate secondhand models: n = 40 Survey n = 1200 Interviews n = 20
Kawulur et al. (2022)	Secondhand with Gen Z	Trust	Trust in secondhand products has a significant and positive influence on the purchasing intentions of Generation Z.		Survey, regression analysis	n = 105
Kim, Woo & Ramkumar, 2021	Online secondhand clothing retail services	Trust towards Service	Product history strengthens consumer confidence in a circular fashion service. This trust has a significant, positive effect on consumer attitudes toward the fashion service.	Narrative Competence Theory	Online experiment, SEM	n = 238
Möhlmann (2015)	Sharing Economy	Trust	Trust in the sharing option has a significant effect on satisfaction with the offer.		Survey, SEM	Study 1 n = 236 Study 2 n = 187
Padmavathy et al. (2019)	Secondhand	Trust	Customer trust can be attributed to the ideological motivation for buying secondhand products online.		Mixed methods, SEM	Focus group n = 14 Expert panel n = 11 Survey n = 223 Survey n = 425
Woo & Ramkumar (2018)	Fashion and Beauty subscription-based online services	E-Tailer Trust	Consumers of a subscription-based online service have a higher level of trust than non-consumers in online retailers.		Survey. Logistic regression	n = 385
Fashion consciousness						
Cervellon-C. et al., 2012	Vintage & Secondhand	Fashion involvement	Fashion involvement has a significant positive influence on the purchase of vintage clothing.		Survey, SEM	n = 103
Evans et al. (2022)	Secondhand	Fashion-consciousness	A higher level of fashion awareness was identified among consumers with irregular shopping behavior. Fashion awareness is associated with online platforms and secondhand shops.		Survey, Multivariate Analysis of Variance (MANOVA)	n = 515
Ferraro et al. (2016)	Secondhand	Fashion motivations	The consumer segment known as "fashionistas" is motivated to buy secondhand clothing solely for fashion reasons.		Survey, Latent Class Analysis	n = 340
Ramkumar and Woo (2018)	Fashion & beauty subscription-based online services	Fashion consciousness	Fashion awareness has a significant positive influence on attitudes toward clothing and beauty subscription services, which in turn have a positive effect on the intention to use them.	TRA	Survey, SEM	n = 385
Silva et al. (2021)	Secondhand	Style orientation	Fashion orientation is not a significant key factor in the secondhand clothing shopping experience.		Survey, mean comparison, logistic regression	n = 127
Turunen and Pöyry (2019)	Secondhand Luxury	Fashion consciousness	A shopping behavior that can be classified as increasingly fashion-conscious is identified among secondhand shoppers in the luxury segment.		Semi-structured interviews	n = 22
Woo & Ramkumar (2018)	Fashion and Beauty subscription-based online services	Fashion consciousness	Consumers of a subscription-based online service are more fashion-conscious than non-consumers.		Survey. Logistic regression	n = 385
Zaman et al. (2019)	Secondhand	Fashion consciousness	Online shoppers have a higher fashion awareness compared to consumers who shop in thrift stores.		Survey, Analysis of Variance (ANOVA)	n = 600
Perceived performance risk						
Bischof et al. (2020)	Curated subscription commerce	Perceived risk	The element of surprise in a subscription box offer increases perceived risk, which significantly negatively influences attitudes toward the product offer.		Online experiment, OLS regression	n = 194
Day et al. (2020)	Subscription services	Physical condition risk	The perceived risk concerning product condition has a significant	Prospect Theory	Survey, SEM	n = 524

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Table A1 (*continued*)

