



Autonomous technology in the marketplace: The impact of enjoyment on consumer responses[☆]

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ABSTRACT

The implementation of AI technologies in smart retailing raises privacy concerns due to their reliance on consumer data. This study examines how technology enjoyment influences consumers' willingness to share personal information and investigates the role of perceived autonomy of technology and psychological needs in shaping enjoyment. Through a survey and two single-factor experiments ($n = 809$) manipulating different smart retailing technologies (e.g., interactive kiosks, mobile apps, and robots), we confirm that technology enjoyment increases consumers' willingness to disclose personal data. Risk perceptions and perceived technology autonomy help explain these findings. Moreover, perceived competence associated with the use of technology positively influences how much consumers enjoy the experience. Our research underscores the pivotal role of enjoyment in mitigating risk perceptions and driving self-disclosure behavior in physical retail settings. We emphasize the importance for marketers and policymakers to recognize the potential unintended consequences of enjoyable technological experiences on consumer privacy. By focusing on enjoyment's buffering effect on risk perceptions and its correlation with technology autonomy, we enhance our understanding of consumer behavior in smart retail environments.

1. Introduction

The dynamic evolution of physical retail requires a reassessment of personalization strategies to align with existing market needs and contemporary customer demands (Scholdra et al., 2023). In this context, artificial intelligence (AI) can bring multiple benefits, such as automating repetitive marketing tasks, improving convenience, personalizing, and enhancing the consumption experience (Guha et al., 2023; Huang & Rust, 2021; Puntoni & Wertenbroch, 2024). Recent research involving marketing managers reveals a significant trend, with 80 % of companies planning to augment investments in AI over the next two years (McKinsey & Company, 2024), with around 55 % of companies listing enabling personalization of customer interactions as a key driver for these investments (Everest Group, 2024). Smart retailing solutions have gained prominence in this narrative, with companies adopting

diverse technological approaches (Dutta et al., 2023; Grewal et al., 2023). The use of autonomous technologies within retail spaces has surged globally, experiencing a remarkable 483 % increase over the past three years. Concurrently, the market for AI in retail shows consistent growth projections, poised to reach an estimated value of 31.2 billion U. S. dollars by 2028 (Statista, 2024).

While AI promises to enhance the consumption journey by improving decisions efficiency and personalizing experiences, it also presents risks such as limiting consumer choices and experiences (Valenzuela et al., 2024) or raising privacy concerns, as AI-based technologies usually require some level of consumer data (Kopalle et al., 2022; Song et al., 2022). The act of sharing personal information with companies or third parties is commonly referred to as self-disclosure (Okasaki et al., 2020). From a brand's perspective, consumers' willingness to disclose (WTD) their personal information is a beneficial

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phenomenon, because such insights allow the company to improve its products, services, and strategies (Tan et al., 2024b). Nonetheless, consumer reactions to innovation are influenced by privacy expectancies (Margulis et al., 2020), and self-disclosure can pose risks for consumers who share personal data with third parties (Kopalle et al., 2022).

Among the psychological and relational variables that influence self-disclosure are the feelings of enjoyment provided by the experience (Ho et al., 2018). Enjoyment is the perception of how pleasurable an experience is (Zhang et al., 2023), regardless of its performance (Kim et al., 2007). Our interest is in the enjoyment that consumers perceive when interacting with technology in the marketplace and how this sentiment shapes their subsequent responses, particularly their willingness to share personal data.

In technological contexts, individuals may perceive differences in control and autonomy, thereby associating potential risks with such technologies (Sohn, 2024; Valenzuela et al., 2024). Usually, people seek control since it helps them see the world as organized and predictable (Sankaran et al., 2023). A technology perceived as more autonomous and capable of making decisions on its own could also be seen as less predictable. If technology does not help consumers satisfy their psychological needs for competence, autonomy, or relationship with others, it could also be associated with reduced enjoyment perceptions (An & Han, 2020; Tsai et al., 2021).

Previous research has suggested that feelings of enjoyment positively influence consumer behavior in several ways, such as fostering purchase intentions and the adoption of new technologies (Holdack et al., 2022; Mkedder et al., 2024). In online retailing, interactions with recommendation agents in e-commerce often trigger impulse purchases (Saad & Choura, 2023), while the enjoyment derived from immersive virtual reality experiences influences consumer attitudes and satisfaction (Dieck et al., 2023; Xi et al., 2024). Additionally, enjoyment has the potential to mitigate the negative effects of the risks associated with technology (Chidambaram et al., 2024; Mkedder et al., 2024). It may even prompt individuals to overlook privacy concerns (Church et al., 2017) due to the perceived immersive nature of joyful experiences, thereby reducing risk perceptions and increasing the propensity to share personal data.

Considering that reduced privacy and risk concerns have the potential to increase consumer vulnerabilities, it becomes imperative for companies, consumers, and policymakers to gain a better understanding of the potential drawbacks of smart retailing technologies (Canhoto et al., 2024). However, existing research predominantly focuses on the impact of feelings of enjoyment on self-disclosure in contexts such as video games or gamified apps (Trang & Weiger, 2021). Beyond the online environment, studies that consider the relationship among technology enjoyment, risk perceptions, and self-disclosure within retailing settings are still scarce (Scholdra et al., 2023). Therefore, this research has two main goals: to analyze the impact that enjoyment has on the willingness to disclose personal data and to further understand how perceptions of technology autonomy and the satisfaction of consumers' psychological needs influence feelings of enjoyment.

Drawing from previous literature across disciplines such as retailing, psychology, gaming, and human-computer interactions, we anticipate that the feelings of enjoyment evoked through technology interaction will increase individuals' intentions to share personal information. Furthermore, we posit that within smart retailing contexts, the availability of less autonomous technologies will help consumers fulfillment of psychological needs for competence, autonomy, and relatedness, thereby further enhancing perceptions of enjoyment.

Our contributions to the literature are twofold: firstly, we aim to deepen the understanding of enjoyment in the consumption journey involving technology in brick-and-mortar retail settings (Dieck et al., 2023; Holdack et al., 2022). This research sheds light on enjoyment as a significant driver of self-disclosure behavior, while also exploring the satisfaction of psychological needs as antecedents of enjoyment (Reer

et al., 2022). Secondly, our study contributes to the comprehension of how smart retailing tools shape perceptions of technology autonomy and subsequently impact the perceived value of the customer experience (Benoit et al., 2024; Valenzuela et al., 2024).

2. Theoretical background and hypotheses

2.1. Self-disclosure

Self-disclosure refers to the communication of personal thoughts, feelings, and information to others (Walsh et al., 2020). Individuals may disclose personal information in face-to-face interactions or through technology (Tan et al., 2024b). AI technologies, for instance, often collect, store and process large amounts of personal data disclosed by users. While self-disclosure can improve user experiences by enabling personalization based on shared information, it also raises concerns related to security, ethics and privacy, which must be considered from a consumer-level perspective (Kopalle et al., 2022; Okasaki et al., 2020).

When interacting with AI-based technologies, factors such as anthropomorphism can enhance cognition-based and affect-based trustworthiness, making individuals more likely to trust the technology and, consequently, engage in self-disclosure behaviors (Saffarizadeh et al., 2024). Similarly, reduced privacy concerns can encourage the sharing of personal information (Aiello et al., 2020; Chou et al., 2025).

Individuals establish personal rules and boundaries regarding self-disclosure to balance privacy with perceived benefits, such as social connections (Beke et al., 2022). Key factors that motivate self-disclosure include outcome expectancy (Al-Natour et al., 2021), experience personalization (Xu et al., 2011), and feelings of enjoyment (Zhang et al., 2023).

