The emperor's new clothes: self-explorative engagement in virtual try-on service experiences positively impacts brand outcomes

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Abstract

Purpose – Virtual try-on (VTO) technology offers an opportunity for fashion and beauty brands to provide enriched self-explorative experiences. The increased popularity of VTOs makes it urgent to understand the drivers and consequences of the exploration of styles in VTO contexts (herein called self-explorative engagement). Notably, little is known about the antecedent and outcomes of the personalized self-explorative experience central to VTOs. This paper aims to fill this knowledge gap.

Design/methodology/approach – An online quasi-experiment (N = 500) was conducted in the context of fashion and beauty VTOs. Participants were asked to virtually try on sunglasses or lipsticks and subsequently answer a questionnaire measuring the key constructs: self-presence (i.e. physical similarity and identification), self-explorative engagement (i.e. exploration of styles in VTO context), brand cognitive processing and brand attitude. The authors analyze the data with structural equation modeling via maximum likelihood estimation in LISREL.

Findings – The experience of self-presence during consumers' use of VTOs in augmented reality environments has a positive effect on self-explorative engagement. Furthermore, a mediation analysis reveals that self-explorative engagement improves brand attitude via brand cognitive processing. The results are confirmed for two popular fashion and beauty brands.

Originality/value – Grounded in extended self theory, to the best of the authors' knowledge, this is the first study to show that a realistic VTO experience encourages self-extension via a process starting from the exploration of styles and results in increased brand cognitive processing and more positive brand attitudes. The exploration of styles is enabled by self-presence.

Keywords Augmented reality, E-commerce, Self-explorative engagement, Self-presence, Brand

Paper type Research paper

1. Introduction

The act of purchasing clothes is often preceded by fitting the clothes on oneself (Alexander *et al.*, 2005; Holmlund *et al.*, 2011). In traditional offline retail, consumers experiment with their appearance by curiosity about how clothing items fit and suit them because they enjoy the novel experience without a defined goal (Gurel and Gurel, 1979). Moreover, clothing and fashion products have symbolic meanings and are related to consumers' self-concept (Piacentini and Mailer, 2004). The self-concept or self refers to the entirety of people's thoughts and feelings toward themselves (Sirgy, 1982). The theory of extended self asserts that consumers can try out new identities by buying clothes and changing styles and when consumers integrate aspects of the branded product into their self-concept, it increases attention and liking for the brand (Belk, 1988, 2013).

However, physical intangibility in e-commerce websites makes it impossible to physically fit clothing and fashion items on oneself. Therefore, many firms (e.g. L'Oréal, Levi's, Mac Cosmetics, Ray-Ban) have adopted a strategy of service augmentation focusing not only on the core product but also on the process-related aspects of consumer-brand interaction (Grönroos, 2020). Specifically, try-on services that used to be limited to in-store shopping (Childers *et al.*, 2001) are increasingly available in the online environment via virtual

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try-on technology (hereafter VTO). Augmented reality (AR) registers augmented virtual products onto consumers' bodies or into their surroundings (Rauschnabel *et al.*, 2022). A VTO is a subcategory of AR applications that displays virtual products directly on consumers' body and facilitates the fitting of products (Hilken *et al.*, 2017). Thus, AR facilitates a self-relevant experience that leads to positive brand outcomes (Ambika *et al.*, 2022; Phua and Kim, 2018; Xu *et al.*, 2019). However, previous studies examining the mechanisms through which AR fosters positive consumer-brand outcomes are scarce (Plotkina *et al.*, 2021). Studies suggest that AR-VTOs motivate consumers to decorate their virtual selves (Huang and Liao, 2017), help discover possible selves and impact consumers' self-concept (Javornik *et al.*, 2021). Furthermore, the existing studies discuss the possibilities and impossibilities of exploring possible selves virtually and their interconnection to self-concept (El-Shamandi Ahmed *et al.*, 2023). However, little is known about the antecedents of the exploration of possible selves and how it leads to positive brand responses.

Against this backdrop, this research has two objectives. In Section 2.2.1, we show that self-presence provides a realistic experience and is, therefore, a key antecedent to self-explorative engagement (i.e. exploration of styles in VTO contexts). Thereafter in Section 2.2.2, grounded in extended self theory, we propose that self-explorative engagement increases brand cognitive processing and, subsequently, improves attitude toward the brand. In Section 3, we empirically test our theoretical framework and conduct a quasi-experimental study to compare fashion and beauty branded VTOs because these products represent symbolic consumption (Schouten, 1991) and the comparison adds to the generalizability of this study. For instance, Ray-Ban has launched a VTO that offers shoppers hundreds of sunglasses to see on their faces in real time, with the use of their Webcam (see ray-ban.com). In parallel, body beautification services, such as L'Oréal's Makeup Genius are becoming the "dressing room" before cosmetic purchases enabling consumers to envision different versions of themselves (Javornik *et al.*, 2021).

This research outlines three main contributions. First, we contribute to research on presence in the context of AR by revealing that self-presence has a pivotal role for self-explorative engagement and enhances brand responses. Second, we contribute to research on motivation to use branded AR apps by showing that self-presence and self-explorative engagement enable the exploration of possible selves. Third, we contribute to the literature on extended self theory (Belk, 1988, 2013) by showing that self-explorative engagement enhances brand cognitive processing during the process of self-extension, and consequently improves brand attitudes. Managerially, the findings imply that investments in developing AR-based VTOs have positive effects on brand-related outcomes if they facilitate a realistic try-on service experience and allow consumers to conveniently explore different styles.

2. Literature review and theoretical background

2.1 Literature review

The existing research on consumer-brand interactions in the AR context has studied the role of self-referencing, personalization, inspiration and the resulting consumer-brand relationships. AR usage inspires consumers to be more creative (Hinsch *et al.*, 2020; Rauschnabel *et al.*, 2019) and motivates them to spend more time exploring products online (Beck and Crié, 2018). From this body of the research, we can conclude that consumers are motivated to use AR when they can personalize the self-relevant try-on experience (Smink *et al.*, 2020). However, the existing research does not provide an understanding of the predictors of consumers' exploration of styles.

Scholz and Duffy (2018) have investigated the symbolic meaning associated with building relationships with brands through long-term usage of branded AR apps. They find that AR app usage is a form of self-care activity that enables consumers to explore their possible selves. Furthermore, as consumers are foregrounded into the experience, they form intimate relationships with brands. Thus, as presented in Table 1, prior literature shows that when consumers can relate aspects of themselves with the brand in the virtual environment, it improves their relationship with a focal brand (Huang, 2019; Phua and Kim, 2018). However, little is known about the exploration of possible selves in AR and how it leads to positive brand responses. Therefore, this study aims to unpack this phenomenon for popular fashion and beauty branded products (i.e. Ray-Ban and MAC Cosmetics).

2.2 Theoretical background and hypothesis development

2.2.1 Self-presence and self-explorative engagement

Self-presence refers to the perception that the virtual self is oneself (Lee, 2004; Vorderer, 2006) on two aspects: physical similarity and identification (Seo *et al.*, 2017). Therefore, self-presence occurs when consumers feel that the VTO permits to view their own physical (virtual) representation and identify with the virtual self. In a similar vein, Ratan and Hasler (2010) conceptualize self-presence to include both body-level presence and identity-level presence. Body-level presence (i.e. physical similarity) refers to the extent to which a virtual self is integrated into the perception of one's body (Ratan and Hasler, 2010). This is exemplified when a consumer tries lipstick on their virtual self and integrates it into their mental representation of their physical offline body. Identity-level self-presence (i.e. identification), in turn, refers to the extent to which some aspects of a virtual self are related to some aspects of personal identity (Ratan and Hasler, 2010). Personal identities (e.g. being fashionable, being a rugged individual) focus on personal traits, characteristics and goals (Oyserman, 2009). When consumers can relate aspects of the virtual self to aspects of their identity, they experience identity-level self-presence (Ratan and Hasler, 2010).