Reference	Research object	Determinant	Results	Theory	Methodology	Sample
			negative effect on purchase intention.			
Kang and Kim (2013)	Consumption of environmentally sustainable apparel	Performance risk	Performance risk had no significant effect on the consumer's attitude or intention to act.	TRA	Survey, SEM	Korean samples: n = 62, n = 205; US sample: 1615
Kim, Jung & Lee, 2021	Circular Fashion	Functional risk	Functional risk had no significant effect on attitudes toward products in the circular fashion economy.		Survey, SEM	n = 850
Lou et al. (2022)	Secondhand Luxury Products	Perceived risk	The perceived risk does not influence the consumer's intention to buy secondhand luxury products.	CPV	Survey, regression analysis	n = 340
Silva et al. (2021)	Secondhand	Risk	Risk is not a significant key factor in the secondhand clothing shopping experience.		Survey, mean comparison, logistic regression	n = 127
Perceived hygiene risk						
Charnley et al. (2022)	Secondhand fashion	Hygiene	For the consumer group of non-buyers of secondhand clothing, hygiene concerns are a barrier to the use of secondhand clothing.		Mixed methods	Organizations that operate secondhand models: n = 40 Survey n = 1200 Interviews n = 20
Edbring et al. (2016)	Circular Economy	Concern about hygiene	The biggest barrier to buying secondhand products is the perception that they are unhygienic.		Mixed methods	Qualitative semi-structured interviews n = 9; Survey n = 1159
Hur (2020)	Secondhand	Cleanliness	For non-consumers, lack of cleanliness was identified as a barrier to buying secondhand clothing.	The Means-End-Chain Theory, Schwartz's 10 Value Domains	Mixed methods	Interview n = 20 Survey n = 272
Kim, Yung & Lee, 2021	Circular Fashion	Sanitary risk	The hygiene risk has a significant negative impact on attitudes toward products in the circular fashion economy.		Survey, SEM	n = 850
Laitala and Klepp (2018)	Secondhand	Hygiene	A comparison of buyers and non-buyers of secondhand clothing shows that the latter group of consumers cite the lack of hygiene as a reason for not buying secondhand clothing.		Survey, group comparison	n = 1019
Oscario (2023)	Secondhand	Hygiene	Before buying secondhand clothing, consumers evaluate the hygiene of the garments.		Mixed methods	Interview n = 51 Survey n = 100
Silva et al. (2021)	Secondhand	Hygiene	Hygiene is a significant factor in the shopping experience of secondhand clothing.		Survey, mean comparison, logistic regression	n = 127
Wang et al. (2022)	Secondhand	Sanitation condition	Identification of concerns about the hygienic condition of secondhand clothing.		Survey (logistic regression), content analysis, word cloud analysis	n = 127

TPB = Theory of Planned Behavior, SDT = Self-Determination Theory, SOR = Stimulus-Organism-Response, CPV = Consumer Perceived Value, TRA = Theory of Reasoned Action.

TableA2
Operationalization of the constructs.

Determinant (source)	Item	
Economic Benefits (EB)		By buying a secondhand subscription box like this …
Guiot and Roux (2010);	EM1*:	… I can afford more clothes because I pay less for them.
Ramkumar and Woo (2018)	EM2:	… I can have more clothes for the same amount of money compared to new clothes.
	EM3:	… I feel like I have a lot of clothes for less money.
	EM4:	… I can save money.
	EM5:	… I can spend less money.
	EM6:	… I can be offered reasonable prices.
Utilitarian benefits		Buying such a secondhand subscription box …
(convenience) (UB)	UB1:	… would be possible for me at any time.
Chiu et al. (2014);	UB2:	… would be possible for me without having to go into a store.
Ramkumar and Woo (2018)	UB3:	… would not affect my schedule.
	UB4:	… would be convenient for me.
	UB5	… would save me time.
Customized Services (CUS)		Such a secondhand subscription box …
Ramkumar and Woo (2018)	CUS1:	… meets my expectations regarding content, through the stylist's clothing selection.
	CUS2:	… allows me to order clothes that are tailored to my needs.
	CUS3:	… is adapted to my wishes.
	CUS4*:	… would make me feel that I am a unique customer.
Desire for Unique Products		With a secondhand subscription box like this …