2.2. Enjoyment

The pleasure associated with a given task is related to the desire to carry out this activity and the engagement involved in the process (Warner, 1980). Enjoyment is an affective response and an intrinsic benefit that may be linked to an activity or technology (Kim et al., 2007). New technologies adopted by consumers can be associated with fun and enjoyment due to their ability to entertain and interact with users, which in turn fosters the development of a positive emotional human-machine relationship and increases perceptions of usefulness (Schultz & Kumar, 2024; Xi et al., 2024). Activities that provide fun and enjoyment are more likely to be immersive and create cognitive absorption, defined as the concentration of one's entire affective, cognitive, and physical resources on the task at hand (Trang & Weiger, 2021). This cognitive absorption is a situation-specific state emerging from a particular combination of personal, technological, and situational factors, in which an individual is fully engaged in interacting with an information system (Agarwal & Karahanna, 2000).

When interacting with technologies, the cognitive absorption elicited by enjoyment can result in positive behaviors, such as a higher propensity to adopt new platforms (Chidambaram et al., 2024; Xi et al., 2024), increased customer satisfaction (Mkedder et al., 2024), greater propensity to make recommendations (Tan, Ren, et al., 2024), and stronger intentions to continue using the technology (Huang et al., 2024). In addition to these positive effects, users also may experience increased resource depletion through cognitive absorption, which could influence the extent of personal information shared with third parties. For example, the degree to which consumers enjoy interacting with AI-based technology can positively influence their willingness to self-disclose information (Ho et al., 2018) or their likelihood of sharing personal information on social media platforms (Trang & Weiger, 2021).

The decision to engage in self-disclosure involves evaluating the perceived costs and benefits of a specific situation (Hayes et al., 2021; Yan et al., 2024). Among the benefits, the emotional aspects of the consumption experience are known to influence perceptions of product

quality, purchase intentions, and willingness to pay. When consumers perceive that technology provides a more hedonic experience, they associate greater value with it, which increases their confidence in purchasing from the company (Chang & Chen, 2021), disclosing personal information on social media (Zhang et al., 2023), or sharing data with the technology provider (Pizzi & Scarpi, 2020). Based on this rationale, we propose that in a retail setting, the fun and entertainment offered by in-store technology could be perceived as an emotional benefit. This perception would associate the technology with a more immersive and enjoyable experience, thereby increasing the willingness to share personal data. Hence, we suggest the first hypothesis:

H1. The perceived enjoyment of interacting with technology will influence consumers' willingness to disclose personal data.

2.3. Risk perception

The "privacy calculus" that a consumer performs when evaluating the possibility of sharing information with third parties involves analyzing the expected benefits *versus* the costs of sharing information (Canhoto et al., 2024; Hayes et al., 2021). The higher the perceived benefits, the more likely someone is to adopt a self-disclosure behavior. In this sense, while enjoyment could be considered a benefit, the perception of risk may represent a potential cost. Interacting with emerging technologies such as AI can shape individuals' perceptions of security and privacy risks (Blut et al., 2024). The perceived risk could be related to the improper treatment of consumer information, while the benefits might include a more personalized experience (Xu et al., 2011). Perceptions of risk tend to result in less favorable attitudes toward a company, triggering negative emotions and reducing both the willingness to adopt new technologies and the likelihood of sharing personal data (Blut et al., 2024; Song et al., 2022).

Privacy risks and trust are well-established antecedents of self-disclosure behaviors when interacting with technology (Yan et al., 2024). However, further clarity is needed regarding the impact of enjoyment on consumer behavior in retail contexts. Previous research, primarily focused on online experiences, suggests that perceptions of hedonic value can enhance positive attitudes towards technologies such as augmented reality (Schultz & Kumar, 2024). Moreover, technology-related enjoyment can foster perceptions of trust (Mkedder et al., 2024), ease of use (Tan, Ren, et al., 2024), and reduce risk perceptions, which in turn influence consumer behavioral responses, including technology adoption and peer recommendation (Chidambaram et al., 2024).

Literature on gaming has shown that the cognitive absorption and involvement resulting from a joyful game experience may influence the propensity to share personal data within the game by diminishing risk perceptions (Trang & Weiger, 2021). We anticipate observing a similar effect in retailing situations. Specifically, we expected that perceived enjoyment related to technology will reduce the perceived risks associated with technology by absorbing and depleting cognitive resources, thereby increasing consumers' willingness to share information. Therefore, we propose the following:

H2. Risk perceptions mediate the relationship between perceived enjoyment and consumers' willingness to disclose personal data.

2.4. Consumer psychological needs

When individuals perceive their efforts as crucial for completing a task, they tend to identify with the goal and experience a sense of meaning and self-determination (Nikolova et al., 2024). Self-determination theory posits that the satisfaction of innate psychological needs for autonomy, competence, and relatedness is key to understanding human motivation (Deci & Ryan, 2000).

Task-related autonomy refers to the perception that individuals can control and regulate their behavior, fostering an internal locus of

causality, which is essential for intrinsic motivation. Competence relates to the sense of challenge and effectiveness, while relatedness refers to the need to connect with others (Deci & Ryan, 1985; Tamborini et al., 2010). These needs can be viewed from an evolutionary perspective, where maintaining control over a situation, managing it safely, and being affiliated with a group could represent one's survival (Griskevicius & Kenrick, 2013). These psychological needs not only influence cognition and behavior but also impact overall human well-being (An & Han, 2020; Tobon et al., 2020).

Advanced technologies can address these basic psychological needs (Zhang et al., 2024), which have been recognized as antecedents of consumer engagement and value creation (An & Han, 2020; Roy et al., 2023). In omnichannel contexts, the satisfaction of psychological needs through personalization, interactivity, and convenience can enhance intentions of re-patronage (Zheng & Li, 2024). Furthermore, the fulfillment of these needs can evoke feelings of enjoyment (Deci & Ryan, 2000; Jang et al., 2018). This effect has been empirically demonstrated across various domains, including media enjoyment (Tamborini et al., 2010), gaming (Than et al., 2014), and mobile applications (Roy et al., 2023; Tsai et al., 2021). For instance, virtual reality games have been shown to enhance user experience, leading to higher levels of interest, fun, and perceived enjoyment (Reer et al., 2022).

Based on this rationale, we propose that the satisfaction of psychological needs will drive enjoyment when consumers interact with technology in a retail setting. Therefore:

H3. Perceived autonomy (a), competence (b), and relatedness (c) are drivers of enjoyment associated with technology.

2.5. Technology autonomy

Technology is becoming increasingly autonomous, and in some cases, it is even capable of making decisions on behalf of consumers. While such advancements can enhance the consumption journey by reducing the time and effort consumers need to decide, they may also reduce consumers' sense of control over their own choices (Bellis & Johar, 2020), thereby increasing resistance to technology (Acikgoz et al., 2023; Puntoni et al., 2021).

Individual autonomy, defined as the consumer's ability to make independent decisions free from external influence, is a crucial aspect of consumer choice (Botti et al., 2009; Wertenbroch et al., 2022). In a human-computer interaction, we can infer that a more autonomous technology will result in lower human autonomy. In this sense, the autonomy attributed to technology emerges as a key ethical consideration in the development and deployment of AI technologies (Hermann et al., 2023) and in evaluating consumers' perceptions of new technologies in retailing (Du & Xie, 2021). Feeling in control of a situation enhances the internal locus of attribution; thus, activities that reduce this perception may threaten this basic psychological need (Deci & Ryan, 2000). Moreover, a heightened sense of control is associated with psychological ownership, which correlates with more positive consumer attitudes (Atasoy & Morewedge, 2018). In this sense, artificial intelligence could potentially undermine individuals' sense of autonomy and control over their consumption experiences (Guha et al., 2023), not only because technology may be responsible for part of the decisions but also because it involves managing data that consumers do not directly handle (Jorling et al., 2019; Puntoni et al., 2021). Store features that enhance convenience and increase perceptions of technology autonomy can undermine safety perceptions (Benoit et al., 2024), often leading to lower intentions to adopt such innovations (Sohn, 2024).