When people want to explore different styles, they are motivated to use mass-customization options (Fiore *et al.*, 2004) and use prior experiences, desires and tastes to simulate the experience (Belk, 2014). Similarly, self-explorative engagement permits consumers to explore styles in a realistic manner and to use prior experience to evaluate options (Huang and Liao, 2017). Thus, virtual self can be used to modify one's physical and symbolic attributes and to explore possible selves (Jin, 2012), which refer to different forms of self-expression (i.e. how people assert their identity or self; Oyserman, 2009). For instance, people can choose to express their actual, ideal or ought to self (Markus and Nurius, 1986). Exploring one's

Table 1 Summary of the literature on consumer-brand themes in augmented reality

References	Method	Process variables/ moderators	Dependent variables	Key findings
(Baek *et al.*, 2018)	Experiment	Self-viewing, self-brand connection/narcissism	Purchase intention	Self-viewing enhances both self-brand connection and purchase intention
(Phua and Kim, 2018)	Survey	Self-referencing, self-brand congruity, perceived humor	Brand attitude, purchase intention	AR enhances attitudes toward brands through self-brand congruity, self-referencing and perceived humor. Perceived humor is more important than self-referencing for brand attitudes
(Scholz and Duffy, 2018)	Ethnographic study	Branded app as personal space, dissolving of boundaries and foregrounding the consumer, protecting and dissolving the consumer/brand fusion	Consumer–brand relationship	AR enables consumers' self-exploration and self-expression. AR drives more intimate consumer–brand relationships when marketers keep both the brand and transactional aspects of the app in the background
(Huang *et al.*, 2019)	Experiment	Sense of ownership control, rehearsability, self-referencing, IT identity	Brand love	AR is higher in interactive effect and higher in audiovisual effect. Brand love is positively influenced by self-referencing and by IT identity
(Rauschnabel *et al.*, 2019)	Survey	Augmentation quality, hedonic and utilitarian quality, inspiration	Brand attitudes	AR apps inspire consumers and improve their attitudes toward brands
(Smink *et al.*, 2019)	Experiment	Self-referencing, perceived informativeness, perceived enjoyment, perceived intrusiveness	Brand attitude, purchase intention, willingness to share personal data	AR enhance self-referencing, in turn, it increases positive brand responses, such as brand attitudes and purchase intentions
(Xu *et al.*, 2019)	Experiment	Self-referencing	Attitude toward product	Self-referencing enhances attitudes toward product
(Smink *et al.*, 2020)	Experiment	Spatial presence, personalization, perceived intrusiveness	Attitude and behavior toward the app, brand attitude, purchase intention	Personalization led to purchase intentions (but not enhanced brand attitudes), while perceived intrusiveness had negative consequences
This study	Survey	Self-presence, self-explorative engagement	Brand cognitive processing, brand attitude	Consumers' sense of an authentic virtual self leads to self-explorative engagement. When consumers explore their styles, it enhances consumers' learning about brands and, thus, heightens brand attitude

Note: AR = augmented reality
Source: Authors' own work

possible selves ranges from imagining wearing a pair of shoes to imagining being a good student (Belk, 2003; Erikson, 2007), and in many cases, digital environments enable consumers to explore their possible selves (Belk, 2013). For instance, AR for makeup enables consumers to explore possible selves via a lived fantasy experience, such as trying on Rihanna's makeup style (El-Shamandi Ahmed *et al.*, 2023).

Studies that have examined the antecedents of self-explorative engagement in the VTO context already hint toward the possibility that self-presence is one of the key drivers. Specifically, Huang and Liao (2017) proposed two key technological features as antecedents for self-explorative engagement in the context of fitting clothes: self-location, which refers to the sense of being in the body of a virtual representation and haptic imagery, which refers to the sense of touching the clothes. However, these antecedents dovetail body-level presence only, whereas we go further and argue that the antecedents to self-explorative engagement entails both body-level and identity-level presence.

Based on these considerations, we argue that when a consumer experiences self-presence, they are not role-playing or projecting a self, but instead, they are the virtual self. If a consumer tries a red lipstick on her virtual self because she has always wondered what it would look like on herself; this exemplifies self-explorative engagement in the VTO context. Furthermore, the theory of extended self suggests that when

people explore styles, they think about the traits associated with the brands and whether they wish to identify personally with those brands (Belk, 2003). Self-presence gives consumers access to private aspects of the self in the virtual environment (Hooi and Cho, 2014) that are used to explore possible selves. Based on these notions, we predict that:

H1. Self-presence enhances self-explorative engagement during the virtual try-on service experience.

2.2.2 Cognitive and affective outcomes of self-presence and self-explorative engagement

Consumers include the symbolic meaning of clothes, makeup, automobiles and so forth into their extended self (Jensen Schau and Gilly, 2003). In addition, brands are meaningful in constructing possible selves (Escalas and Bettman, 2005). According to the extended self theory (Belk, 1988, 2013), when consumers try on symbolic products, they may integrate the brand offering into their self-concept. The symbolic meaning of a branded product refers to the sense of being that is presumably provided by a branded product (Belk, 1988) or traits, such as glamour or ruggedness, that people wish to associate with (Belk, 2003). People consider their augmented images as part of their extended self (Scholz and Duffy, 2018). Consumers may extend their self-concept with the branded beauty product experienced in AR-VTO if this possible self is accepted by others (El-Shamandi Ahmed *et al.*, 2023). Thus, consumers give attention to brands that have become related to aspects of themselves (Escalas and Bettman, 2005).

Furthermore, information that is highly relevant to one's self-concept increases elaboration of message information (Burnkrant and Unnava, 1995). When people feel that the virtual self is physically similar to them, it increases trust in the product information (Shim and Lee, 2011) and consumer intentions to use the VTO (Suh *et al.*, 2011). Therefore, a message tailored to be self-relevant to virtual world users increases its persuasive outcomes (Fox *et al.*, 2009). The self is deeply involved in information processing, interpretation and memory of personal information (Rogers *et al.*, 1977). New information encoded as self-relevant lead to easier and faster processing and easier recall (Rogers *et al.*, 1977). Thus, we suggest that self-presence as a cue for highly self-relevant information enhances elaboration about the brand during the VTO experience. Therefore, we predict that:

H2. Self-presence enhances brand cognitive processing during the virtual try-on service experience.

Products and brands presented in self-relevant advertisements are perceived as more like oneself (Burnkrant and Unnava, 1995). When the message is highly self-relevant, for instance, by using a cue that represents the self in the virtual space, such as a name, the pronoun "you," profile picture of the self or an avatar, it influences consumers to like the brand more (Ahn and Bailenson, 2011; Escalas, 2007). The VTO experience allows consumers to view brands directly on themselves, which facilitates the formation of a relationship between brands and consumers and increases positive attitudes toward brands (Huang, 2019; Xu *et al.*, 2019). When AR enables consumers to view themselves during the brand experience, consumers' brand attitude and purchase intentions improve (Ahn and Bailenson, 2011). Thus, we hypothesize:

H3. Self-presence enhances brand attitude during the virtual try-on service experience.

Self-explorative engagement might prompt cognitive processing of information, which could, on the one hand, overload the working memory, make the information less valuable for decision-making and distract attention from other mental tasks (Keogh and Pearson, 2014). For example, picturing oneself trying on a shirt and keeping the image in working memory can be a highly demanding task and reduce consumers' consideration of other information, such as learning information about a brand. On the other hand, however, AR allows consumers to digitally generate a vivid, lasting three-dimensional representation of the try-on experience on a live-stream of consumers' faces (Heller *et al.*, 2019). Therefore, AR offloads the cognitive processing of imagining how the product would look like in a realistic manner (Heller *et al.*, 2019). Notably, such offloading of otherwise internalized cognitive processing facilitates the processing of complex visual information (Heller *et al.*, 2019). Based on these considerations, we argue that when consumers engage in self-brand-related activities, such as trying on products of a specific brand, self-relevant information enhances consumers' information processing (Escalas, 2007). Thus, when consumers are mentally simulating trying on products, more cognitive resources can be allocated to processing brand-related information. Based on these notions and extended self theory, we suggest that trying on styles and using past experiences to evaluate products is highly self-involving and encourages consumers to learn about the brands. We, therefore, argue that:

H4. Self-explorative engagement increases brand cognitive processing during the virtual try-on service experience.

According to the theory of extended self, the more an object is tied to one's extended self, the more attention and care it receives (Belk, 1988). When consumers explore possible selves virtually, they are motivated to gather new information from brands and to integrate aspects of the brand into their self-concept. For instance, an AR experience (compared to a non-AR experience) is more likely to create positive brand outcomes because it motivates consumers to create, reinforce and express their sense of self (Huang, 2019). Consumers appreciate brands that allow them to creatively explore themselves (Chernev *et al.*, 2011). "Elaboration leads to attitude change via logical consideration and evaluation of arguments" (Green and Brock, 2000, p. 702), and when information is highly self-relevant, people are more willing to process it and thus will have more favorable brand attitudes (Schlosser, 2003). Thus, we propose that self-exploration enables the creation of personalized information about a branded product, results in more cognitive processing about the brand and positively impacts brand attitude. Based on these notions, we infer that:

H5. Self-explorative engagement positively impacts brand attitude through increased brand cognitive processing during the virtual try-on service experience.

