The Perceived Influence of E-Shopping Cues on Customers' Buying Decisions

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ABSTRACT

E-shopping sites use a variety of design elements that affect the shopping process and lead customers to favorable buying decisions. Such elements also play a significant role as impulse buying behavior triggers. In this exploratory study based on online questionnaires (N = 401), we investigated customers' perception of the influence of eleven common e-shopping cues on their buying decisions and explored the connection between the perceived influence of the cues and the respondents' gender, education level, and neuroticism. We found (1) that participants group the e-shopping cues by their influence power; (2) participants' gender and educational level contribute to a more critical/favorable perception of some shopping cues; (3) a connection between a higher level of neuroticism and greater perceived influence of shopping cues, which results in lower shopping risks. Drawing on our research, we offer several design recommendations for the advancement of e-shopping websites, particularly concerning the implementation of e-shopping cues.

CCS CONCEPTS

• **Social and professional topics** → *Gender*; *Age*; • **Applied computing** → *Online shopping*.

KEYWORDS

E-shopping, Shopping Cues, Neuroticism, Perceived Influence, Gender, Educational Level

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1 INTRODUCTION

E-shopping cues are embodied in shopping sites' designs as standard features such as ratings, reviews, detailed pictures, 3D visualizations, sales labels (like "Bestseller" or "The deal of the day"), or countdown timers (see Figure 1).

While some studies suggest that cues (like for scarcity) are mostly recognized as "fake" [39], leading to shopping aversion [56], others have demonstrated that e-shopping cues can influence impulse buying behavior [31, 41]. Yet, little is known about how users perceive e-shopping cues and to what degree they think these different cues might influence their buying decisions.

This study contributes to closing this gap. We invited online shoppers (N=401) to assess the degree to which 11 types of shopping cues may affect their buying decisions. We were interested in seeing to what extent demographic factors such as gender, age, and educational background come into play. What is more, as neuroticism is known to be the main personality factor that is connected with compulsive buying [7, 45], we were interested in investigating its correlation with how influential users perceive certain shopping cues.

Our paper contributes to the knowledge of persuasion in e-shopping by addressing three key aspects.

(1) We provide insights into the perceived influence of e-shopping site elements by presenting a clustering model that groups shopping cues according to their degree of influence.
(2) We examine the connection between demographic variables, such as age, gender, and education, and the user's perception of the influence of e-shopping cues.
(3) We shed light on the role of the personal factor neuroticism in users' perception of the influence of shopping cues, adding to the broader understanding of the link between personal factors and e-shopping behavior.

Overall, our paper contributes to the understanding of users' perception of e-shopping environments with its persuasive elements.

2 RELATED WORK

2.1 Approaches to persuasion in e-shopping sites

Persuasion has been described as attempting to purposefully change someone's behavior without deception [22]. The goal of shopping