Technologies available in smart retail environments, such as recommendation agents or robots, may be perceived as more autonomous than those requiring active consumer involvement, like mobile payment systems or touch screens (Steinhoff & Martin, 2023). AI-based technologies and robots, which possess higher levels of autonomy, can decrease perceived consumer agency (Jorling et al., 2019) and lead to

other negative outcomes, such as increased uncertainty (Rohden & Espartel, 2024). Moreover, these technologies may heighten the attribution of responsibility for outcomes to the technology itself, especially when consumer expectations are not met (Lucia-Palacios & Pérez-López, 2021). Given that the robotization of consumer experiences can negatively impact self-determination (Nikolova et al., 2024), we posit that more autonomous technologies will undermine consumers' satisfaction with their innate psychological needs. Thus:

H4. Technology autonomy has a negative impact on the satisfaction of perceived personal autonomy (a), competence (b), and relatedness (c).

Our conceptual model proposes that technology-related enjoyment in retailing contexts positively impacts consumers' willingness to disclose personal information, with the underlying mechanism being reduced risk perception, as supported by privacy theory (Hayes et al., 2021). Additionally, we draw on self-determination theory to understand the antecedents of enjoyment elicited by these new technologies (Deci & Ryan, 2000). Interacting with more autonomous technologies (e.g., robots) negatively affects consumers' sense of relatedness, competence, and perceptions of agency over the process, while the fulfillment of these psychological needs enhances feelings of enjoyment. Although more autonomous technologies can potentially facilitate the consumer journey, they may also be perceived as barriers to the adoption of new technology due to a reduced sense of behavioral control over choices and processes (Bellis & Johar, 2020; Jorling et al., 2019). Given that diminished control represents a cost experienced by consumers when interacting with technology, this perception may foster resistance toward autonomous systems (Puntoni et al., 2021). The conceptual model (Fig. 1) summarizes these hypothesized relationships.

2.6. Overview of studies

We collected and analyzed data using correlational and experimental methods to empirically test our hypotheses. Study 1 consisted of a survey that verified the main effects of enjoyment on willingness to disclose personal data (H1) and the mediating role of perceived risks (H2). Study 2 involved an experiment focused on assessing psychological needs as antecedents of enjoyment (H3) and manipulating technology autonomy to assess its impact on psychological needs satisfaction (H4). In Study 3, we conducted another experiment to confirm H1, H2, and H3 in a different context, considering consumer interactions with diverse technologies. Table 1 summarizes the purposes of the studies and indicates that we considered samples with diverse demographic characteristics in terms of age and gender (e.g., ages ranging from 19 to 81 years old). Detailed descriptions of the scenarios and the scales used in each study are available in the Appendices. All analyses were conducted using R, and the code is available upon request.

3. Study 1: the impact of enjoyment on willingness to disclosure

The goal of Study 1 was to examine the impact of enjoyment perception during technology usage in physical retail on the willingness to disclose personal data. Additionally, we aimed to test the mediating role of perceived risks. Information sensitivity, previous experiences of privacy violations, and familiarity with the technology (AI) were explored as control variables.

3.1. Participants and procedure

We recruited 251 respondents from a poll of potential participants who had already subscribed to the online platform Prolific (74 % female, $M_{age} = 41$ years old, $SD_{age} = 14.09$). Using the platform's recruitment tool, we selected participants based on their location (UK) and language (English). Through Prolific, participants received a link to an online questionnaire hosted on Qualtrics. After reading and agreeing to the informed consent, participants were shown an image and a brief description illustrating the use of facial recognition technology in a physical retail setting. Based on this description, they assessed their perceived enjoyment of using such technology (12 items adapted from Lin et al., 2008, $\alpha = .98$), their willingness to disclose personal data (three items adapted from Wang et al., 2017, $\alpha = .91$), and their perception of risk (three items adapted from Xu et al., 2011; Hayes et al., 2021, $\alpha = .88$).

Additionally, we incorporated control measures, including perceptions of the sensitivity of different personal data (nine different data types, adapted from Schomakers et al., 2019), past experiences of privacy violations (three items, also adapted from Schomakers et al., 2019, $\alpha = .74$), familiarity with AI (three items adapted from Chi et al., 2021, $\alpha = .91$), and demographic information. All questions were measured using a 7-point Likert scale. Upon completing the questionnaire, participants received a code which they submitted via the Prolific website to obtain their financial incentive for participating. The incentive followed standard practices in experimental research (averaging € 9.00/hour). Scenarios and scales are available in the Appendices.

3.2. Results and discussion

The reported results exclude univariate outliers, considering the time taken by respondents to complete the questionnaire. We identified univariate outliers using boxplots, with deviations exceeding two standard deviations from the mean considered outliers. We tested the main hypotheses both with and without these outliers, and there was no impact on the results. Since all survey responses were mandatory, there were no missing values. Tests of the assumption of normality of the residuals of the model did not indicate any violations (the same procedure was applied across all three studies). The Kolmogorov-Smirnov test was used, along with visual inspection using Q-Q plots and histograms of the residuals. Research has demonstrated the robustness of linear models to

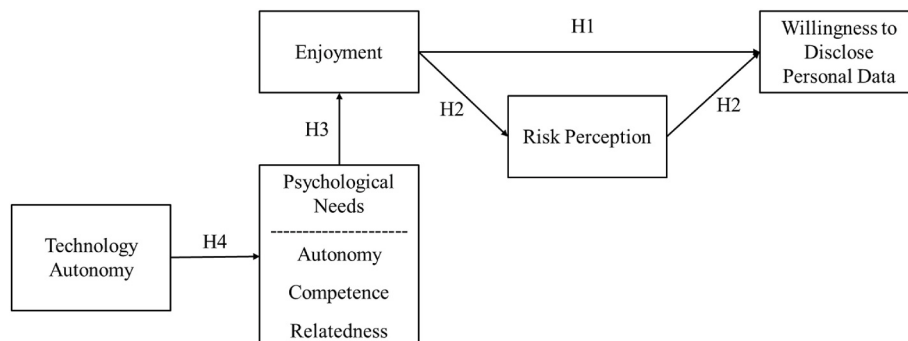


Fig. 1. Conceptual model.

Table 1
Summary of studies.

	Study 1	Study 2	Study 3
Purpose	To identify the main effect of enjoyment on willingness to disclose personal data and the mediating role of perceived risks	To assess the impact of technology autonomy and psychological needs satisfaction as drivers of enjoyment	To enhance the generalizability of our findings by changing context and technologies
Participants (n)	251 European participants from an online panel	111 students from a European university (<i>pretest</i>) 218 European participants from an online panel	229 European participants from an online panel
Age (years)	M = 41; SD = 14.09	M = 20; SD = 2.20 (<i>pretest</i>) M = 42; SD = 13.52	M = 46; SD = 13.37
Gender	74 % female	59 % female (<i>pretest</i>) 49 % female	50 % female
Design	Survey	Single factor experiment	Single factor experiment
Context/ Technology	Smart mirror in clothing retail	Interactive kiosk vs. robot in clothing retail	Mobile app vs. robot in wine retail
Support to hypotheses	H1 and H2	H1, H2, H3, and partially to H4	H1, H2, and H3

violations of distribution assumptions (e.g., Knief & Forstmeier, 2021). Table 2 presents descriptive statistics for all variables included in the mediation model, along with correlations with the main constructs of the study.

To test the main effect of perceived enjoyment on willingness to disclose personal data and the mediation of risk perceptions, we ran the analysis in R using the package mediation (version 4.5.0), employing a 95 % confidence interval (CI) and 10,000 bootstrapped samples. The results (Table 3) confirmed the direct effect of enjoyment (ENJOY) on willingness to disclose (WTD), thereby supporting H1. Additionally, the mediation analysis of perceived risks (RISKS) in the relationship between ENJOY and WTD provided support for H2.