3. Methodology

3.1 Study design

Many studies recommend service managers to invest in AR apps to improve consumer experience (Dacko, 2017). Thus, given that AR apps are applied in various industries, it is important to understand whether different types of apps elicit different outcomes (van Noort and van Reijmersdal, 2019). Plotkina *et al.* (2021) compared six types of AR apps and, among them, two apparel VTOs. This constitutes an important ground work for comparing AR apps as they show that VTO apps are the most popular AR apps, and consequently resulted in more favorable brand outcomes (Plotkina *et al.*, 2021). Fashion and beauty industries participate to body beautification, and therefore, we infer that both product categories encourage consumers to explore what fits and suits them. We used popular branded AR apps in both contexts for this study.

Thus, this study is an online quasi-experiment with a between-subjects study design with two conditions: one VTO for fashion accessories and one for beauty products. Only female participants were assigned to the beauty condition, while all genders could be assigned to the fashion condition. The online survey was administered to a US national panel from Qualtrics. Participants were asked their age because we aimed to collect a representative sample. Participants in the sunglasses condition were instructed to browse through two or three pairs of sunglasses, while participants in the makeup condition were instructed to try two or three lipsticks on. Thereafter, participants were directed to the VTO application on a brand's website, where they saw the virtual products on themselves by using their own mobile devices. Concretely, the participants saw themselves on the screens of their own devices, filmed via the Web cameras of their devices. Participants could spend as much time as they wished inspecting products and, subsequently, responding to the questionnaire that includes the self-presence, self-explorative engagement, brand cognitive processing and brand attitude items. Participants spent 5 min on average on the overall survey for both conditions. We implemented an attention check ("Does this statement correspond to the task you completed? I fitted products on fashion models," for which the correct answer was "No") at the beginning of the questionnaire to ensure that participants used the AR apps. Therefore, if the participants failed the attention check, they did not access the questionnaire. Therefore, of the original 500 participants, 58 were rejected. We then conducted an additional round of data collection ($n = 58$).

In the final sample ($n = 500$; median age group is 35–44), 254 participants tried on the sunglasses (i.e. fashion condition) – 104 females, 144 males and 6 others – and 246 female participants tried on the lipsticks (i.e. beauty condition). Additional demographics are presented in Table 2.

All scales used in this study are previously validated (see Table A1 in Appendix for measurement items). The descriptive statistics of both conditions are reported in Table 3 (see Table A2 in Appendix for goodness of fit statistics).

Table 2 Participants' demographics

Characteristics	No.	%
Overall, US sample	500	100
Age (years)		
18–24	68	13.6
25–34	108	21.6
35–44	113	22.6
45–54	122	24.4
55–64	89	17.8
Previous experience with VTO		
Yes	83	16.6
No	383	76.6
Not sure	34	6.8
Education		
High school	251	50.2
Bachelor's degree	143	28.6
Master's degree	57	11.4
PhD	13	2.6
No degree	36	7.2
Fashion buyers*	376	64.2

Note: *Respondents who bought fashion items in the past two years
Source: Authors' own work

3.2 Results of the measurement model

The results of the measurement model revealed a satisfactory fit to the data. The measures were validated by confirmatory factor analysis (CFA) and tested using LISREL 8.80 statistical software. Similar to McLean and Wilson (2019), we use multigroup structural equation modeling and test measurement invariance to ensure that the results obtained from the two VTO conditions (sunglasses and makeup) were comparable. This was achieved in two-steps by testing configural and metric invariance of path parameters of both conditions simultaneously. Measurement invariance verifies that the same construct is measured across groups (Hair *et al.*, 2010). To do so, at each step, we compared an unconstrained measurement model to a constrained one and used changes in the chi-square (χ^2) and degrees of freedom (d.f.) as measures of whether invariance exists between measurement models. The χ^2 values and differences in χ^2 values between the base model and constrained model indicate insignificant degradation of the model fit compared with the base model; therefore, we confirm equivalence between both conditions (Table 4).

The validity and reliability of the measurement model were confirmed, as the composite reliability (CR) loaded above the threshold value of 0.6 for all items (Bagozzi and Yi, 1988) and the average variance extracted (AVE) values for each construct exceeded the threshold value of 0.5 (Hair *et al.*, 2010). Discriminant validity was assessed by the Fornell–Larcker criterion (Fornell and Larcker, 1981) by comparing correlations with the square root of AVEs for the corresponding constructs. All square root AVEs are greater than the corresponding correlations; thus, the results confirm discriminant validity (see Table 5). Furthermore, the highest variance inflation factor (VIF) is 2.27; thus, we confirm that all VIF values are well below the threshold of 10

Table 3 Descriptive statistics

Construct	Items	Mean	SD	Item loading	Cronbach's alpha
Fashion condition					
Self-presence	Total	3.95	1.41		0.90
	SEP1			0.82	
	SEP2			0.90	
	SEP3			0.88	
Self-explorative engagement	Total	4.32	1.43		0.88
	SE1			0.83	
	SE2			0.83	
	SE3			0.86	
Brand cognitive processing	Total	4.37	1.40		0.85
	BCP1			0.76	
	BCP2			0.83	
	BCP3			0.84	
Brand attitude	Total	4.75	1.45		0.90
	BA1			0.84	
	BA2			0.91	
	BA3			0.87	
Beauty condition					
Self-presence	Total	3.87	1.42		0.92
	SEP1			0.87	
	SEP2			0.92	
	SEP3			0.88	
Self-explorative engagement	Total	4.38	1.38		0.88
	SE1			0.81	
	SE2			0.84	
	SE3			0.85	
Brand cognitive processing	Total	4.37	1.35		0.86
	BCP1			0.77	
	BCP2			0.86	
	BCP3			0.86	
Brand attitude	Total	4.50	1.68		0.95
	BA1			0.91	
	BA2			0.98	
	BA3			0.91	

Source: Authors' own work

(Field, 2009). In addition, the highest condition index is 12.36, which is well below the threshold of 30 (Field, 2009). Therefore, multicollinearity is not a cause for concern (see Table A3 in Appendix 1).

Following recommendations by Armstrong and Overton (1977), we performed nonresponse bias analyses (see Table A4 in Appendix 1). The results of Pearson's chi-squared tests indicate that the early respondents do not significantly differ from the late respondents in terms of gender ($\chi^2 = 0.52$, $p > 0.05$) or level of education ($\chi^2 = 4.44$, $p > 0.05$) while there is a significant difference in age groups ($\chi^2 = 60.24$, $p < 0.05$). However, as reported later (Section 4.4), including age as a control variable does not impact our model. The *t*-tests indicate nonsignificant differences in self-presence $t(248) = 1.15$, $p > 0.05$, self-explorative engagement $t(248) = 0.45$, $p > 0.05$, brand cognitive processing $t(248) = 0.03$, $p > 0.05$ and, brand attitude $t(248) = 0.28$, $p > 0.05$ between the early and late respondents.

Table 4 Multigroup CFA for invariance testing

Model	χ2 (d.f.)	Delta: χ2(d.f.)	RMSEA	NNFI	CFI
Configural invariance	252.64 (99)		0.07	0.97	0.98
Metric invariance	261.60 (107)	7.76 (8)	0.07	0.98	0.98

Notes: χ2 = chi-square; d.f. = degrees of freedom; RMSEA = root mean square error of approximation; NNFI = non-normed fit index; CFI = comparative fit index
Source: Authors' own work

Table 5 Measure properties

	1	2	3	4	Square root AVE
Fashion condition					
1. Self-presence	1.00				0.87
2. Self-explorative engagement	0.68	1.00			0.84
3. Brand attitude	0.53	0.49	1.00		0.84
4. Brand cognitive processing	0.69	0.79	0.55	1.00	0.82
CR	0.90	0.88	0.90	0.86	
AVE	0.76	0.72	0.76	0.67	
Beauty condition					
1. Self-presence	1.00				0.89
2. Self-explorative engagement	0.69	1.00			0.83
3. Brand attitude	0.57	0.59	1.00		0.94
4. Brand cognitive processing	0.70	0.78	0.63	1.00	0.83
CR	0.90	0.88	0.90	0.86	
AVE	0.76	0.72	0.76	0.67	

Note: AVE = average variance extracted
Source: Authors' own work

To ensure that common method bias is not an issue, we implemented the preventative steps recommended by Mackenzie and Podsakoff (2012). We minimized the difficulty of responding with the help of several doctoral students from various fields that confirmed the questionnaire is easy to understand and unambiguous. Furthermore, we ensured that the participants were motivated to respond accurately by offering monetary compensation if their questionnaire answers were not rejected due to quality issues. To reduce satisficing, participants were informed that the researchers do not have access to their private information, and therefore, their answers to the questionnaire are anonymous. Furthermore, our variables make it unlikely that the participants' answers were driven by social desirability. Nevertheless, we additionally calculated common method variance. After data collection, we used Harman's single-factor test with CFA to test the hypothesis that a single factor can account for all of the variance in the data (Korsgaard and Roberson, 1995; Mossholder *et al.*, 1998). Thereby, we conducted two CFAs, one with a single-factor solution whereby all items loaded on one factor ($\chi 2$ = 1,849.36, d.f. = 54) and another one with a two-factor solution ($\chi 2$ = 1,626.80, d.f. = 53) and compared the chi-square and d.f. for both models. A significant chi-squared test indicates a significant improvement in the model fit and is supported by a change in chi-square above the threshold of 3.84 for d.f. = 1 (Field, 2009). We find that the CFA with a two-factor solution had a significantly better fit than the CFA with a one-factor solution (Δ chi-square = 222.56, Δ d.f. = 1) (see Table A5 in Appendix 1). Thus, we conclude that common method bias is not a serious threat to the robustness of the results.