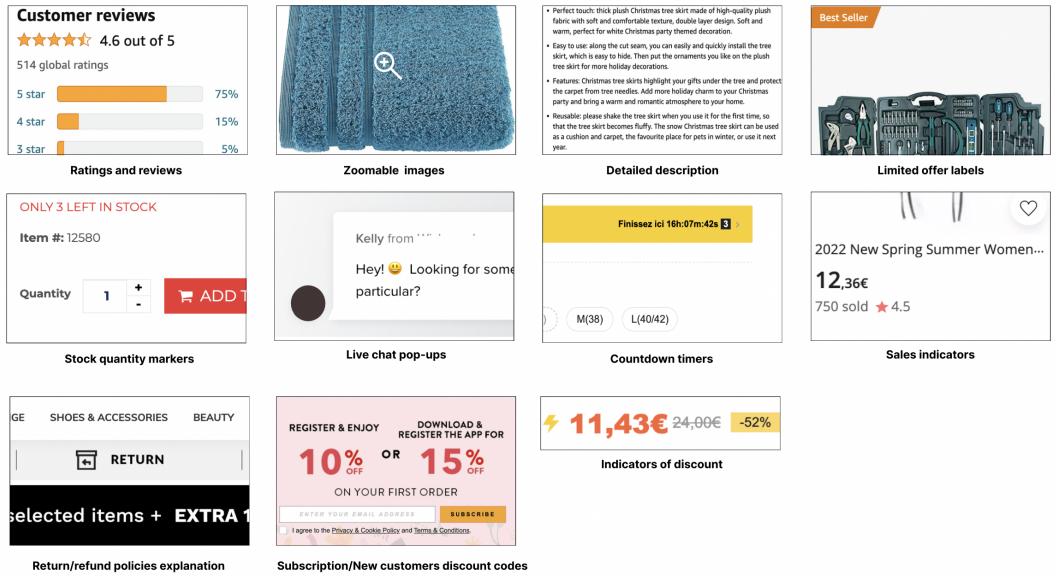

Figure 1: Examples of e-shopping cues from different shopping sites.

websites is to influence users toward buying. To this end, persuasion strategies have become an essential component of e-shopping sites. Current approaches to persuasion in e-shopping are either based on the persuasive models used in psychology, behavioral economy, and marketing or apply specific HCI-rooted approaches addressed to the shopping website as persuasive computer-based systems. The first line of studies employed the Elaboration Likelihood model, which provides an explanation of two separate strategies for addressing the users' way of interacting with the shopping site information. It helps to explain the process of users' exploration of different shopping sites' functionality and design [16, 46]. Cialdini's persuasive principles [14] are another approach to describe persuasion in the context of e-shopping [6] or to discuss the "persuasive profiles" [38]. Moreover, the concept of persuasion mechanisms on e-commerce websites is actively discussed within the framework of nudge theory [48]. Nudge theory examines the inherent biases in human decision-making and suggests countermeasures that utilize similar bias-based mechanisms to help individuals make better decisions for themselves. At the same time, multiple nudging techniques can be employed not to serve the individual's interests but to manipulate decisions in favor of commercial organizations [10]. In this paradigm, the different persuasive techniques embodied in elements found on e-commerce sites can be regarded as nudges. For instance, a countdown timer that leverages the "scarcity bias" is designed to encourage users to make quick purchases.[50, 51] The persuasive approach to system design was introduced by Fogg [22] and further developed in the work of Oinas-Kukkonen and Harjumaa [26, 36], who connected Fogg's approach to persuasion and requirements of computer systems. Oinas-Kukkonen and Harjumaa approach allows for evaluating e-shopping sites' implementation of persuasive design by looking at the user interaction with shopping website elements [34].

2.2 E-shopping cues as an instrument of e-shopping persuasion

The term "shopping cues" groups the different factors of the shopping environment that contribute to shopping decisions [2], and that can cause impulse buying [9]. They include a broad range of visual and non-visual stimuli (like the smell or sounds), factors related to pricing (price-sensitivity issues), and the general atmosphere of the shopping venue [52]. While not all the modalities are transferable to a web store environment, there are a number of common e-shopping cues that may affect customers' behavior in the same way as tangible shopping cues affect the real-world shopping experience [20, 31, 32, 42, 47]. Several studies have examined different types of e-shopping cues and found that product ratings [47], product images [20], a clearly listed return policy [40], and product descriptions [32] contribute to customers' favorable buying decisions. On the other hand, some e-shopping cues, such as scarcity cues, raised customers' skepticism towards the deal [1, 29, 42], especially in situations where such elements are not explained and justified [33]. The results of these studies prove the power of e-shopping cues to influence customers' buying behavior. However, little is known about the extent to which customers are aware of the influence these cues may have on them. So far, only one experiment regarding users' awareness of dark patterns online asked users how likely different types of manipulative designs would influence them. In the designs tested, one particular design featured a message indicating both high demand and limited availability (depending on whether the information behind this message is genuine, it can be seen as either a persuasive cue or a dark pattern [30]). Most study participants identified this design and assumed it had a moderate influence on their behavior [12].