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TableA2 (*continued*)

Determinant (source)	Item	
(DUP) Guiot and Roux (2010); Kim, Yung & Lee, 2021; Liu et al. (2023)	DUP1:	… I hope to get items of clothing that nobody else has.
	DUP2:	… I hope to get items of clothing that are not available in the usual stores.
	DUP3:	… the garments are unique.
	DUP4:	… the garments are different from normal clothes.
	DUP5:	… the search for special items of clothing is important to me.
Perceived Quality Value (PQ)		With a secondhand subscription box like this …
Lou et al. (2022)	PQ1:	… the overall quality of the secondhand clothing is excellent for me.
	PQ2:	… the quality of the secondhand clothes is the main reason for my purchase.
	PQ3:	… for me, there is high-quality secondhand clothing at a low price.
	PQ4*:	… there are secondhand clothes in excellent style and beautiful colors for me.
	PQ5*:	… there are secondhand clothes that meet my quality standards.
Hedonic benefits (HB)		Buying a secondhand subscription box like this …
Chiu et al. (2014)	HB1:	… is an adventure for me.
	HB2:	… inspires me.
	HB3:	… is exciting for me.
	HB4:	… gives me the feeling of being in my own universe.
Environmental benefits (EB)		Such secondhand subscription boxes …
Borusiak et al. (2020)	EB1:	… can slow down the rate of depletion of natural resources.
	EB2:	… can have a positive impact on the environment.
	EB3:	… can reduce climate change.
	EB4:	… can minimize environmental degradation.
Trust (TR)	TR1:	The offer of such a secondhand subscription box is trustworthy.
(Kim, Yung & Lee, 2021)	TR2	I have confidence in the promises made in the offer of such a secondhand subscription box.
	TR3:	The information given by the provider of such a secondhand subscription box is sincere and honest.
	TR4:	The provider of such a secondhand subscription box is honest and transparent about the products offered.
Fashion consciousness (FC)	FC1:	I usually have one or more outfits that are currently on trend.
Ramkumar and Woo (2018)	FC2:	I keep my wardrobe up to date in line with changing fashion trends.
	FC3:	Fashionable, attractive styling is very important to me.
	FC4*:	I shop in different stores and choose different brands.
	FC5:	I am usually the first to know the latest fashion trends.
Perceived performance risk	PPR1:	I am concerned about the longevity of the secondhand clothing in such a subscription box.
(PPR) (Kim, Yung & Lee,	PPR2:	I am concerned about the condition of the secondhand clothing in such a subscription box.
2021; Silva et al., 2021)	PPR3:	I am concerned about possible damage (e.g., missing buttons or defective zippers) to the secondhand clothing in such a subscription box.
	PPR4*:	I think it is risky to buy such a secondhand subscription box online.
	PPR5*:	The clothes in such a secondhand subscription box do not correspond to the latest design or style trends.
Perceived hygiene risk (PHR)		It is likely that the secondhand clothes in such a subscription box …
(Kim, Yung & Lee, 2021)	PHR1:	… are not clean.
	PHR2:	… have stains or dirt.
	PHR3:	… are unhygienic.
	PHR4:	… smell unpleasant.
Purchase intention (PI)	PI1:	I intend to buy such a secondhand subscription box in the future.
Lou et al. (2022)	PI2:	I am very likely to buy such a secondhand subscription box in the future.
	PI3:	My willingness to buy such a secondhand subscription box is high.
	PI4:	I would probably recommend a friend to buy such a secondhand subscription box.
Attitude (ATT)	ATT1:	Bad vs. Good
Ramkumar and Woo (2018)	ATT2:	Inferior vs. Superior
	ATT3:	Unpleasant vs. Pleasant
	ATT4:	Boring vs. Interesting
	ATT5:	Poor vs. Excellent
	ATT6:	Not useful vs. Useful
Sustainable behavior (SB)	SB1*:	I tailor my old clothing when I am tired of it.
(Lang and Joyner Armstrong,	SB2:	I have already bought clothing made from recycled materials.
2018)	SB3:	I seek out information about different ways to wear the items I already own.
	SB4:	I swap my clothing with other people.