3.3 Results of hypothesis testing

The structural equation model was estimated based on the hypothesized model in Figure 1. The structural model presented an acceptable fit (Jöreskog and Sörbom, 1993) (root mean square error of approximation [RMSEA] = 0.07; $\chi 2$ = 261.60, d.f. = 107, $p < 0.005$, SRMR = 0.04, RMR = 0.09, comparative fit index [CFI] = 0.98, NFI = 0.97, GFI = 0.92). The model supports all the hypothesized relationships for both conditions (see Table 6).

H1 proposed that self-presence influences self-explorative engagement: this hypothesis is confirmed ($H1_{\text{Fashion}}$: $\beta = 0.69$, $p < 0.001$, $H1_{\text{Beauty}}$: $\beta = 0.69$, $p < 0.001$). *H2* confirms that self-presence enhances brand cognitive processing ($H2_{\text{Fashion}}$: $\beta = 0.28$, $p < 0.001$, $H2_{\text{Beauty}}$: $\beta = 0.30$, $p < 0.001$). *H3* states that self-presence enhances brand attitude and is confirmed ($H3_{\text{Fashion}}$: $\beta = 0.29$, $p < 0.001$, $H3_{\text{Beauty}}$: $\beta = 0.20$, $p < 0.01$). Self-explorative engagement improves brand cognitive processing ($H4_{\text{Fashion}}$: $\beta = 0.59$, $p < 0.001$, $H4_{\text{Beauty}}$: $\beta = 0.59$, $p < 0.001$), therefore, *H4* is confirmed. As predicted by *H5*, self-explorative engagement positively influences brand attitude through brand cognitive processing. Notably, we use LISREL and find that the indirect effects ($H5_{\text{Fashion}}$: $\beta = 0.19$, $p < 0.01$, $H5_{\text{Beauty}}$ $\beta = 0.20$, $p < 0.01$) and the total effects (*Fashion*; $\beta = 0.23$, $p < 0.01$, *Beauty*; $\beta = 0.38$, $p < 0.01$) are significant while the direct effects (*Fashion*; $\beta = 0.19$, n.s., *Beauty*; $\beta = 0.20$, n.s.) are not significant. Hayes (2018) notes that the "condition for mediation" by Baron and Kenny (1986) have been criticized and are not anymore the standard in statistical research. Instead, Hayes (2018) recommends to confirm the mediation hypotheses by estimating and interpreting the direct, indirect and total effects. Moreover, the strength of the mediation should be measured by the size of the indirect effect (Zhao *et al.*, 2010). In the fashion condition, our model explains 48% of self-explorative engagement, 30% of brand attitude and 66% of brand cognitive processing. In the beauty condition, our model explains 48% of self-explorative engagement, 45% of brand attitude and 69% of brand cognitive processing.

3.4 Robustness checks

Thereafter, we estimate the model again including three control variables (age, education and interest in fashion shopping) on the dependent variables. The results confirm the previous significant relationships (see Table A6 in Appendix 1); thus, we gain additional support for our model. In addition,

Figure 1 Conceptual framework

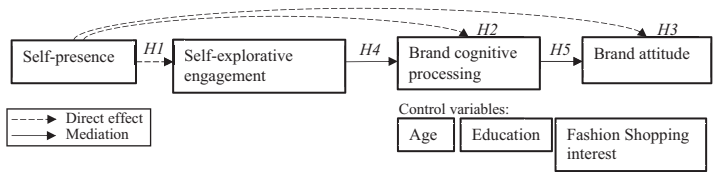

Table 6 Results of structural equation modeling

Hypothesized relationships	Effects[a]	Stderr	*t*-value	Result
Fashion condition				
Self-presence → SE	0.69***	0.06	11.22	*H1*: confirmed
SEP → BCP	0.28***	0.07	3.72	*H2*: confirmed
SEP → BA	0.29***	0.09	3.13	*H3*: confirmed
Indirect effect: SEP → SE → BCP	0.41***	0.06	6.44	
Indirect effect: SEP→ SE → BA	0.25***	0.07	3.62	
Total effect: SEP → BCP	0.68***	0.06	10.68	
Total effect: SEP → BA	0.54***	0.06	8.56	
SE → BCP	0.59***	0.07	7.38	*H4*: confirmed
Indirect effect: SE → BCP→ BA	0.19**	0.07	2.60	*H5*: confirmed
Total effect: SE → BA	0.23**	0.07	2.54	
Direct effect: SE → BA	0.04[n.s.]	0.11	0.30	
BCP → brand attitude	0.33**	0.13	2.78	
Beauty condition				
Self-presence → SE	0.69***	0.06	11.22	*H1*: confirmed
SEP → BCP	0.30***	0.07	4.13	*H2*: confirmed
SEP → BA	0.20**	0.10	2.44	*H3*: confirmed
Indirect effect: SEP → SE → BCP	0.41***	0.06	6.45	
Indirect effect: SEP → SE → BA	0.25***	0.07	6.00	
Total effect: SEP → BCP	0.68***	0.06	10.78	
Total effect: SEP → BA	0.54***	0.07	9.84	
SE → BCP	0.59***	0.07	7.47	*H4*: confirmed
Indirect effect: SE → BCP→ BA	0.20**	0.09	2.60	*H5*: confirmed
Total effect: SE → BA	0.38***	0.13	5.13	
Direct effect: SE → BA	0.19[n.s.]	0.13	1.60	
BCP → BA	0.35***	0.15	3.13	

Notes: SE = self-explorative engagement; SEP = self-presence; BA = brand attitude, BCP; brand cognitive processing; [a]standardized effect; Stderr = standard error; critical t-value (one-tailed) = 1.645. ***$p<0.001$; **$p<0.01$; [n.s.]$p>0.05$
Source: Authors' own work

most of the effects of the control variables on the focal variables are insignificant. However, we find that interest for fashion shopping improves brand attitude in both the fashion and beauty conditions, while age negatively influences self-explorative engagement in the beauty condition. In addition, we investigate the mediation with a more stringent test that consists in model comparison and χ^2 significance test between the freely estimated effect of self-explorative engagement on brand attitude and by constraining the relationship to zero. Model fit is good (RMSEA = 0.07), but this stronger statistical test does not provide enough proof to confirm full mediation because the constrained model (full mediation) results in a significant degradation of fit (Δ d.f. = 2, Δ chi-square = 7.92; see Table A7 in Appendix 1). Thus, the more stringent test indicates a partial mediation of self-explorative engagement on brand attitude.

Finally, we provide support for the normality and homogeneity of the data. Field (2009) advises to inspect the shape of the distribution visually and to inspect the value of the skewness and kurtosis statistics. The visual inspection of the p-p plots (see Figure A1 in Appendix 2) indicates that there is no concern about normality of the data. The normality assumption for maximum likelihood estimation was tested, and we reported (see Table A8 in Appendix 2) that all variables are well below the threshold of two for skewness and seven for kurtosis (Fabrigar *et al.*, 1999). Regarding testing homogeneity of variance between two groups, Levene's test and Hartley's variance Fmax ratio can be used. The variances were equal between the fashion and beauty conditions for self-presence $F(1,498) = 0.07$, n.s, for self-explorative engagement $F(1,498) = 0.40$, n.s. and for the brand cognitive processing $F(1,498) = 0.62$, n.s, but not for brand attitude $F(1,498) = 4.12$, $p < 0.05$. In large

samples, Levene's test can be significant even when the variance between groups is not very different; thus, it should be interpreted in conjunction with the variance ratio (Field, 2009). We find that Hartley Fmax variance ratio is close to one, and thus, we confirm homogeneity of variance between both groups for each variable (Field, 2009) (see Table A9 in Appendix 2).