2.3 E-shopping and personal factors

Most previous studies identified variables of gender, age, and education as important predictors of shopping intentions, buying behavior, or shopping orientations [8, 13, 17, 19]. Several studies show, for example, that a lack of physical proximity (i.e. tactile information) in e-shopping can raise negative emotional attitudes in female customers [15, 28]. In the study of Dennis et al. [19], women customers demonstrated a stronger orientation towards social cues and stronger hedonic motivation in online shopping. Another study showed the highly negative impact of older age and higher level of education on using online shopping platforms [17]. Along the same line, the study of Ansari [8] found a strong effect of education on online shopping, but the direction of the effect is not discussed in the paper. Still, the connection between the perceived influence of different e-shopping cues and demographics requires further investigation.

There is also evidence that neuroticism affects people's buying motivation [55] and buying intentions [58] towards excessive shopping habits, which may stem from a perception or reality of limited resources, leading to the acquisition of too many items [11] and impulsive purchases [21, 24, 37, 44, 49]. These pieces of evidence lead to the assumption that people with a high level of neuroticism are more strongly influenced by shopping cues than people with a lower level of neuroticism. The connection between the perceived influence of specific e-shopping cues and personal factors, including people's level of neuroticism, remains to be investigated.

2.4 Research questions

Based on these research gaps, we seek to explore two research questions:

RQ1: How do users rate the influence of different e-shopping cues on their buying decisions?

RQ2: What are the effects of gender, age, level of education, and neuroticism on the perceived influence of e-shopping cues?

3 METHOD

3.1 Creation of the list of e-shopping cues

We developed a list of eleven e-shopping design elements that users encounter on shopping websites (see Table 1). The list was based on the impulse buying features and themes (physical proximity, social influence, urgency and scarcity, lower shopping risk) defined by Moser et al. [31]. After defining the initial set of features, the first author went through the list of top e-shopping sites[1] and e-shopping apps[2] to ensure the presence and visibility of these e-shopping cues on web-commerce. The list of cues was then discussed with the co-authors. Because the shopping cues can be presented in different visual forms on websites (for example, countdown timers can be placed on a single product or a group of products and in different parts of the screen), we decided to use a plain text-based description of the cues to address the generalized user experience about different types of cues.

3.2 Sample

We recruited participants (N=401) via the crowdsourcing platform Prolific,[3] as it provides access to a large English-speaking population and is GDPR-compliant [4]. Our criterion for participation was fluency in English and a minimum age of 18. We also selected the gender balance option to ensure an equally distributed sample by gender. Prolific led the participants to our survey on LimeSurvey[5]. The completion time was about 5 minutes. Ethical approval for the experiment was received from the University of Luxembourg Ethic Panel.

3.3 Procedure and measurements

First, the survey provided detailed information about the study to ensure participants' informed consent. Next, we collected demographic information (gender, age, and education level) and administered the neuroticism scale. To assess participants' neuroticism levels, we used the 10-question Emotional Stability scale from the lexical Big Five inventory [25] provided by the International Personality Item Pool.[6] Finally, the participants filled out the questionnaire about the perceived influence of each shopping cue from Table 1. We showed participants a brief text description of each shopping cue and asked them to answer the question "How much does this element affect your buying decision favorably?" on a 5-point Likert scale about each cue, from 1 - "does not affect at all" to 5 - "affects a whole lot.".

4 RESULTS

4.1 Descriptive statistics

We obtained complete responses from 401 participants. 49% identified as women, 49% as men and 2% as non-binary. 19% had a degree higher than a bachelor's, 31% had a bachelor's degree, and 49% had a degree lower than a bachelor's. 49% of participants were up to 24 years old, 37% were 25-34 years old. As we received a very limited number of responses from participants of age groups 35 - 44 years old and 45+ years old, we grouped the two groups into one age cluster over 34 years (14%).