* Subsequent exclusion of the item based on item testing.

TableA3
Discriminant validity (Fornell-Larcker (FL) criterion, HTMT criterion).

	FL/HTMT	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Economic benefits	**0.66**													
2	Utilitarian benefits (convenience)	0.29***	**0.72**												
		0.37													
3	Customized services	0.34	0.46***	**0.75**											
		0.43	0.54												
4	Desire for unique products	0.02	0.06	0.19**	**0.80**										
		0.04	0.05	0.22											
5	Perceived quality value	0.23**	0.40***	0.49***	0.38***	**0.72**									
		0.29	0.46	0.52	0.38										
6	Hedonic benefits	0.30***	0.46***	0.51***	0.40***	0.53***	**0.78**								
		0.38	0.55	0.61	0.46	0.57									
7	Environmental benefits	0.39***	0.21**	0.30***	0.18**	0.39***	0.40***	**0.837**							
		0.41	0.24	0.35	0.20	0.38	0.45								

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TableA3 (*continued*)

	FL/HTMT	1	2	3	4	5	6	7	8	9	10	11	12	13	14
8	Trust	0.22**	0.39***	0.51***	0.15*	0.39***	0.54***	0.35***	**0.75**						
		0.29	0.45	0.59	0.18	0.44	0.62	0.39							
9	Fashion consciousness	0.23**	0.21**	0.16*	0.26***	0.31***	0.42***	0.3***	0.29***	**0.76**					
		0.27	0.25	0.18	0.30	0.39	0.49	0.34	0.33						
10	(No) Perceived performance risk	0.04	0.20**	0.19**	−0.04	0.22**	0.17*	0.06	0.33***	0.11	**0.82**				
		0.07	0.23	0.23	−0.06	0.25	0.20	0.06	0.39	0.12					
11	(No) Perceived hygiene risk	0.14*	0.23**	0.29***	−0.05	0.22**	0.23**	0.11	0.39***	0.00	0.64***	**0.86**			
		0.17	0.26	0.33	−0.06	0.27	0.26	0.11	0.43	0.00	0.72				
12	Purchase intention	0.29***	0.44***	0.60***	0.23**	0.54***	0.71***	0.36***	0.61***	0.34***	0.40***	0.36***	**0.91**		
		0.34	0.49		0.24	0.56	0.79	0.39	0.66	0.37	0.45	0.39			
13	Attitude	0.36***	0.47***	0.55***	0.29***	0.61***	0.66***	0.41***	0.63***	0.32***	0.39***	0.43***	0.73***	**0.75**	
		0.45	0.54	0.64	0.32	0.64	0.76	0.47	0.72	0.36	0.46	0.48	0.80		
14	Sustainable behavior	0.09	0.11+	0.21**	0.25**	0.29**	0.36**	0.25**	0.29**	0.36***	0.33***	0.21**	0.40***	0.36***	**0.85**
		0.13	0.15	0.29	0.32	0.44	0.48	0.33	0.38	0.13	0.44	0.27	0.51	0.47	

In bold on the diagonal: square root of AVE.
Significance levels: + $p < 0.10$; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

Table A4
Changes in effect size classification in different groups based on CR-FDH

	Total sample	Male	Females	Familiar with SBS	Unfamiliar with SBS	Higher sustainable behavior	Lower sustainable behavior
Economic benefits	M	○			○		●
Utilitarian benefits (convenience)	L			○		○	
Customized services	M	●		●		●	
Desire for unique products	S	●			●		
Perceived quality value	L		○		○		
Hedonic benefits	M	●			●	●	●
Environmental benefits	M	●			○		
Trust	M		●		●		●
Fashion consciousness	M						
(No) Perceived performance risk	M	●				○	○
(No) Perceived hygiene risk	S	●			●		

SBS: subscription box services, L = large, M = medium, S = small.
○ decrease in classification.
● increase in classification.