4. Discussion

4.1 Theoretical contributions

VTO revolutionizes the shopping experience because it allows consumers to decorate themselves virtually, which mimics their window-shopping in-store experience without having to travel to the store. Such services are crucial to help brands be more competitive (Berry, 2016). The findings of the present study make three main contributions.

First, we participate in the discussion on the role of presence experiences in AR. We show that consumers are motivated to explore their styles in AR-based service contexts (Scholz and Duffy, 2018), provided that they consider the virtual self to be themselves (i.e. self-presence). In addition, to the best of the authors knowledge, this study is the first to show that self-presence also has a direct positive impact on cognitive and affective brand-related outcomes in AR-enabled service contexts. These findings extend the work of Scholz and Duffy (2018), who find that AR makeup apps enable consumers to try-on a product on their own face and in their personal space, therefore, foregrounding consumers' self-exploration and leading to intimate consumer–brand relationships. Furthermore, we extend the work of Adachi *et al.* (2020), who show that self-presence in VR leads to positive attitudes that transfer to the image of travel destinations by demonstrating that self-presence has the potential to improve consumers' attitudes also in the context of AR-based VTOs.

Second, this study contributes to research on the exploration of possible selves in virtual contexts (Ambika *et al.*, 2022; El-Shamandi Ahmed *et al.*, 2023) by showing that self-presence and self-explorative engagement enable consumers to explore their possible selves. This finding extends prior research, which shows that consumers use AR to explore their ideal and true self-presentation (Javornik *et al.*, 2022). Our results provide nuance to many studies that point out that consumers do not believe that AR is realistic and would not use it to explore themselves (El-Shamandi Ahmed *et al.*, 2023; Javornik *et al.*, 2022). Importantly, such studies considered AR try-ons that display multiple brands or unbranded styles while we confirm our findings in two branded AR contexts. We further establish that self-presence is an important and novel prerequisite for self-explorative engagement in the context of VTO and, therefore, contribute to the existing research on consumers' self-explorative engagement (Chernev *et al.*, 2011). This finding answers the call for novel insights about consumers' key motivations to use online services (Furrer *et al.*, 2020).

Third, this study contributes to research on the extended self (Belk, 1988, 2013) by denoting the existence of an extended self in AR-VTOs that results in positive brand attitudes when consumers use branded fashion and beauty apps. Belk (2013) concluded that virtual self may influence offline selves and help create multiplicity of selves. Our study contributes to this literature on how AR helps consumers present themselves and shows that in the context of AR branded apps, the symbolic meaning from a focal brand gives reassurance and permits self-extension. Specifically, during self-extension, consumers explore their styles and increase their processing of brand information. In turn, self-extension benefits brands that offer such services.

4.2 Practical implications

The findings of this study are verified across two online service experiences and have several implications for service managers and developers of AR-based shopping apps. First, developing apps that enhance consumers' self-explorative engagement requires that app developers provide a realistic experience of the virtual self (i.e. self-presence). Prior research shows that consumers report a lack of authenticity in the VTO service experience and desire a believable representation of shades and sizes on people's own physical characteristics, for instance, different skin colors or facial features (El-Shamandi Ahmed *et al.*, 2023). Thus, designers should involve consumers in the cocreation of the service experience from the beginning to make AR more inclusive, for instance, making it more accurate for Asian women (El-Shamandi Ahmed *et al.*, 2023). In addition, brands should be the background of the service experience while consumers are foregrounded (Scholz and Duffy, 2018).

Second, self-explorative engagement provides a novel type of experience that service managers can propose for finding their target audience willing to embrace AR. Most AR research focuses on increasing purchases and views AR as a mere decision-making tool (Hilken *et al.*, 2017; Whang *et al.*, 2021), while we suggest that VTOs might have an additional role in the customer journey. Specifically, this study finds that the VTO is a tool for self-exploratory behavior (Javornik *et al.*, 2022) that enhances affective and cognitive brand outcomes, and previous research suggests that self-explorative engagement can help companies form close relationships with consumers (Scholz and Duffy, 2018). Therefore, service managers and brands should not focus only on supporting the utilitarian purposes of using VTO apps but also enable more hedonic self-explorative engagement. This is a novel way to enable interaction between consumers and the organizational frontline with the potential to expand services by deepening consumer relationships (Marinova *et al.*, 2017). Therefore, we recommend especially smaller and less-known brands to consider using VTO services to increase positive attitudes toward brands. This is consistent with a recent study showing that AR apps are particularly useful for less known brands, brands with smaller target audiences and luxury products (Tan *et al.*, 2022).

Third, brands investing in AR technology might create a lock-in effect with the branded app. Lock-in effects are a type of loyalty that occurs when the costs of switching is higher than the benefits (Murray and Häubl, 2007). When people are loyal to an online vendor, it is often because they have spent time and energy learning how to use it and learning about the brand (Shih, 2012). Technological lock-ins stem from a positive affective and cognitive experience with products and brands (Shih, 2012). An AR-VTO as a feature of a branded app (e.g. Sephora and Nike AR apps) encourages consumer exploration of styles and facilitates affective and cognitive responses toward the focal brand and can, therefore, help create lock-in effects. We suggest that through this mechanism, AR can help brands

capture more value for themselves instead of joining a marketplace and pay commission to the platform.

5. Limitations and future research

The present study is a cross sectional one, thus involving the risk of common method bias (Podsakoff *et al.*, 2003), which we considered before and after data collection. Prior to the data collection, we implemented the preventative steps recommended by MacKenzie and Podsakoff (2012) to ensure that common method bias is not a serious issue in our study. We also checked for common method bias afterwards with Harman's criterion. However, in light of current controversy on Harman's criterion (Baumgartner *et al.*, 2021), we recognize that common method bias might be a limitation to our data.

Furthermore, this study has several limitations that offer fruitful avenues for future research. First, to the best of authors' knowledge, this is the first study to show the importance of self-presence in AR, and we hope it will inspire further research on presence theory. Research discusses presence as multidimensional concept that encompasses spatial presence, self-presence and social presence (Lavoye and Tarkiainen, 2021; Lee, 2004). Whereas spatial presence has been the most commonly studied presence dimension in AR research thus far (Hilken *et al.*, 2017; Smink *et al.*, 2020), the present research provides important background for a multidimensional investigation of presence.

Second, we only discuss the exploration of styles via VTO but do not investigate the deeper meaning of such exploration for consumers' self-concept. The research literature recognizes the importance of many self-related constructs (self-expression, Belk, 1988; self-congruity, Sirgy, 1982) as antecedents to positive brand outcomes in the context of VTOs. These self-related constructs assume that consumers already have formed a self-image they wish to express, and they will assess the brands' congruence with this self-image. However, research also shows that low self-esteem consumers are the most keen to use AR (Yim and Park, 2019), and they wish to explore their self-concept with AR (Javornik *et al.*, 2021). Therefore, helping this segment to explore their self-concept is an important avenue for future research. Future research can dive into the self-explorative experience and collect additional data to verify our findings with self-explorative engagement as performance, which can entail observing how many products participant try-on, how long they use the app and how creative their experience is.

Third, extended self theory recognizes that the incorporation of branded products into the self happens through a process of increasing knowledge of the object, which becomes desirable thereafter (Belk, 1988). However, our results did not provide support for a full mediation between self-explorative engagement and brand attitude via brand cognitive processing; thus, we encourage future research to provide additional clarity on these relationships. Beyond cognitive and affective brand outcomes, future studies should investigate whether self-explorative engagement might, under some conditions, decrease loyalty to brands and businesses. Self-extension typically increases loyalty to a focal brand; however, digital products might play different roles and reduce brand loyalty (Belk, 2013). This might be the case because some VTOs enable consumers to explore brands, and consumers might, therefore, move from one brand to another easily. Consequently, their loyalty to any individual brand could be decreased. Retailers are increasingly investing in VTOs, for instance, Amazon is adding AR-VTO for shoes, and therefore, lets consumers explore thousands of styles from footwear brands including New Balance, Adidas, Reebok and Lacoste (Perez, 2022). Many big Tech rivals, for instance, Snapchat, Pinterest and Google, also leverage AR-VTO to display clothes, makeup and accessories (Perez, 2022). This is an important topic because of the popularity of those platforms that make VTO technologies instantly available to millions of users.