4.2 Perceived influence of e-shopping cues - RQ1

Table 2 provides the perceived influence rating for each shopping cue. To determine if there is a statistically significant difference between the different shopping cues, we conducted a Friedman test of differences among related samples. Results showed significant differences $\chi^2\ (10, N = 401) = 1135.33$, $p < 0.001$, which means that at least some of the cues are perceived as more influential than others. We conducted a hierarchical cluster analysis (average linkage measure) [57] to understand similarities and differences

[1]Top 20 cross-border fashion key retailers and marketplaces, Retrieved December 10, 2022, from https://www.cbcommerce.eu/press-releases/top-20-fashion-retail-europe-report-2022; Top Websites Ranking for eCommerce and Shopping in the world, Retrieved December 10 from https://www.similarweb.com/top-websites/category/e-shopping-and-shopping

[2]Worldwide Shopping App Downloads Retrieved December 10, 2022 from https://www.marketplacepulse.com/articles/amazon-slips-to-4th-in-global-shopping-app-rankings

[3]https://www.prolific.co/.

[4]https://participant-help.prolific.co/hc/en-gb/articles/360021786554-Data-Protection-and-Privacy-GDPR.

[5]https://www.limesurvey.org/.

[6]https://ipip.ori.org/.

Table 1: E-shopping cues presented to the study participants.

ID	E-shopping cue	Description	Theme (adapted from Moser et al. 2019)
1	Ratings and reviews	Information about how other users rated the good.	Social influence
2	High-quality (zoomable) product images	Product images with the opportunity to zoom in to better view product details	Physical proximity
3	Detailed product description	Written information about additional features of the product (material, functionality, origin)	Physical proximity
4	Limited offer labels	Labels with information about some special proposal like “Bestseller” or “On sale”	Social influence/ Perceived scarcity(urgency)
5	Live pop-up chats	A chat overlay that invites to ask questions about goods and provides proposals in real-time	Lowering risks
6	Limited offer countdown timers	Timers that show how much time is left before the deal expires	Perceived scarcity (urgency)
7	Stock quantity markers	Markers showing how many items are left in stock	Perceived scarcity (urgency)
8	Subscription/new customer discount codes	Discounts provided by the company to the new/returning customers	Lowering risks
9	Sales indicators	Labels or footer information about how many items have already been sold	Social influence
10	Refund policies explanation	Detailed description of how to obtain refunding	Lowering risks
11	Discount indicators	Crossed-out old price	Lowering risks

Table 2: Results of E-shopping cues evaluation

	N	Mean	CI(lower,upper)	Median	Percentiles		
					25	50	75
Ratings and reviews	401	4.00	3.90,4.09	4.00	4.00	4.00	5.00
Zoomable images	401	4.12	4.03,4.21	4.00	4.00	4.00	5.00
Detailed description	401	4.19	4.10,4.28	4.00	4.00	4.00	5.00
Limited offer labels	401	3.25	3.14,3.36	3.00	2.00	3.00	4.00
Live pop-up chats	401	2.16	2.04,2.29	2.00	1.00	2.00	3.00
Lim.offer countdown timers	401	2.76	2.64,2.89	3.00	2.00	3.00	4.00
Stock quantity markers	401	3.32	3.20,3.44	3.00	3.00	3.00	4.00
Subscription discount codes	401	3.53	3.42,3.64	4.00	3.00	4.00	4.00
Sales indicators	401	2.91	2.78,3.03	3.00	2.00	3.00	4.00
Refund policies explanation	401	3.84	3.73,3.95	4.00	3.00	4.00	5.00
Discount indicators	401	3.77	3.67,3.87	4.00	3.00	4.00	5.00

between the cues regarding their influence potential. The results show three clusters of elements, grouped by the scores indicating the perceived influence of each design element (see Figure 2). The first cluster contained proximity and social cues (new price, detailed description, images, reviews, and refund policies). A second cluster groups scarcity cues, cues about availability, and promotions. A third cluster includes only the "live pop-up chats" cue. It received the lowest overall rating (median = 2), indicating that participants did not consider this cue as influential. We hence decided to focus our analysis on the first two clusters. A paired t-test revealed that the difference in the items' score sum in clusters one ($M = 19.91$, $SD = 3.384$, $SE = .169$) and two ($M = 15.17$, $SD = 4.119$, $SE = .128$) was statistically significant ($T(400) = 23.962$, $p < 0.001$,$SD = 3.956$, $CIofDifferences$ 4.345, 5.121), meaning that the items in cluster two are perceived as significantly less influential compared to cluster one.