We further investigated potential alternative explanations by adding all sensitivity measures, previous experience with data violation, and familiarity with the technology as covariates in the proposed mediation model. As before, we ran the mediation analysis in R, using the package mediation (version 4.5.0) with a 95 % CI and 10,000 bootstrapped samples. Additionally, we included gender and age as control variables. The indirect effect remained significant ($b = .03$, $CI_{95} = .004, .08$, $p = .04$). None of the covariates were significant in the total model. In path “a”, where perceived risk served as the dependent variable, two covariates emerged as significant: sensitivity to face data ($b = .25$, $p = .004$) and previous experience with violation ($b = .17$, $p = .009$). However, perceived enjoyment remained significant ($b = -.15$, $p = .02$). Additional investigations on alternative explanations are provided in the supplementary material of this paper.

These results raised concern by indicating that enjoyment could make consumers more willing to share personal information, aligning with existing privacy literature in marketing (Ho et al., 2018; Zhang et al., 2023). The results also confirmed that individuals who are

entertained tend to perceive fewer risks associated with sharing personal data. This suggests that when individuals perceive an activity as joyful, their perceptions of associated risks diminish, potentially compromising data privacy. However, the study does not provided explanations regarding what makes technology more enjoyable. Study 2 sought to address this gap by investigating variances in perceptions of different technologies and further elucidating the factors that contribute to joy in human-machine interactions.

4. Study 2: investigating the antecedents of perceived enjoyment

The goal of Study 1 was to explore the impact of enjoyment perception on the willingness to disclose personal data, along with examining the mediating role of perceived risks. In contrast, study 2 aimed to deepen our understanding of how different technologies are linked to enjoyment, particularly focusing on analyzing potential drivers within a smart retailing context. To accomplish this, we employed a between-subjects single-factor experimental design, where we manipulated two technologies based on their autonomy levels.

4.1. Pretest

We recruited 111 students from a European university (59 % female, Mage = 20 years old, SD = 2.20), who volunteered to participate in exchange for course credit. In class, students were provided with a QR code linked to the online questionnaire hosted on Qualtrics. After reading and accepting the informed consent, participants were randomly assigned to one of the conditions, with blocked randomization used to ensure balanced and equivalent groups. The pretest followed a single factor, between-subjects design.

The autonomy of the technology was manipulated through two different scenarios. In one scenario, participants were shown an image of an interactive screen, also known as a store kiosk, which allows consumers to access information about the store and its products via a touchscreen device. In the other scenario, participants viewed an image of a robot designed to assist consumers in accessing information about the store and its products.

Following the assignment to one of the two conditions (robot or kiosk), participants assessed their perceived enjoyment of the experience (Venkatesh & Bala, 2008). The scale used in study 2 corresponds to a subset of the scale employed in study 1, chosen to keep the questionnaire short ($\alpha = .71$). Respondents were also asked about their frequency of technology use as a control variable (“How frequently do you use the described technology when purchasing goods or using services?”, with response options ranging from “Never” to “Very often”). To verify the effectiveness of manipulation, a single-item measure assessing the perceived level of technology’s autonomy was included as a manipulation check (“Do you believe this is a technology that”, ranging

Table 2
Descriptive statistics and correlations – Study 1.

Variables	Mean	SD	1	2	3
1. WTD	2.99	1.50			
2. ENJOY	3.53	1.47	.68***		
3. RISKS	4.98	1.37	-.38***	-.28***	
Control variables					
Violation	3.59	1.50	-.14*	-.13*	.21***
Familiarity	3.48	1.54	.13*	.13*	-.03
Sensitivity to age	2.29	1.58	-.09	-.12*	.15*
Sensitivity to behavior	3.17	1.85	-.13*	-.18**	.20**
Sensitivity to gaze	3.08	1.78	-.17**	-.25***	.20**
Sensitivity to ethnicity	2.53	1.76	-.17**	-.16*	.19**
Sensitivity to face	3.90	2.00	-.30***	-.27***	.35***
Sensitivity to gender	2.39	1.70	-.15*	-.16*	.15*
Sensitivity to mood	3.36	1.91	-.24***	-.29***	.30***
Sensitivity to pictures	4.18	1.99	-.22***	-.21***	.27***
Sensitivity to reactions	3.72	1.93	-.22***	-.25***	.27***

Note: Significance codes: ‘***’ .001; ‘**’ .01; ‘*’ .05.

Table 3

Results of main effect and mediation analysis – Study 1.

Type	Effect	Coeff.	Se	LLCI	ULCI	Std Coeff	t (249)	p-value
Indirect (c-c')	ENJOY -> RISKS -> WTD	.06	.02	.02 ^a	.11 ^a	.06	2.36 ^b	<.001***
Component (path a)	ENJOY -> RISKS	-.26	.06	-.37	-.15	-.28	-4.55	<.001***
Component (path b)	RISKS -> WTD ^c	-.22	.05	-.32	-.12	-.21	-4.44 ^d	<.001***
Direct (path c')	ENJOY -> WTD	.63	.05	.54	.73	.63	13.47 ^d	<.001***
Total (path c)	ENJOY -> WTD	.69	.05	.60	.78	.68	14.75	<.001***

Note: Significance codes: '***' .001; '**' .01; '*' .05.

Results hold whether the mean-centered variables are used or not. Reported results are not centered.

Sobel Test available at [Quantpsy.org](https://quantpsy.org). Test statistic = 3.09, se = .02, p = .002.^a 95 % confidence intervals with bias corrected bootstrap (n = 10,000) on R package mediation.^b Estimated by the authors (coeff/se).^c Controlled by ENJOY.^d t (248).

from “Requires user involvement in the task” to “Performs the task autonomously without user involvement”). All questions were measured using a 7-point Likert scale. Furthermore, participants were prompted to provide a written explanation of their answers to the perceived enjoyment scale. This open question aimed to gain a deeper understanding of respondents' perceptions regarding the different technologies and the levels of enjoyment elicited. Scenarios and scales are in the Appendices.

The manipulation yielded significant differences ($t(108) = -8.32$, $p < .001$), with respondents perceiving the kiosk scenario as less autonomous ($M = 2.32$, $SD = 1.86$) compared to the robot scenario ($M = 5.05$, $SD = 1.59$). Moreover, kiosks were associated with more enjoyment ($M = 6.03$, $SD = .91$) than robots ($M = 5.10$, $SD = .94$), with the difference being significant ($t(108) = 5.28$, $p < .001$).

To gain further insights about variances in enjoyment perceptions, we coded the open answers (Table 4). A noticeable trend emerged where the robot scenario was more frequently associated with negative aspects, while the interactive screen/kiosk was more frequently connected to positive elements. Respondents often expressed feelings of playfulness, power, and control, particularly concerning being able to interact physically with the kiosk technology. Conversely, perceptions of robots were characterized by notions of independence, increased autonomy, or diminished reliability. These findings suggested a potential negative correlation between the level of enjoyment and the perceived level of autonomy attributed to the technology.

Building upon the successful manipulation and considering insights from the pretest indicating that enjoyment perception is influenced by the perceived autonomy of the technology and the fulfillment of psychological needs (Reer et al., 2022; Than et al., 2014), we ran Study 2 with the same manipulation.

4.2. Participants and procedure

In a between-subjects single-factor experiment, we manipulated the type of technology involved in a shopping experience. The two scenarios

used in Study 2 were identical to those employed in the pretest, with the same text in both scenarios. The only alterations between scenarios were the terms used to define the technology (robot or kiosk) and the image (Pepper robot or a kiosk). Additionally, we ensured that the image of the robot depicted a context similar to that of the kiosk, featuring a woman interacting with technology in a clothing retail context.

We recruited 218 Prolific users (49 % female, $M_{age} = 41.89$, $SD = 13.52$) using the same screening criteria as in Study 1 (UK sample and English as a first language). Participants received a link to an online questionnaire, and after providing their consent to participate, they were randomly assigned to one of the conditions. Following the exposure to the manipulation, participants completed measures assessing willingness to disclose ($\alpha = .92$), perceived enjoyment ($\alpha = .93$), and perceived risks ($\alpha = .90$). The manipulation check, control of technology use frequency, and demographics remained consistent with the pretest.