Fourth, our stimuli compare two different product categories (i.e. lipstick and sunglasses), and more product categories should be considered as they might reveal new boundary conditions to our findings. Other possible boundary conditions are consumers' characteristics, such as their satisfaction with their appearance. Specifically, consumers' satisfaction with their appearance improves self-presence, product diagnosticity and loyalty toward the try-on experience (Suh *et al.*, 2011), while consumers' dissatisfaction (vs satisfaction) with their body image enhances the popularity of VTOs (Yim and Park, 2019). We suggest that dissatisfaction with one's appearance reduces self-presence and, in turn, a lower self-presence protects against the negative emotions linked with one's low self-image and enables consumers to focus on the products and the experience. Therefore, future studies should investigate the extent to which different levels of self-presence will benefit different consumers in this context and provide guidelines to service designers.

Fifth, and finally, the lipstick condition was only tested by women, as it is the typical target segment for makeup; however, gender might be an interesting boundary condition to investigate further. In addition, this survey had an experimental task, and 77% of the participants had never used AR before. Future research on this topic would benefit from insights of more experienced users of the apps to better understand their needs and motivations when using such technologies.

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Appendix 1

Table A1 Measurement items

Construct	Source	Item wording
Seven-point Likert scale: 1 = "strongly disagree," 7 = "strongly agree"		
Self-presence	Adapted from Seo *et al.* (2017)	SEP1: I felt like this character resembled me SEP2: I felt like I identified with this character SEP3: I felt like this character represented something in me
Self-explorative engagement	Adapted from Huang and Liao (2017)	SE1: I was able to try-on various expressions and poses SE2: I was able to apply my previous try-on experiences to the experience with the virtual product SE3: I was able to move the way I would in real life to inspect the product's fit
Brand cognitive processing	Adapted from Hollebeek *et al.* (2014) and McLean and Wilson (2019)	BCP1: I was able to learn about the brand BCP2: I thought a lot about the brand BCP3: I was motivated to learn more about the brand
Seven-point semantic differential scale		
Brand attitude	Adapted from Li *et al.* (2002)	BA1: Bad/good BA2: Unappealing/appealing BA3: I do not like the brand/ I like the brand

Source: Authors' own work

Table A2 Goodness of fit indexes per condition

Condition	χ2 (d.f.)	RMSEA	NNFI	CFI
Fashion condition	127.86 (48)	0.08	0.97	0.98
Beauty condition	122.31 (48)	0.07	0.98	0.98

Notes: χ2 = chi-square; d.f. = degrees of freedom; RMSEA = root mean square error of approximation; NNFI = non-normed fit index; CFI = comparative fit index

Source: Authors' own work

Table A3 Collinearity statistics

Independent variables	Dependent variables	VIF	Condition index
Fashion condition			
Self-presence	Brand attitude	1.80	9.42
Self-explorative engagement		2.25	7.96
Brand cognitive processing		2.23	11.81
Beauty condition			
Self-presence	Brand attitude	1.89	7.90
Self-explorative engagement		2.27	9.88
Brand cognitive processing		2.33	12.36

Note: VIF = variance inflation factor

Source: Authors' own work

Table A4 Nonresponse bias

Demographic	Pearson's χ^2 results	Significance
Age	$\chi^2 = 60.24, p < 0.05$	Significant
Gender	$\chi^2 = 4.44, p > 0.05$	Not significant
Education	$\chi^2 = 0.52, p > 0.05$	Not significant
Dependent variables	*t*-test results	Significance
Self-presence	$t(248) = 1.15, p > 0.05$	Not significant
Self-explorative engagement	$t(248) = 0.45, p > 0.05$	Not significant
Brand cognitive processing	$t(248) = 0.03, p > 0.05$	Not significant
Brand attitude	$t(248) = 0.28, p > 0.05$	Not significant

Source: Authors' own work

Table A5 Common method variance test

Model	χ2 (d.f.)	Delta: χ2 (d.f.)	RMSEA	NNFI	CFI
One-factor model	1,849.36 (54)		0.25	0.80	0.83
Two-factor model	1,626.80 (53)	222.56 (1)	0.24	0.84	0.87

Notes: χ2 = chi-square; d.f. = degrees of freedom; RMSEA = root mean square error of approximation; NNFI = non-normed fit index; CFI = comparative fit index
Source: Authors' own work

Table A6 Results of structural equation modeling with covariates in the analysis

Hypothesized relationships	Effects[a]	Stderr	*t*-value	Result
Fashion condition				
Self-presence → SE	0.68***	0.07	10.75	*H1*: confirmed
SEP → brand cognitive processing	0.27***	0.07	3.54	*H2*: confirmed
SEP → brand attitude	0.25**	0.09	2.76	*H3*: confirmed
Indirect effect: SEP→SE→ BCP	0.40***	0.06	6.44	
Indirect effect: SEP→SE→BA	0.24***	0.07	3.62	
Total effect: SEP→BCP	0.67***	0.06	10.27	
Total effect: SEP→BA	0.49***	0.07	7.69	
SE → BCP	0.60***	0.07	7.44	*H4*: confirmed
Indirect effect: SE → BCP→ BA	0.20**	0.07	2.69	*H5*: confirmed
Total effect: SE → BA	0.22**	0.08	2.41	
Direct effect: SE → BA	0.01[n.s.]	0.11	0.10	
BCP → BA	0.34**	0.13	2.88	
Beauty condition				
SEP → SE	0.68***	0.06	10.96	*H1*: confirmed
SEP → BCP	0.30***	0.06	4.13	*H2*: confirmed
SEP → BA	0.21**	0.10	2.49	*H3*: confirmed
Indirect effect: SEP→SE→BCP	0.39***	0.06	6.20	
Indirect effect: SEP→SE→BA	0.35***	0.07	5.85	
Total effect: SEP→BCP	0.68***	0.06	10.21	
Total effect: SEP→ BA	0.55***	0.06	9.35	
SE → BCP	0.57***	0.07	7.37	*H4*: confirmed
Indirect effect: SE → BCP→ BA	0.18***	0.07	2.98	*H5*: confirmed
Total effect: SE → BA	0.37***	0.09	5.14	
Direct effect: SE → BA	0.19[n.s.]	0.13	1.60	
BCP → BA	0.32**	0.15	2.79	
Covariates				
Fashion condition				
Age → SE	0.01[n.s.]	0.06	0.18	
Edu → SE	−0.05[n.s.]	0.08	−1.24	
Int → SE	0.06[n.s.]	0.14	1.10	
Age → BCP	0.03[n.s.]	0.04	0.55	
Edu → BCP	0.06[n.s.]	0.06	1.10	
Int → BCP	0.01[n.s.]	0.11	1.10	
Age → BA	−0.08[n.s.]	0.06	−1.39	
Edu → BA	−0.04[n.s.]	0.08	−0.50	
Int → BA	0.12**	0.15	2.18	
Beauty condition				
Age → SE	−0.10*	0.05	−1.81	
Edu → SE	0.01[n.s.]	0.06	0.25	
Int → SE	0.04[n.s.]	0.14	0.71	
Age → BCP	−0.04[n.s.]	0.05	−0.96	
Edu → BCP	−0.04[n.s.]	0.07	1.10	
Int → BCP	0.10[n.s.]	0.11	0.15	
Age → BA	0.04[n.s.]	0.06	−1.39	
Edu → BA	−0.02[n.s.]	0.08	−0.50	
Int → BA	0.13**	0.15	2.18	

Notes: SE = self-explorative engagement; SEP = self-presence; BA = brand attitude; BCP = brand cognitive processing. [a]standardized effect; Stderr = standard error; critical *t*-value (one-tailed) = 1.645. ***$p < 0.001$; **$p < 0.01$; [n.s.]$p > 0.05$

Source: Authors' own work

Table A7 Full mediation robustness check

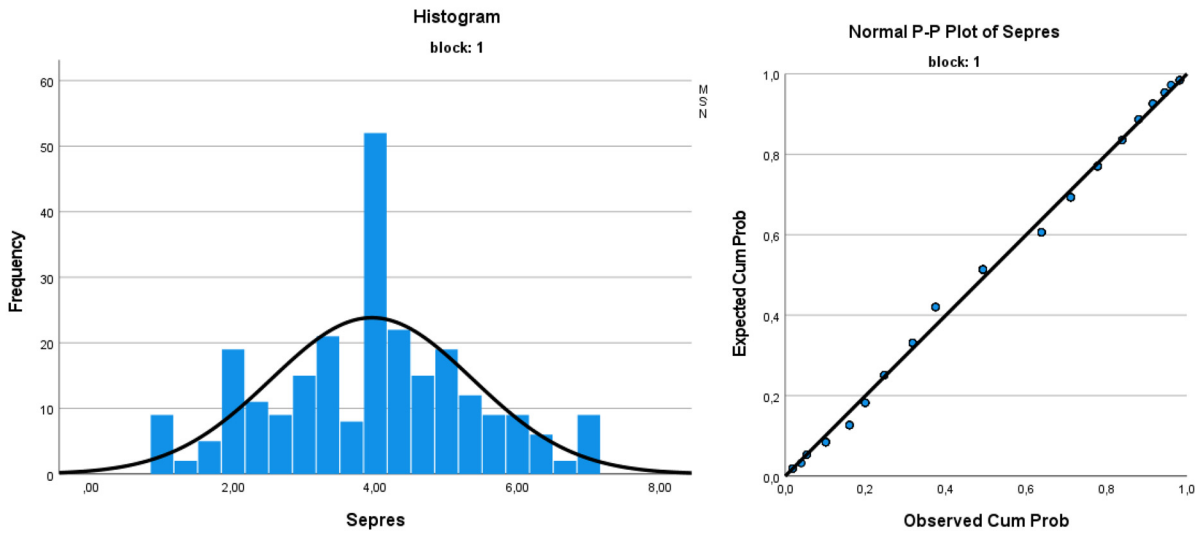
Model	χ2 (d.f.)	Delta: χ2(d.f.)
Unconstrained (partial mediation)	261.60 (107)	
Constrained (full mediation)	269.52 (109)	7.92 (2)