4.3 Effect of gender, age and education level on the perceived influence of e-shopping cues - RQ2

To determine possible connections between the perceived influence of the tested e-shopping cues and the demographic variables gender, age, and education level, we conducted a series of ordinal regression models with gender, age, and education as independent variables and the neuroticism level as a covariate. Following the model's assumption, we could not include the small subgroup of non-binary participants (n=8).

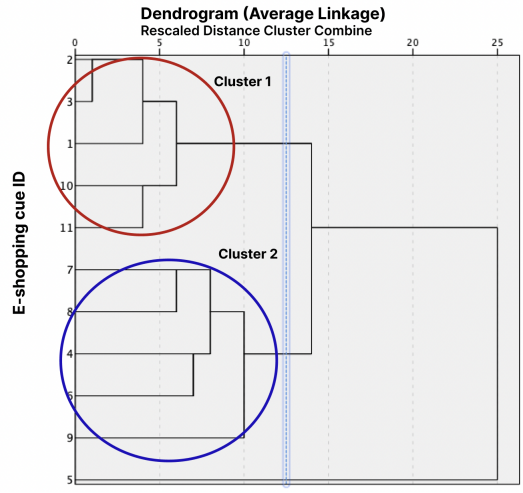

Figure 2: Hierarchical clustering dendrogram of e-shopping cues.

4.3.1 Age. Our study did not find any significant differences in the perceived influence of e-shopping cues between the users of the groups "18 - 24 years", "25 - 35 years" and "35+ years".

4.3.2 Gender. "Gender" contributes to the model of the perceived influence of "stock quantity markers" (model effects: $Wald = 10.53$, $df = 1$, $p = .001$, $orderedlog - odds = .619$, $SE = .189$ "male" as the reference group) and "live pop-up chats" ($Wald = 4.218$, $df = 1$, $p = .04$, $orderedlog - odds = .394$, $SE = .192$, "male" as reference group); the results show that in both cases female participants perceived these cues as less influential compared to the male participants.

4.3.3 Educational level. The predictor variable "education level" significantly contributed to the models for "limited offer countdown timers" (model effects: $Wald = 10.032$, $df = 2$, $p = .007$; parameters estimates $orderedlog - odds = 610$,$SE = .267$, $Wald = 5.236$, $p = .022$ and $orderedlog - odds = 858$,$SE = .269$, $Wald = 10.178$, $p = .001$, with the reference group "education higher than bachelor level") and "live pop-up chats" (model effects: $Wald = 10.012$, $df = 2$, $p = .007$; $orderedlog - odds = .809$, $SE = .277$, $Wald = 8.528$, $p = .003$ on the level of bachelor degree, reference group "education higher than bachelor level"). That means the participants with a level of education higher than a bachelor's degree perceived the influence of "live pop-up chats" and "countdown timers" as significantly lower compared to people with lower education levels.

We did not find any significant effect of gender and education level on the perceived influence of the other e-shopping cues.

4.4 Effect of neuroticism to the perceived influence of e-shopping cues - RQ2

To investigate the relationship between the level of neuroticism and the perceived influence of shopping cues on customers' decisions, we conducted a correlation analysis (2-tailed Pearson correlations with BCa bootstrap CI) on these two variables. We found a significant positive correlation between the neuroticism level and "refund policies" cue ($r(399) = .116$, $p = .02$, bootstrapped CI (10^4) .029, .213), as well as with "discount" cues ($r(399) = .103$, $p = 0.39$, bootstrapped CI (10^4) .003, .197). This means that people with higher levels of neuroticism think they might be more influenced into buying by discount cues and explicit refund policies than participants with a lower level of neuroticism.