In this study, we introduced the three hypothesized antecedents of enjoyment: personal autonomy ($\alpha = .86$), competence ($\alpha = .87$), and relatedness ($\alpha = .93$), each measured with three items adapted from Than et al. (2014) and Reer et al. (2022). All questions were measured using a 7-point Likert scale. Upon completing the questionnaire, participants received a code to claim their financial incentive, following a similar procedure to Study 1. Detailed scenarios and scales are provided in the Appendices.

4.3. Results and discussion

In Study 2, no outliers were identified and Harman's one-factor test confirmed acceptable levels of total extracted variance (44.5 %), raising no concerns regarding common method bias. Table 5 presents the descriptive statistics of all variables and the correlations between the main constructs of the study. All correlations were significant, and the strongest correlations were observed between perceived enjoyment (ENJOY) and its antecedents. Furthermore, willingness to disclose (WTD) exhibited strong correlations with perceived risks (RISKS) and perceived enjoyment. These correlations were also reflected in the stronger correlations of perceived risks.

Table 6 shows the manipulation check and the direct effects of the scenarios on each variable. The scenarios exhibited significant differences in the perceived autonomy of the technology, with the robot scenario registering significantly higher levels. Additionally, there was a significant difference in competence (an antecedent of enjoyment), consistent with our hypothesis. Specifically, the scenario with higher perceived autonomy of the technology (robot) had a lower mean in the satisfaction of competence ($r = -.18$, $p = .006$), thus supporting H4b. However, hypotheses H4a and H4c were not confirmed since there were no differences when we considered the impact of personal autonomy and perceived relatedness.

The willingness to disclose (the dependent variable) reported by respondents was different between scenarios. However, the mediators (enjoyment and risk perceptions) showed no significant univariate

Table 4

Text analysis.

Scenario	Kiosk	Robot	Example
<i>Negative reasons</i>	6.7 %	93.3 %	
Trust (lack of)	100 %	14.3 %	<i>I don't trust robots; they seem too independent for simple machines</i>
Employment issues		57.1 %	<i>Because it will replace a human that may need a job</i>
Relatedness		28.6 %	<i>[...] we lose that personal connection that we have when dealing with a human</i>
<i>Positive reasons</i>	60 %	40 %	
Competence	57.1 %	25.0 %	<i>It would facilitate the purchase procedure of a consumer!</i>
Innovation	14.3 %	67.9 %	<i>It represents the evolution of technology</i>
Personal autonomy	28.6 %	7.1 %	<i>Because even though it is a screen, by touching it, you feel, in some way, at power using it</i>

Table 5

Descriptive statistics and correlations – Study 2.

Variables	Mean	SD	1	2	3	4	5
1. WTD	3.00	1.46					
2. ENJOY	4.05	1.44	.53***				
3. RISKS	4.99	1.44	-.61***	-.29***			
4. Personal Autonomy	3.70	1.36	.50***	.75***	-.25***		
5. Competence	4.70	1.40	.41***	.73***	-.16*	.65***	
6. Relatedness	2.75	1.44	.48***	.60***	-.20**	.67***	.47***
Control Variable							
Frequency of use	2.39	1.58	.23***	.38***	-.14*	.33***	.33***

Note: Significance codes: '***' .001; '**' .01; '*' .05.

Table 6Means, standard d, and *t*-test results – Study 2.

Variable	Scenarios (Mean/SD)		<i>t</i>	p-value	Cohen's <i>d</i>
	Kiosk	Robot			
1. Technology's autonomy	2.00 (1.32)	2.90 (1.60)	-4.53	<.001***	.61
2. WTD	2.70 (1.33)	3.29 (1.52)	-3.03	.003**	.41
3. ENJOY	4.13 (1.42)	3.98 (1.46)	.79	.43	n.s.
4. RISKS	5.13 (1.44)	4.85(1.43)	1.43	.15	n.s.
5. Personal autonomy	3.73 (1.16)	3.67 (1.53)	.32	.75	n.s.
6. Competence	4.97 (1.19)	4.45 (1.54)	2.79	.005**	.38
7. Relatedness	2.61 (1.30)	2.88 (1.56)	-1.40	.16	n.s.

Note: Significance codes: '***' .001; '**' .01; '*' .05.

difference between the scenarios, nor did personal autonomy or relatedness. Furthermore, we explored the correlation between the two autonomies (technology and personal), which was found to be not significant ($r = .03$, $p = .61$), suggesting that respondents perceived these two constructs as distinct from each other.

Similar to Study 1, we ran the analysis in R using the package mediation (version 4.5.0) with 95 % CI and 10,000 bootstrapped samples. Table 7 shows the results of the mediation analysis, confirming the support provided by Study 1 for H1 and H2. These results offer further support to the positive direct effect of perceived enjoyment on willingness to disclose (H1) and to the mediation of perceived risks in this relationship (H2). Furthermore, we ran the mediation analysis adding frequency of use, gender, and age as control variables. Despite this, the indirect effect remained significant ($b = .14$, $CI95 = .05, .24$, $p = .0008$) and none of the covariates were significant.

After exploring the direct and univariate effects, finding evidence that partially supports H4, and the mediation analysis, providing further support to H1 and H2, we ran a linear model to test the validity of H3. Hypothesis 3 states that the satisfaction of each psychological need serves as an antecedent of the level of enjoyment. The results presented in Table 8 confirm this hypothesis. We also included in the model the

Table 7

Results of main effect and mediation analysis – Study 2.

Type	Effect	Coeff.	Se	LLCI	ULCI	Std Coeff	<i>t</i> (216)	p-value
Indirect (c-c')	ENJOY -> RISKS -> WTD	.15	.03	0.07 ^a	0.24 ^a	.15	5.00 ^b	<.001***
Component (path a)	ENJOY -> RISKS	-.29	.06	-.42	-.17	-.29	-4.54	<.001***
Component (path b)	RISKS -> WTD ^c	-.51	.05	-.61	-.41	-.50	-10.03 ^d	<.001***
Direct (path c')	ENJOY -> WTD	.38	.05	.28	.48	.38	7.59 ^d	<.001***
Total (path c)	ENJOY -> WTD	.53	.06	.42	.65	.53	9.13	<.001***

Note: Significance codes: '***' .001; '**' .01; '*' .05.

Results hold whether the mean-centered variables are used or not. Reported results are not centered.

Sobel Test available at [Quantpsy.org](https://www.quantpsy.org). Test statistic = 4.37, $se = .03$, $p < .001$.^a 95 % confidence intervals with bias corrected bootstrap ($n = 10,000$) on R package mediation.^b Estimated by the authors (coeff/se).^c Controlled by ENJOY.^d *t* (215).**Table 8**

Results of regression analysis with enjoyment as DV – Study 2.

Independent variables	Std. coef.	p-value
Technology (Robot = 1)	.03	n.s.
Competence	.41	***
Personal autonomy	.36	***
Relatedness	.13	*
Control variables		
Female	-.002	n.s.
Frequency of use	.09	*
Age	-.04	n.s.
Model statistics	Adj R ² = .68	
	F (7,209) = 66.07, $p < .001$	

Note: Significance codes: '***' .001; '**' .01; '*' .05.

variable perceived technology autonomy, which was found to be not significant, consistent with the findings presented in Table 6.

Among the psychological needs, competence emerged as the strongest antecedent of enjoyment perceptions, followed by personal autonomy. This indicated that technologies enhancing feelings of personal competence and autonomy offer customers a more enjoyable experience. The smaller impact of relatedness perceptions on enjoyment could be attributed to our scenarios not highlighting this variable. For instance, the robot lacks a human-like appearance, and the kiosk does not facilitate human interaction (e.g., via video chat). Consequently, the lower coefficient and mean in relatedness were not surprising. The only significant control variable was the frequency of use, which could increase technology knowledge and self-efficacy perception, thereby improving the experience and making it more enjoyable. However, the results showed a very low coefficient when compared to the satisfaction of psychological needs.