Table A5
Highest threshold values (mean, percentage) and regression coefficients for the highest reached purchase intention Y in the samples

	Total sample			Males			Females			Familiar with SBS			Unfamiliar with SBS			Higher sustainable behavior			Lower sustainable behavior		
	R	>4	>50%	R	>4	>50%	R	>4	>50%	R	>4	>50%	R	>4	>50%	R	>4	>50%	R	>4	>50%
Economic benefits											✓	✓					✓	✓			
Utilitarian benefits (convenience)		▲	▲		▲			▲	✓		▲	▲		✓	✓					✓	✓
Customized services	✓	✓	✓		✓	✓	✓		✓	✓		✓	✓	✓	✓				✓	▲	▲
Desire for unique products															✓						
Perceived quality value		✓	✓		✓	✓			✓	✓	✓	✓			✓		✓			✓	✓
Hedonic benefits	▲	✓	✓	▲	✓	✓	▲	✓	▲	▲		✓	▲	✓	✓	✓	✓	✓	▲		✓
Environmental benefits		✓			✓	✓											✓	✓		✓	
Trust	✓	✓			✓	▲	✓	✓	✓				✓	▲	▲				✓	✓	✓
Fashion consciousness		✓	✓			✓								✓	✓		▲	▲			✓
(No) Perceived performance risk	✓				✓	✓	✓			✓			✓	✓	✓	▲			✓		
(No) Perceived hygiene risk					✓	✓								✓	✓						

SBS = subscription box services, R = significant regression coefficient, ▲ = highest value, $\surd$ = applies.

Additional material

Table Add1. Effect sizes according to the CR-FDH ceiling line – male versus female participants.

	Male			Female		
	Effect size (CR-FDH)	**Classification**	**p**	**Effect size (CR-FDH)**	**Classification**	**p**
Economic benefits	0.26*	Medium*	0.17*	0.19	Medium	0.01
Utilitarian benefits (convenience)	0.30	Large	0.01	0.42	Large	<0.001
Customized services	0.36	Large	<0.001	0.21	Medium	<0.001
Desire for unique products	0.22	Medium	0.01	0.06*	Small*	0.50*
Perceived quality value	0.43	Large	<0.001	0.27	Medium	<0.001
Hedonic benefits	0.38	Large	<0.001	0.27	Medium	<0.001
Environmental benefits	0.30	Large	0.02	0.21*	Medium*	0.06*
Trust	0.27	Medium	<0.001	0.35	Large	<0.001
Fashion consciousness	0.25	Medium	<0.001	0.16	Medium	0.01
(No) Perceived performance risk	0.33	Large	<0.001	0.11	Medium	0.01
(No) Perceived hygiene risk	0.26	Medium	0.03	0.08*	Small*	0.25*

*Exclusion due to small, irrelevant effect sizes.

Table Add2. Threshold values of necessary-but-not-sufficient conditions to be achieved (values, percentile values) – male and female participants.