Source: Authors' own work

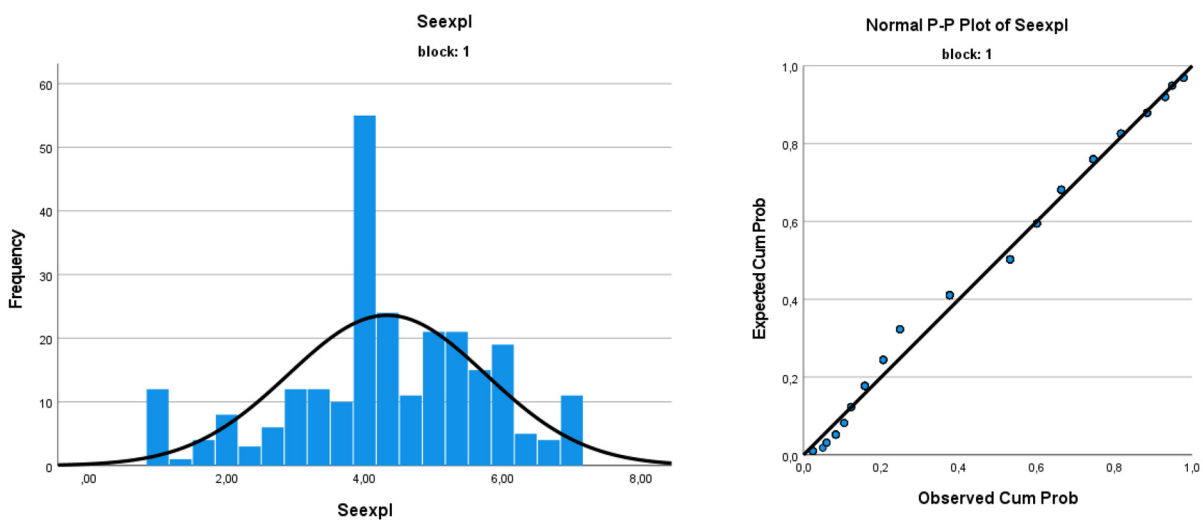
Appendix 2. Assumptions

Figure A1 Normality analysis with histogram (on the left) and p-p plot (on the right)

Fashion condition



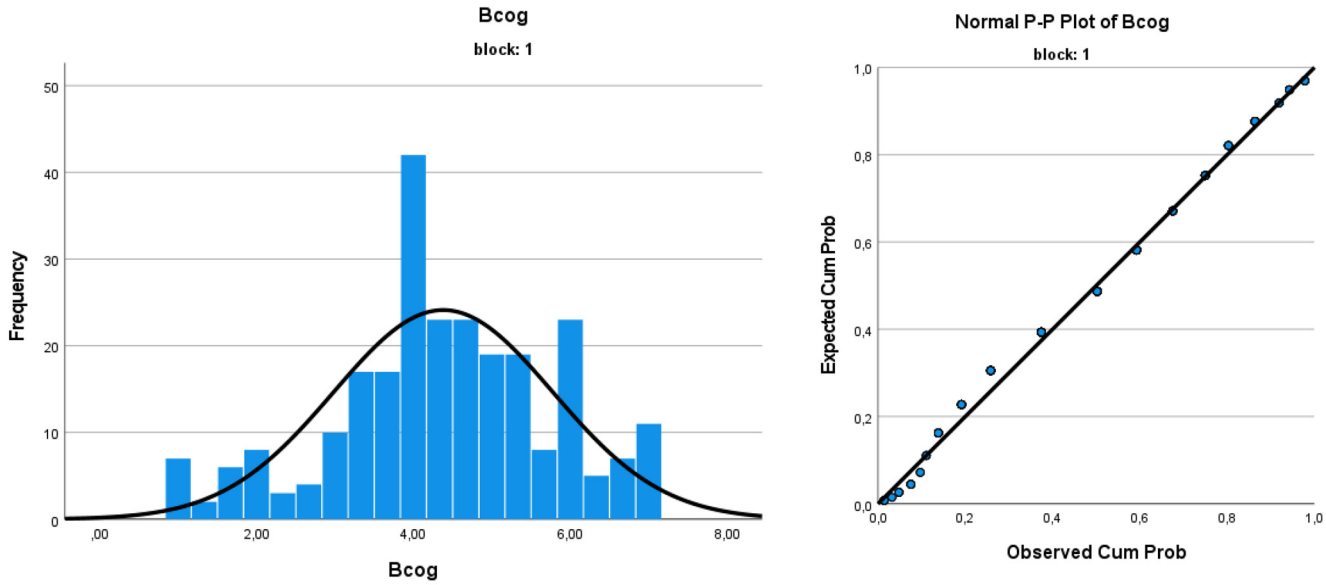
(a) Self-presence



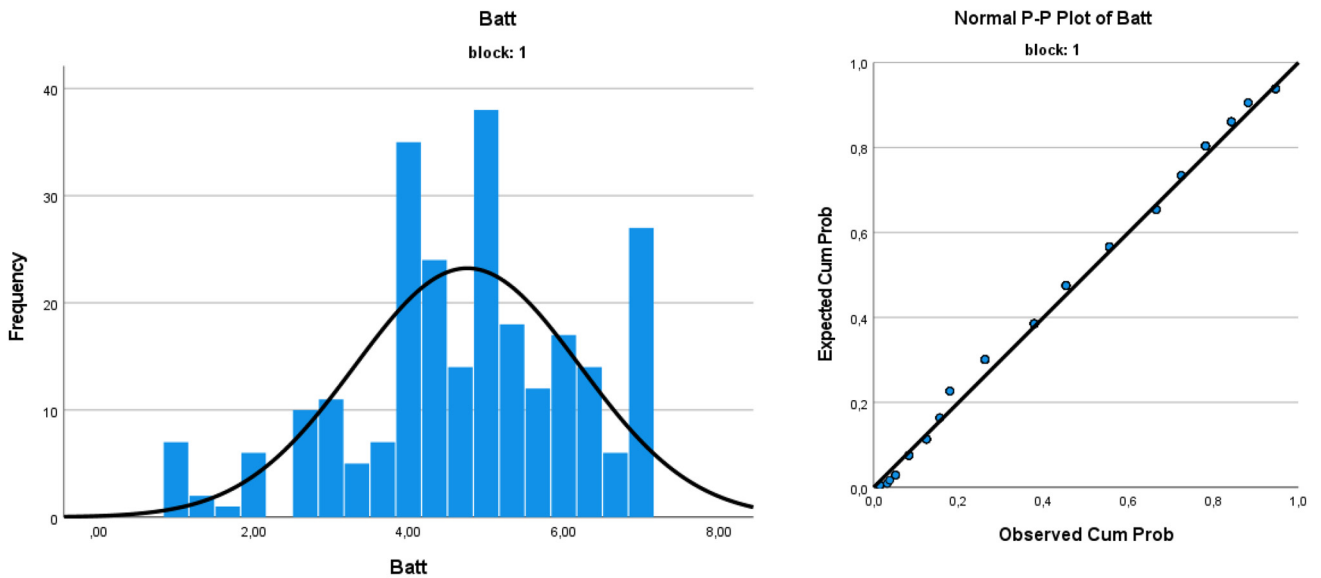
(b) Self-explorative engagement

(*continued*)