To gain deeper insights into the impact of technology autonomy on enjoyment, risk perceptions, and willingness to disclose, we examined various mediation models. These additional mediations include (1) the mediation of competence in the relationship between technology

autonomy and perceived enjoyment (Table 9), and (2) the mediation of perceived enjoyment in the relationship between competence and perceived risks (Table 10). We did not explore the other antecedents of perceived enjoyment since previous analysis indicated that there was no effect of the technology autonomy on personal autonomy and relatedness.

The findings from Table 9 indicated that competence fully mediated the effect of the autonomy of the technology in perceived enjoyment. This suggested that an increase in the autonomy of the technology decreased the perception of competence. Specifically, when technology operates with higher autonomy, customers perceive themselves as less competent, resulting in diminished enjoyment of the experience. Notably, even after controlling for frequency of use, gender, and age, the indirect effect remained significant ($b = -.20, -.38$ -.03, $p = .02$). Additionally, frequency of use ($b = .11, p = .0004$) and age ($b = -.008, p = .01$) were significant in the total model, and the autonomy of the technology became significant (partial mediation, $b = .19, p = .04$). In path a, both frequency of use ($b = .18, p < .001$) and age ($b = -.01, p = .02$) were significant.

The results of Table 10 showed that perceived enjoyment fully mediated the effect of competence satisfaction on perceived risks. This means that an increase in the perceived sense of competence resulted in greater perceptions of enjoyment. Essentially, as customers perceived themselves as more competent, involved, and necessary to the interaction, they derived greater enjoyment from the experience and perceived fewer risks in interacting with the technology. When controlling for frequency of use, gender, and age, the indirect effect remained significant ($b = -.24, -.38$ -.09, $p = .001$). Frequency of use ($b = -.10, p = .001$) and age ($b = -.01, p = .003$) were significant in path a.

Additionally, we further explored the potential for serial mediation (model 6) using the Process for SPSS with 95 % CI and 10,000 bootstrapped samples. The results revealed that the indirect effect of technology autonomy on willingness to disclose personal information could be explained by the serial mediation pathway. Perceived competence increased enjoyment, subsequently reducing risk perceptions, thereby influencing intention to share personal data with third parties ($b = -.05$, CI -10 to -.01).

Furthermore, the findings indicate that as consumers perceived the technology to be more autonomous, they experienced a decrease in their perception of personal competence satisfaction ($b = -.52, se = .18, t = -2.77, p = .006$). However, a greater sense of competence resulted in a heightened perception of enjoyment in the experience ($b = .77, se = .05, t = 15.94, p = .000$). Subsequently, increased enjoyment correlated with lower perceived risks ($b = -.36, se = .09, t = -3.81, p = .0002$), and heightened risk perception inversely affected individuals' willingness to disclose personal information ($b = -.49, se = .05, t = -10.06, p = .000$).

Moreover, both the direct positive effect of enjoyment ($b = .27, se = .07, t = 3.85, p = .0002$) and personal competence on willingness to disclose were significant ($b = .18, se = .07, t = 2.46, p = .01$). Finally, the direct positive effect of the autonomy of the technology on

willingness to disclose ($b = .58, se = .14, t = 4.23, p = .000$) competed with the significant negative indirect effect in this serial mediation model.

5. Study 3: the impacts of enjoyment with other technologies

Study 3 aimed to enhance the generalizability of our findings by introducing changes in the context (shifting from clothing retail, as examined in Studies 1 and 2, to a wine store) and the technology used (transitioning from a smart mirror in Study 1 and an interactive kiosk in Study 2 to a mobile app). In this experiment, we manipulated the type of technology independently of its autonomy level. Our objectives were twofold: firstly, to investigate the impact of in-store technologies on enjoyment, risk perceptions, and self-disclosure within a distinct purchasing context, and secondly, to deepen our understanding of how the autonomy level of technology impacts consumer responses.

5.1. Participants and procedure

We applied a between-subjects single-factor experimental design, wherein we manipulated the type of technology (mobile app vs. Pepper robot). We asked respondents to imagine themselves visiting a wine store, where they would have access to either an interactive app or a robot. By scanning a QR code and using an app or talking to the robot, they could explore different product options. In both scenarios, we stressed that the technology would require personal information. Based on their responses and preferences, the technology would then recommend wines tailored to their profile.

In addition to the screening criteria employed in previous studies (UK sample and English as a first language), respondents were required to be individuals who regularly purchase wine to participate in the study. The procedure and the financial incentive for participation remained the same: participants received a link to an online questionnaire via Prolific, which was hosted on Qualtrics. After accepting the informed consent, they were randomly assigned to one of the scenarios.

Following exposure to the manipulation, a total of 229 Prolific users (50 % male, $M_{age} = 45.79, SD = 13.37$) completed measures assessing willingness to disclose ($\alpha = .95$), perceived enjoyment ($\alpha = .96$), perceived risks ($\alpha = .89$), and the antecedents of enjoyment: personal autonomy ($\alpha = .86$), competence ($\alpha = .81$), and relatedness ($\alpha = .93$). In this study, we also introduced a scale of technology autonomy (Lucia-Palacios & Pérez-López, 2021; $\alpha = .92$) and involvement with purchase (Laurent & Kapferer, 1985; $\alpha = .91$). Participants provided additional information on technology use frequency (1 item), wine consumption (1 item), and demographics. Detailed scenarios and scales are provided in the Appendices.

5.2. Results and discussion

No outliers were identified in Study 3. The correlations among the

Table 9
Results of full mediation analysis (technology autonomy - competence - enjoyment).

Type	Effect	Coeff.	Se	LLCI	ULCI	Std Coeff	t (218)	p-value
Indirect (c-c')	Scenarios -> competence -> ENJOY	-.28	.15	-.48 ^a	-.09 ^a	-.28	-1.86 ^b	**
Component (path a)	Scenarios -> competence	-.52	.19	-.89	-.15	-.18	-2.78	**
Component (path b)	Competence -> ENJOY ^c	.77	.05	.67	.86	.74	15.94 ^d	***
Direct (path c')	Scenarios -> ENJOY	.24	.13	-.02	.51	.08	1.81 ^d	n.s.
Total (path c)	Scenarios -> ENJOY	-.15	.19	-.53	.23	-.05	-.79	n.s.

Note: Significance codes: '***' .001; '**' .01; '*' .05.

Results hold whether the mean-centered variables are used or not. Reported results are not centered.

Sobel Test available at [Quantpsy.org](https://www.quantpsy.org). Test statistic = -2.69, $se = .15, p = .007$.

^a 95 % confidence intervals with bias corrected bootstrap ($n = 10,000$) on R package mediation.

^b Estimated by the authors (coeff/se).

^c Controlled by ENJOY.

^d t (215).

Table 10

Results of full mediation analysis (competence – enjoyment – risks).

Type	Effect	Coeff.	Se	LLCI	ULCI	Std Coeff	t (218)	p-value
Indirect (c-c')	Competence ->ENJOY-> RISKS	-.28	.07	-.42 ^a	-.13 ^a	-.28	-4.00 ^b	***
Component (path a)	Competence ->ENJOY	.75	.05	.66	.85	.73	15.80	***
Component (path b)	ENJOY-> RISKS ^c	-.38	.09	-.57	-.19	-.38	-4.02 ^d	***
Direct (path c')	Competence -> RISKS	.12	.09	-.07	.31	.12	1.26 ^d	n.s.
Total (path c)	Competence -> RISKS	-.16	.07	-.30	-.03	-.16	-2.39	*

Note: Significance codes: '***' .001; '**' .01; '*' .05.

Results hold whether the mean-centered variables are used or not. Reported results are not centered.

Sobel Test available at [Quantpsy.org](https://www.quantpsy.org). Test statistic = -4.06, se = .07, p = .00005.^a 95 % confidence intervals with bias corrected bootstrap (n = 10,000) on R package mediation.^b Estimated by the authors (coeff/se).^c Controlled by ENJOY.^d t (215).

primary constructs were all significant, as presented in Table 11. Regarding the control variables, the frequency of technology use had a significant correlation with all the constructs. However, the frequency of wine purchases did not show significant correlations with any of the constructs. Finally, it was observed that involvement with wine purchase was correlated solely with the satisfaction of the psychological needs, which serve as antecedents of enjoyment.