Y	EB		UB		CS		DUP		PQ			
	Value	%	value	%	value	%	value	%	value	%		
5	3.95*/ 3.71	7.1*/6.2	**4.44/4.31**	12.9/12.4	3.89/ 2.91	28.6/11.0	2.69/ 1.32*	20.0/ 1.4*	4.03/ 3.36	41.4/9.0		
6	4.75*/ 4.24	22.9*/ 20.0	**5.15/5.10**	28.6/33.1	4.68/ 3.93	64.3/28.3	3.19/ 2.04*	31.4/ 4.1*	4.74/ 4.13	70.0/24.8		
6.5/ 7	5.16*/ 4.78	47.1*/ 33.8	**5.51/5.89**	42.9/64.1	5.07/ 4.95	74.3/54.5	3.43/ 2.76*	38.6/ 9.7*	5.10/ 4.90	77.1/52.4		
Y	**HB**		**EnvB**		**TR**		**FC**		**(No) PPR**		**(No) PHR**	
	Value	%	value	%	value	%	value	%	value	%	value	%
5	3.92/3.37	38.6/**19.3**	3.96/ 2.93*	14.3/3.4*	4.11/ 3.92	28.6/13.8	3.56/2.45	41.4/9.0	4.00/ 1.98	**55.7**/6.9	3.88/NN*	20.0/NN*
6	4.68/4.23	61.4/38.6	5.02/ 3.84*	44.3/ 12.4*	5.23/ 4.51	70.0/ **44.8**	4.50/3.27	62.9/ 27.6	4.85/ 2.73	**77.1**/ 22.1	4.76/ 2.50*	38.6/5.5*
6.5/ 7	5.06/5.79	82.9/**71.0**	5.55/ 4.75*	67.1/ 29.7*	5.78/ 5.12	**90.0**/ 66.2	4.96/4.10	74.3/ 44.8	5.28/ 3.48	85.7/37.2	5.19/ 4.00*	54.3/ 25.5*

In bold: highest value.
Male/female.
*Exclusion due to small, irrelevant effect sizes and/or lack of significance.
EB = economic benefits, UB = utilitarian benefits (convenience), CS = customized services, DUP = desire for unique products, PQ = perceived quality value, HB = hedonic benefits, EnvB = environmental benefits, TR = trust, FC = fashion consciousness, PPR = (No) Perceived performance risk, PHR = (No) Perceived hygiene risk, Y = purchase intention.

Table Add3. Effect sizes according to the CR-FDH ceiling line – participants familiar versus unfamiliar with subscription box services.

	Familiar with subscription box services			Unfamiliar with subscription box services		
	Effect size (CR-FDH)	**Classification**	**p**	**Effect size (CR-FDH)**	**Classification**	**p**
Economic benefits	0.19	Medium	0.01	0.24*	Medium*	0.11*
Utilitarian benefits (convenience)	0.27	Medium	<0.001	0.38	Large	<0.001
Customized services	0.34	Large	<0.001	0.26	Medium	<0.001
Desire for unique products	0.06*	Small*	0.39*	0.24	Medium	<0.001
Perceived quality value	0.36	Large	<0.001	0.25	Medium	<0.001
Hedonic benefits	0.29	Medium	<0.001	0.30	Large	<0.001
Environmental benefits	0.24	Medium	0.03	0.26*	Medium*	0.05*
Trust	0.24	Medium	0.01	0.41	Large	<0.001
Fashion consciousness	0.18	Medium	<0.001	0.20	Medium	0.01
(No) Perceived performance risk	0.13	Medium	0.04	0.19	Medium	0.01
(No) Perceived hygiene risk	0.08*	Small*	0.56*	0.27	Medium	<0.001

*Exclusion due to small, irrelevant effect sizes and/or lack of significance.

Table Add4. Threshold values of necessary-but-not-sufficient conditions to be achieved (values, percentile values) – familiar/unfamiliar with subscription box services.

Y	EB		UB		CS		DUP		PQ	
	Value	%	value	%	value	%	value	%	value	%
5	3.98/ 3.34*	7.5/5.5*	**4.63**/4.12	10.4/17.4	3.71/ 3.28	**22.6**/ 24.8	1.32*/ 3.26	1.9*/27.5	3.93/ 3.21	17.9/ 10.1
6	4.64/ 3.72*	27.4/7.3*	**5.32**/4.85	28.3/33.9	4.34/ 4.53	**39.6**/ 47.7	2.04*/ 4.06	8.5*/47.7	4.55/ 3.88	37.7/ 22.0

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(*continued*)