Figure A1



(c) Brand cognitive processing

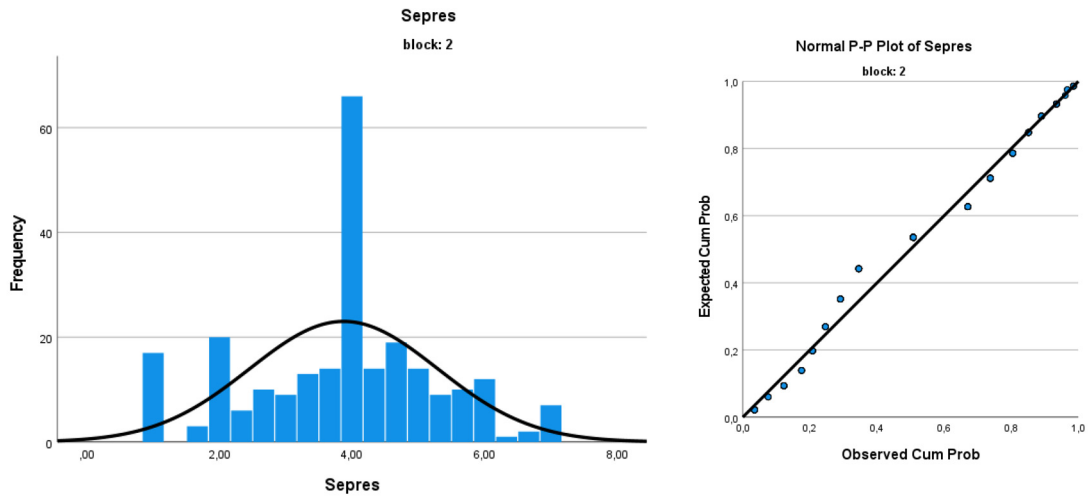


(d) Brand attitude

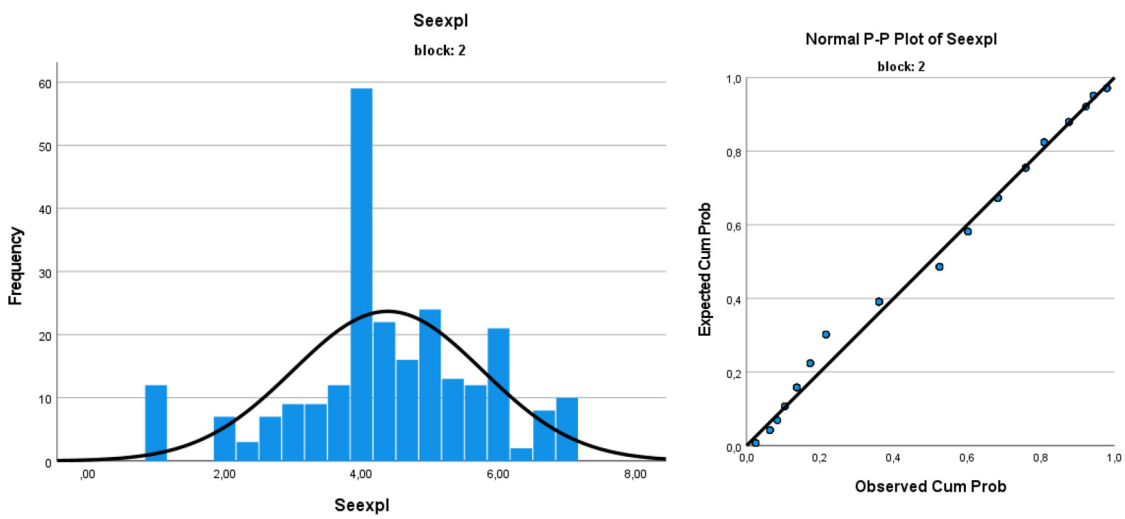
(*continued*)

Figure A1

Beauty condition



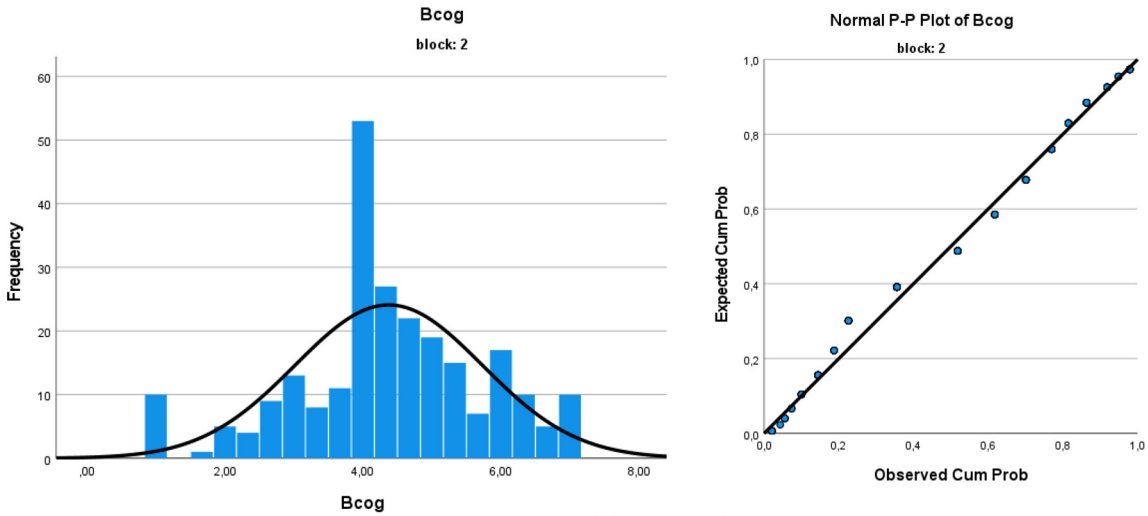
(a) Self-presence



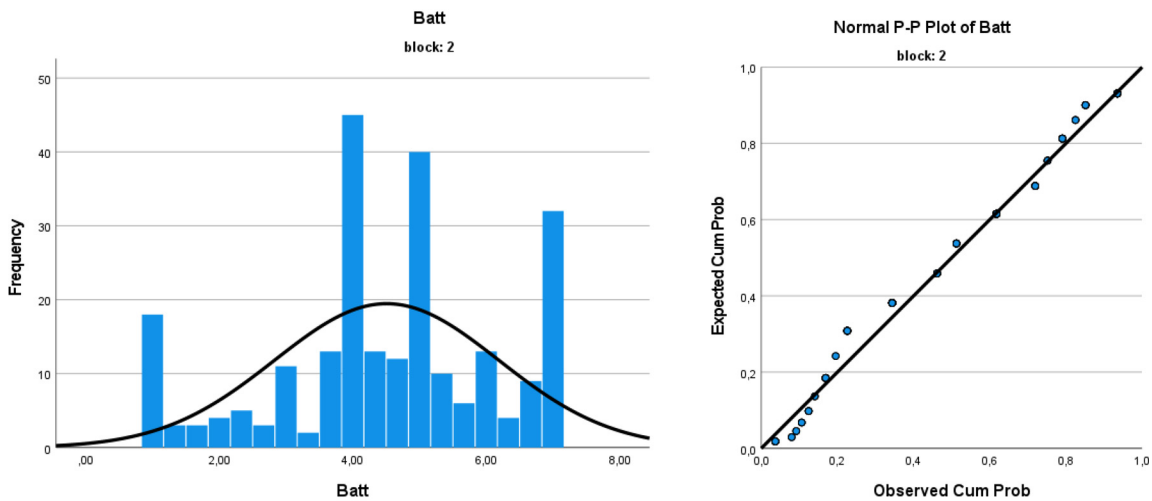
(b) Self-explorative engagement

(*continued*)

Figure A1



(c) Brand cognitive processing



(d) Brand attitude

Source: Authors' own work

Table A8 Skewness and kurtosis

Variables	Skewness	Std. error of skewness	Kurtosis	Std. error of kurtosis
Fashion condition				
Self-presence	−0.38	0.15	−0.03	0.30
Self-explorative engagement	−0.38	0.15	−0.30	0.30
Brand cognitive engagement	−0.29	0.15	−0.09	0.30
Brand attitude	−0.45	0.15	−0.01	0.30
Beauty condition				
Self-presence	−0.16	0.15	−0.18	0.31
Self-explorative engagement	−0.38	0.15	0.26	0.31
Brand cognitive engagement	−0.29	0.15	0.20	0.31
Brand attitude	−0.40	0.15	−0.33	0.31

Source: Authors' own work

Table A9 Tests for homogeneity of variance

Variables	Variance in fashion condition	Variance in beauty condition	Hartley FMax
Self-presence	2.00	2.02	0.99
Self-explorative engagement	2.05	1.9	1.07
Brand cognitive engagement	1.96	1.84	1.06
Brand attitude	2.11	2.82	0.75

Source: Authors' own work

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