Table 12 did not reveal any significant difference in technology autonomy, which contrasts with the findings of Study 2. However, the scenarios exhibited variations in the dependent variable, perceived risks, and competence (a determinant of enjoyment). Notably, the mobile app scenario received a higher average rating for the satisfaction of competence. Nevertheless, these results lead us to reject H4, which hypothesized that technology autonomy would negatively impact the satisfaction of psychological needs. Despite a significant correlation between these constructs, they all showed positive relationships (Table 11). Even though perceptions of competence were lower in the robot scenario, the autonomy associated with both technologies was not significantly different (Table 12).

As in Studies 1 and 2, we also ran the mediation analysis proposed in H2 using the R package mediation (version 4.5.0) with 95 % CI and 10,000 bootstrapped samples. Table 13 indicates that enjoyment has a positive direct effect on willingness to disclose (H1), with perceived risks mediating this relationship (H2). These findings corroborate the results obtained in Studies 1 and 2.

In this study, we tested the validity of H3 using a linear model, as presented in Table 14. Results showed that relatedness does not influence enjoyment perceptions; however, both competence and personal autonomy were found to be significant. This reaffirms the findings of Study 2, suggesting that technologies satisfying personal competence and autonomy needs can indeed offer a more enjoyable experience.

Additionally, we observed that the only significant control variable was the level of involvement with wine. Surprisingly, higher levels of involvement were associated with a less enjoyable experience. One

Table 12

Means, standard d, and t-test results – Study 3.

Variable	Scenarios (Mean/SD)		t	p-value	Cohen's d
	App	Robot			
1. Technology's autonomy	3.68 (1.34)	3.5 (1.38)	1.03	n.s.	
2. WTD	3.82 (1.58)	3.31 (1.61)	2.41	.02*	.32
3. ENJOY	4.29 (1.65)	3.97 (1.63)	1.45	n.s.	
4. RISKS	4.36 (1.35)	4.83(1.46)	-2.54	.01*	.34
5. Personal autonomy	4.03 (1.26)	3.89 (1.49)	.73	n.s.	
6. Competence	4.85 (1.24)	4.33 (1.43)	2.93	.004**	.39
7. Relatedness	2.93 (1.47)	2.79 (1.52)	.69	n.s.	

Note: Significance codes: '***' .01; '**' .05.

possible explanation could be that customers who feel knowledgeable about the product may not perceive that the technology is helping them, as they already possess a strong understanding of their preferences. However, it is noteworthy that the impact of purchase involvement, although significant, was relatively small compared to the coefficients of satisfaction of psychological needs.

We performed a further test on serial mediation using the Process for SPSS (model 6) with 95 % CI and 5000 bootstrapped samples to confirm the indirect effect, as shown in Table 15. The results revealed that the impact of the type of technology (robot) on willingness to disclose personal information was mediated by perceived competence, enjoyment, and risk perceptions. These findings corroborate the results obtained in Study 2. Notably, the robot had a direct and negative impact on competence, indicating that both interactive kiosks (Study 2) and mobile apps (Study 3) enhanced users' perceptions of competence compared to robots.

Despite perceived technology autonomy not explaining competence levels in Study 3, the results of the serial mediation observed in Study 2

Table 11

Descriptive statistics and correlations – Study 3.

Variables	Mean	SD	1	2	3	4	5	6
1. WTD	3.56	1.61						
2. ENJOY	4.13	1.64	.74***					
3. RISKS	4.59	1.42	-.56***	-.33***				
4. Personal Autonomy	3.96	1.38	.67***	.80***	-.32***			
5. Competence	4.59	1.36	.69***	.79***	-.31***	.75***		
6. Relatedness	2.86	1.49	.53***	.60***	-.34***	.67***	.55***	
Control Variables								
Frequency of use								
Frequency of Wine	4.73	1.71	.009	.04	-.06	.08	.11	.04
Wine Involvement	3.98	1.35	.11	.11	-.06	.20**	.22***	.19***
Technology Autonomy	3.59	1.36	.22***	.24***	.06	.27***	.25***	.22***

Note: Significance codes: '***' .001; '**' .01; '*' .05.

Table 13

Results of main effect and mediation analysis – Study 3.

Type	Effect	Coeff.	Se	LLCI	ULCI	Std Coeff	t (227)	p-value
Indirect (c-c')	ENJOY -> RISKS -> WTD	.16	.02	0.09 ^a	0.25 ^a	.16	8.00 ^b	<.001***
Component (path a)	ENJOY -> RISKS	-.28	.05	-.39	-.18	-.33	-5.27	<.001***
Component (path b)	RISKS -> WTD ^c	-.40	.05	-.50	-.31	-.36	-8.69 ^d	<.001***
Direct (path c')	ENJOY -> WTD	.61	.04	.53	.69	.62	15.14 ^d	<.001***
Total (path c)	ENJOY -> WTD	.73	.04	.64	.81	.74	16.56	<.001***

Note: Significance codes: '***' .001; '**' .01; '*' .05.

Results hold whether the mean-centered variables are used or not. Reported results are not centered.

Sobel Test available at [Quantpsy.org](https://quantpsy.org). Test statistic = 4.59, se = .02, p < .001.^a 95 % confidence intervals with bias corrected bootstrap (n = 10,000) on R package mediation.^b Estimated by the authors (coeff/se).^c Controlled by ENJOY.^d t (226).**Table 14**

Results of regression analysis with enjoyment as DV – Study 3.

Independent variables	Std. coef.	p-value
Technology (Robot = 1)	.05	n.s
Competence	.44	***
Personal autonomy	.43	***
Relatedness	.07	n.s
Control variables		
Female	.09	n.s.
Frequency of use	.03	n.s.
Age	-.03	n.s.
Wine frequency	.04	n.s.
Wine involvement	-.11	*
Model statistics	Adj R ² = .73	
	F (9,219) = 70.2, p < .001	

Note: Significance codes: '***' .001; '**' .05.

Table 15

Serial mediation results – Study 3.

Type	Effect	Std. Coef.	Se	LLCI	ULCI
Direct	TECH -> COMP	-.38	.18	-.87	-.17
	COMP -> ENJOY	.80	.05	.87	1.07
	ENJOY -> RISKS	-.25	.09	-.39	-.04
	RISKS -> WTD	-.34	.04	-.48	-.30
Total	TECH -> WTD	-.30	.10	-.50	-.08
Indirect	TECH -> COMP -> ENJOY -> RISK -> WTD	-.03	.01	-.06	-.0006

remained consistent when considering a different context and technology in Study 3. An increased sense of competence resulted in higher enjoyment, which subsequently reduced perceived technology risk and enhanced the propensity to disclose personal information. It is noteworthy that the direct effect of technology on enjoyment, when controlled by the need for competence, was not significant, indicating that the technology's impact on enjoyment was fully mediated by competence. Moreover, the effect of competence followed the pathway through enjoyment rather than through perceived risks. Once again, the effect of competence on perceived risks was fully mediated by perceived enjoyment. Enjoyment exhibited both a direct effect on willingness to disclose and an indirect effect through perceived risks. In summary, the sequence of variables (as shown in Table 15) comprehensively explained the self-disclosure behavior.

6. Conclusion

With a considerable body of research dedicated to digital contexts and e-commerce, it is imperative to consider the role of AI in-store technologies in enhancing both efficiencies and consumer experiences

(Grewal et al., 2023). While marketplace technology plays a pivotal role in streamlining the consumer journey and providing valuable insights to brands, it also introduces potential risks to data privacy (Aiello et al., 2020). This research contributes to the ongoing discussion surrounding factors influencing consumers' willingness to disclose personal information to companies (Chidambaram et al., 2024). Feelings of enjoyment and risk perceptions emerge as critical antecedents of self-disclosure, especially in contexts where the technology is less autonomous, offering consumers some leeway in the purchase process.