Y	EB		UB		CS		DUP		PQ			
6.75/ 7	5.30/ 4.00*	50.9/ 14.7*	**6.02**/5.40	**66.0**/57.8	4.98/ 5.46	55.7/ 85.3	2.76*/ 4.67	14.2*/ 61.5	5.16/ 4.39	62.3/ 50.5		
Y	**HB**		**EnvB**		**TR**		**FC**		**(No) PPR**		**(No) PHR**	
	Value	%	value	%	value	%	value	%	value	%	value	%
5	3.50/3.36	21.7/27.5	3.09/ 3.51*	5.7/10.1*	3.44/ **4.33**	6.6/**39.4**	2.97/2.82	13.2/28.4	2.15/ 2.62	9.4/31.4	NN */3.51	NN */18.3
6	4.08/4.10	37.7/44.0	3.82/ 4.54*	14.2/ 23.9*	4.12/ **5.00**	28.3/ **75.2**	3.70/4.14	29.2/55.0	2.89/ 4.26	16.0/ 56.0	2.50*/ 4.41	3.8 */59.6
6.75/ 7	4.65/4.65	54.7/58.7	4.56/ 5.32*	35.8/ 50.5*	4.80/ **5.51**	48.1/ **89.9**	4.43/5.13	47.2/80.7	3.69/ 5.49	34.0/ 80.7	4.00*/ 5.08	19.8 */**89.9**

In bold: highest value.
Familiar/unfamiliar with subscription box services.
*Exclusion due to small, irrelevant effect sizes and/or lack of significance.
EB = economic benefits, UB = utilitarian benefits (convenience), CS = customized services, DUP = desire for unique products, PQ = perceived quality value, HB = hedonic benefits, EnvB = environmental benefits, TR = trust, FC = fashion consciousness, PPR = (No) Perceived performance risk, PHR = (No) Perceived hygiene risk, Y = purchase intention.

Table Add5: Effect sizes according to the CR-FDH ceiling line – higher versus lower sustainable behavior.

	Higher sustainable behavior			Lower sustainable behavior		
	Effect size (CR-FDH)	Classification	p	Effect size (CR-FDH)	Classification	p
Economic benefits	0.22	Medium	0.01	0.30	Large	0.04
Utilitarian benefits (convenience)	0.17	Medium*	0.09*	0.43	Large	<0.001
Customized services	0.30	Large	<0.001	0.27	Medium	<0.001
Desire for unique products	0.09*	Small*	0.42*	0.04*	Small*	0.83*
Perceived quality value	0.32	Large	<0.001	0.33	Large	<0.001
Hedonic benefits	0.31	Large	<0.001	0.31	Large	<0.001
Environmental benefits	0.22	Medium	0.01	0.25	Medium	0.03
Trust	0.10*	Medium*	0.15*	0.40	Large	<0.001
Fashion consciousness	0.13	Medium	0.05	0.24	Medium	<0.001
(No) Perceived performance risk	0.18	Medium	0.01	0.15*	Medium*	0.10*
(No) Perceived hygiene risk	0.15*	Medium*	0.12*	0.24	Medium	0.02

*Exclusion due to small, irrelevant effect sizes and/or lack of significance.

Table Add6. Threshold values of necessary-but-not-sufficient conditions to be achieved (values, percentile values) – higher versus lower sustainable behavior.