5 DISCUSSION

Shopping cues are a classical way to influence users' buying behavior. During the last decades, e-shopping became a developed practice of channeling persuasion via website design, specifically via e-shopping cues. While previous studies discussed some website elements related to extreme shopping behavior, including forms of shopping addiction, it is necessary to understand the current baseline of the influence on general users buying decisions.

Our results show two distinct groups of e-shopping cues regarding their perceived influence on buying behavior. Most of the e-shopping cues that include advertising and promotion initiatives are perceived as less influential than cues with information about product features (physical proximity-theme cues [31]). These results align with the user's appreciation of e-shopping site elements, which helps to overcome the lack of physicality and proximity in e-shopping interaction [18].

From the social influence-themed cues, the "ratings and reviews" cue was perceived as influential, while the "sales indicators" cue was perceived as less influential. A possible reason may be the potential manipulativeness behind urgency and scarcity cues [29]. People may perceive these cues as deceptive and therefore decide

not to consider them in their decision-making. Previous studies showed that users perceive certain discounts as "fake" [56]. In our study, we still found that people consider discount-related cues influential in their buying decisions.

We did not find any significant connection between the age of our participants and the perceived influence of shopping cues. However, we should stress that our sample had a significant bias toward young people, so we cannot make strong claims about general age effects, which might manifest in groups of older users.

We did not find a statistically significant effect of gender on the perceived influence of most of the tested e-shopping cues either. The results are in line with the findings [27], which pointed out that for experienced online shoppers, age, education, and gender, in general, do not affect behavioral outcomes. We found some statistical evidence that educational level can impact how users are influenced by "live pop-up chats" and "limited offer countdown timers". For both cues, people holding a degree higher than a bachelor's rated the perceived influence of these cues lower than people with lower degrees. At the same time, we did not find statistically significant differences regarding the educational level for the other shopping cues. We found a significant effect of gender on the perceived influence of "live pop-up chats" and "stock quantity markers" with these being less influential to women. While previous research showed that the presence of physical proximity cues is more important for female participants [15, 28], our results show that "live pop-up chats" and "stock quantity markers" are more influential to male users.

We also saw that "discount" and "refund-policy" cues were perceived as more influential by people with higher neuroticism levels. However, contrary to a previous study [11], we did not find significant evidence that people with higher neuroticism levels perceive scarcity/urgency cues as more influential. Considering that the persuasive scarcity strategy has been found effective for people with higher neuroticism levels [5, 53, 54], we conclude that even if these people are more affected by the scarcity-based persuasion, they do not consider these e-shopping cues as more influential on their buying decision than people with lower neuroticism levels. A possible explanation for this finding is that higher neuroticism levels are also associated with risk-aversion [35]. As shown by Ali et al. [4], there is a connection between people's neuroticism level and their tendency to take lower shopping risks, which is reflected in the higher influence of "refund policy" and "discount" elements on these people because they presumably lower the subjective cost of shopping mistakes and thus reduce the risk associated with the buying decision.

Our findings show that personality traits like neuroticism can predict people's perception of e-shopping cues. To summarize, the different cues used to expedite users' shopping decisions are perceived to have different levels of influence potential. Scarcity cues and cues regarding availability and promotions were perceived as less influential on shopping decisions, and product information-related cues are considered more influential. Demographics seem of little relevance to the studied phenomena. We only found that people with an educational level higher than a Bachelor's degree perceive "limited offer countdown timers" and "live pop-up chats" as less influential than people with lower education levels. Two of the explored shopping e-cues ("live pop-up chats" and "stock quantity markers") have significant connections with users' gender, and in both cases, women rated the perceived influence of these e-cues lower than men. Finally, our exploration of the role of neuroticism showed a potential influence of "discount" cues and "refund policies" on the buying behavior of people with higher neuroticism levels.