Y	EB		UB		CS		DUP		PQ			
	Value	%	value	%	value	%	value	%	value	%		
5	3.90/ 3.75	11.1/6.2	4.01*/ **4.50**	5.6*/19.3	3.49/3.37	11.1/27.3	1.77*/ 1.16*	1.9*/1.9*	**4.19**/3.77	13.0/23.6		
6	4.83/ 4.30	**35.2**/ 18.6	4.98*/ **5.43**	16.7*/ 48.4	4.20/4.94	29.6/63.4	2.33*/ 1.78*	5.6*/4.3*	4.64/4.58	24.1/50.9		
7	5.76/ 4.85	66.7/41.6	5.95*/6.36	63.0*/ 80.1	4.90/**6.52**	40.7/**99.4**	2.90*/ 2.40*	9.3*/9.3*	5.10/5.40	44.4/85.1		
Y	**HB**		**EnvB**		**TR**		**FC**		**(No) PPR**		**(No) PHR**	
	Value	%	value	%	value	%	value	%	value	%	value	%
5	3.80/ 3.42	**16.7**/ 24.2	3.64/3.20	5.6/5.6	3.00*/ 4.26	1.9*/**41.6**	NN/2.90	NN/23.6	2.34/ 2.23*	9.3/12.4*	1.19*/ 2.90	1.9*/8.7
6	4.72/ 4.08	33.3/46.6	**5.02**/4.13	**35.2**/17.4	4.00*/ 5.04	11.1*/ **73.9**	3.65/3.60	25.9/37.3	3.90/ 2.94*	40.7/ 24.2*	3.67*/ 3.43	14.8*/ 17.4
7	5.72/ 4.73	77.8/64.4	6.40/5.06	72.2/47.2	5.00*/ 5.82	33.3*/91.3	**6.44**/4.29	**83.3**/ 62.7	5.47/ 3.64*	72.2/ 44.7*	6.15*/ 3.97	83.3*/ 25.5

In bold: highest value.
Higher sustainable behavior/lower sustainable behavior/.
*Exclusion due to small, irrelevant effect sizes and/or lack of significance.
EB = economic benefits, UB = utilitarian benefits (convenience), CS = customized services, DUP = desire for unique products, PQ = perceived quality value, HB = hedonic benefits, EnvB = environmental benefits, TR = trust, FC = fashion consciousness, PPR = (No) Perceived performance risk, PHR = (No) Perceived hygiene risk, Y = purchase intention.

Table Add7. Standardized regression weights of multiple regression analysis for the sub-groups

Predictors	Total sample	Males	Females	Familiar with SBS	Unfamiliar with SBS	Higher sustainable behavior	Lower sustainable behavior
Economic benefits	0.02	−0.03	0.03	0.08	−0.01	−0.10	0.05
Utilitarian benefits (convenience)	−0.01	−0.13	0.05	0.12+	−0.06	0.13	−0.06
Customized services	0.21***	0.21+	0.24***	0.25**	0.17*	0.15	0.24***

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Predictors	Total sample	Males	Females	Familiar with SBS	Unfamiliar with SBS	Higher sustainable behavior	Lower sustainable behavior
Desire for unique products	−0.06	0.07	−0.09	0.00	−0.02	0.01	−0.03
Perceived quality value	0.10+	0.05	0.09	0.16*	0.02	0.18+	0.07
Hedonic benefits	0.43***	0.48***	0.41***	0.31***	0.57***	0.34**	0.45***
Environmental benefits	0.01	0.03	0.02	0.05	−0.07	0.18	−0.07
Trust	0.16***	0.17	0.15*	0.09	0.19*	0.11	0.21**
Fashion consciousness	0.03	0.01	0.04	0.01	0.03	0.06	−0.01
(No) Perceived performance risk	0.23***	0.11	0.26***	0.20*	0.22**	0.35**	0.16*
(No) Perceived hygiene risk	−0.03	0.06	−0.07	−0.03	0.02	−0.14	0.01
Adjusted R^2, F, p	0.65, 36.53, $p < 0.001$	0.61, 10.65, $p < 0.001$	0.65, 25.38, $p < 0.001$	0.69, 22.15, $p < 0.001$	0.64, 18.10, $p < 0.001$	0.75, 15.76, $p < 0.001$	0,58, 20.65, $p < 0.001$

Significance levels: + $p < 0.10$, *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.
SBS = subscription box services.

Data availability

Data will be made available on request.

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