Our data sheds light on what consumers perceive as influential e-shopping cues. Further research should examine instances where users believe certain cues do not affect their decisions, yet the data indicates increased sales when these cues are present. This discrepancy could signal a covert manipulative effect of the cue.

6 DESIGN RECOMMENDATIONS

As we mentioned, the discussed shopping cues are commonly found on e-commerce websites, so users are not surprised to see them when they visit such sites. However, our study results suggest specific design recommendations that consider users' mental models and prioritize elements important to their decision-making process while shopping online.

Emphasize product information and provide better proximity cues: Since cues related to product features were perceived as more influential, we suggest focusing on providing detailed and accurate information about the products. We also stress the role of the quality of the supporting photo and video materials and suggest going beyond the 2D presentation of the product and using the opportunities for 3D presentation of the product, as it was shown to enhance consumers' attitudes, knowledge, and purchase intentions [3].

Facilitate ratings and reviews process: Users found the cue of "ratings and reviews" to be highly influential, highlighting the significance of this form of social proof. This emphasizes the need to identify customers and facilitate the exchange of their opinions about the product directly on the website. Additionally, we recommend prominently featuring information about highly-rated and positively discussed products on the main page of the shopping site to ensure the visibility of social presence on the site.

Avoid extensive scarcity cues: A number of studies have shown that users often view scarcity cues in online shopping as manipulative [39, 56]. This negative perception extends beyond just shopping sites and applies to broader online advertising that uses scarcity [43]. Previous research has also highlighted the significance of adequately justifying scarcity beyond the cue itself [33]. Combining these results with our findings of the relatively low perceived influence of scarcity cues, we suggest minimizing the use of scarcity cues on e-commerce sites, using them only for special events like "spring sales". It is also important to clearly explain to customers why an offer is time-sensitive or has limited stock, and to provide honest information about future product availability.

Consider customization options: Based on our findings, we suggest allowing users to customize their shopping experience by giving them control over the cues they find influential. It can lead to providing options to enable/disable specific elements (e.g., scarcity countdown timers) or personalize their shopping interface according to their preferences. This can reduce visual clutter and enhance the user experience.

7 LIMITATIONS AND FUTURE STUDIES

The main limitation of the study is the exploratory character of the findings and the possible effect of multiple comparisons problem. It is necessary to take future steps to make confirmatory verification of the results [23]. Still, our data can be useful for generating hypotheses about users' perceptions of e-shopping cues. Another limitation of the study is the sample characteristics. While we had balanced data in terms of gender, the data were not balanced by age. This could bias our results toward representing the view of a rather young population. We plan to address the role of age in the perception of the influence of shopping cues in our following studies. The data of this study is self-reported. Self-reported data can be biased toward social desirability. An exciting direction for future studies can be exploring the gap between reported influence and the effects of cue presence on sales results. Finally, using the terms "high-quality zoomable images" and "detailed descriptions" in cue descriptions could have potentially biased participants to rate these cues more favorably because of the positive wording. While literature supports that product image and description play an important role in shopping decision-making [20, 32], we decided to reformulate the cue definition in our following studies (e.g., "high-resolution" instead of "high-quality" image).

8 CONCLUSIONS

In the current study, we provide insights into users' perceptions of different e-shopping cues. We found that e-shoppers clearly distinguish between groups of more and less influential shopping cues and that this view of shopping cues is consistent across different gender groups. We found that variables of gender and education level significantly connect to some e-shopping cues, namely "live pop-up chats", "stock quantity markers" and "limited offer countdown timers". We also found a positive effect of neuroticism on the perceived influence of shopping cues that presumably lower the risks of online shopping. Our results set a useful basis for follow-up studies that seek to examine the role of e-shopping cues in users' perception and decision-making in online shopping, including the relations between the perceived influence of the cue and its actual effectiveness in driving sales. Based on our findings, we have formulated a set of suggestions aimed at improving the user experience on e-commerce websites. These recommendations focus on aligning the design with users' expectations and enhancing transparency to create more user-centered e-shopping platforms.

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