6.1. Theoretical contributions

This research contributes to the literature on consumer behavior, psychology, and human-technology interaction. First, the findings deepen our understanding of enjoyment as a driver of the intentions to adopt a self-disclosure behavior. Three studies confirm that the perceived enjoyment derived from using AI solutions in retailing settings increases consumers' willingness to disclose personal data by mitigating perceived risks. Consumer reactions to new technologies are influenced by several aspects such as the attitude toward technology, perceived benefits, privacy, and security expectancies (Canhoto et al., 2024; Margulis et al., 2020). Privacy risk is especially sensitive when it comes to consumers adopting artificial intelligence technologies in consumption experiences (Song et al., 2022). The research findings show that while technology enjoyment seems to provide a more positive experience to consumers, it may concurrently reduce the attention consumers give to potential privacy risks. As a result, they are more prone to adopt self-disclosure behaviors when interacting with technologies that provide a joyful experience.

Previous research has examined the effects of perceived hedonic values and enjoyment on intentions to adopt specific technologies, such as augmented reality in retail (Schultz & Kumar, 2024), virtual try-on technologies in e-commerce (Chidambaram et al., 2024), or autonomous stores (Tan et al., 2024b). While there is some insight into the impact of technology enjoyment on consumers' sense of presence (Dieck et al., 2023), satisfaction (Mkedder et al., 2024; Xi et al., 2024), and recommendation intentions (Tan, Ren, et al., 2024), to the best of our knowledge, previous research has not explored how enjoyment elicited by interacting with technology in retailing influences consumers' willingness to self-disclosure. Our study sheds light on the role of enjoyment as a pivotal antecedent of self-disclosure behaviors during interactions with novel in-store technologies. The mechanism that helps to understand this effect is the cognitive absorption elicited by joyful experiences, which may cognitively deplete consumers, leading them to perceive fewer risks associated with sharing personal data with third parties. The fact that enjoyment decreases perceived risks and increases willingness to share information represents a significant theoretical finding. Furthermore, it raises critical considerations regarding customer well-being, privacy protection, and potential ramifications of enjoyment in the consumption journey.

Moreover, this research demonstrates that the psychological needs outlined in the self-determination theory can serve as drivers of enjoyment in smart retailing experiences (Deci & Ryan, 2000; Reer et al., 2022). When new technologies are perceived to enhance levels of autonomy, competence, and relatedness, they positively influence individuals' self-determined motivation, consequently heightening the perceived hedonic value of the experience (Tsai et al., 2021) or, more specifically, enhancing perceptions of enjoyment (Reer et al., 2022). The fulfillment of these psychological needs not only leads to increased engagement (Roy et al., 2023) and a greater propensity to adopt new technology (Leung & Matanda, 2013), but also, as evidenced by our studies, fosters intentions to disclose personal information, as individuals enjoy the experience more and perceive fewer risks. Self-determination theory has been largely overlooked when examining the impact of technology on consumer behavior, and our findings contribute to a deeper understanding of the factors driving perceptions of enjoyment during interactions with novel technology throughout the shopping journey. The role of competence is particularly significant, which stands out as the most influential factor in enhancing consumers' enjoyment of human-technology interactions.

Lastly, our studies confirm that the level of autonomy attributed to a technology significantly impacts the willingness to disclose personal information, both directly and through the mediation of competence, enjoyment, and perceived risks. High-autonomy technologies have the potential to provide consumers with personalized services, thereby increasing the degree of psychological ownership individuals associate with technology. This is achieved by satisfying their needs for self-identification and control within their environment. Conversely, autonomous technologies can also be perceived as more intrusive, posing a potential threat to individuals' privacy (Bellis & Johar, 2020; Sohn, 2024). These findings add to the limited literature on the elements of marketing strategy and technology interaction that influence consumers' satisfaction of psychological needs regarding relatedness, competence, and autonomy (Zheng & Li, 2024).

Furthermore, the research results reinforce previous studies suggesting that in smart retailing contexts, more autonomous technologies can reduce the perceived value of the customer experience (Lucia-Palacios & Pérez-López, 2021). For instance, a robot perceived as more autonomous could reduce one's sense of competence when interacting with technology, thereby reducing feelings of enjoyment compared to a store kiosk where consumers interact with a touchscreen. Notably, the indirect effect of technology autonomy on self-disclosure is negative, whereas the direct effect is positive. This suggests that previous studies neglecting to account for these mediators may yield conflicting results, hence failing to capture the complexity of the phenomena at hand.

6.2. Managerial contributions

By applying our insights, companies can gain a deeper understanding of the nuanced interplay between personal autonomy and technological autonomy in shaping consumer enjoyment within their experiences. Enjoyment emerges not only as an important antecedent of the willingness to disclose information – which is vital for personalization and increasing profits – but also as a key driver of satisfaction and loyalty (Dieck et al., 2023). Therefore, understanding the dynamics of enjoyment and incorporating enjoyable moments into the customer journey is essential for a firm's success. Among all psychological needs, competence seems to play a pivotal role in shaping perceptions of enjoyment. Consequently, it would be beneficial for brands to develop strategies aimed at evoking consumers' perceptions of competence.

Our research findings offer valuable insights for reimagining the physical store environment (Grewal et al., 2023). Companies could apply these insights by designing technology that encourages consumer participation, engages them through interaction, and provides positive feedback. Such interactions could increase both the sense of control and

competence, while also ensuring that the technology is perceived as less autonomous. To further enhance consumers' feeling of competence, firms could make the technology easier to use. This could involve investing in user-friendly devices and interfaces, providing easy access to tutorials, or employing frontline staff to help educate consumers. On the other hand, firms should avoid using technology that excludes consumers from the process, particularly in physical stores. Although highly autonomous technology can have positive outcomes, it may diminish the enjoyment of the experience, which is a significant drawback based on our findings.

Moreover, competence cues could be integrated in a gamified manner, thereby enhancing the fun associated with the interaction (Trang & Weiger, 2021). Allowing consumers to share the outcomes of their interactions with technology that demonstrates increased competence and self-efficacy may lead individuals to associate greater joy with the experience. One approach could involve sharing these badges or milestones on social media platforms. Additionally, associating competence labels with loyalty or relationship programs could heighten consumer awareness of their level of competence when engaging with various technologies and touchpoints offered by the brand (Zheng & Li, 2024). A significant trade-off exists for consumers: optimizing the consumer journey and having positive experiences often requires sharing personal data. In this regard, one key contribution of this paper is to reinforce the necessity for managers to carefully consider data privacy issues. While technologies prove valuable in capturing consumer insights, it is crucial to uphold data privacy. We underscore the importance of enhancing the consumer experience through marketing while simultaneously ensuring privacy protection when consumers interact with new technologies. This topic will be further explored in the following section.

6.3. Societal contributions

Artificial intelligence applications can offer benefits not only to companies but also to policymakers (Jabeur et al., 2023). New policies that ensure consumer protection can help create a better and safer marketplace. It is essential for practitioners, society at large, and policymakers to engage in discussions and find solutions that strike a balance between an enjoyable and safe experience for consumers. Our results indicate that consumers tend to have more enjoyable experiences with less autonomous technology. However, this enjoyment may not be entirely beneficial, especially if exploited by individuals with ulterior motives or even criminal intent. The enjoyment can obscure the perception of risks and make consumers more inclined to share their data.

While having more consumer data is crucial for businesses to offer personalized and relevant products and services, consumers should make informed decisions about sharing their data – decisions that are not solely influenced by how much fun they are having. Our research not only assists companies in understanding the antecedents of enjoyment but also serves as a cautionary note about potential side effects for customers. The finding that increased enjoyment decreases perceived risks and increases willingness to disclose information is significant for policymakers. It underscores the need for regulations and educational initiatives that aim to protect customer privacy and raise awareness about risks associated with artificial intelligence and other technologies (Du & Xie, 2021).

Although our research focuses on in-store technologies, our findings offer insights that could be relevant for other autonomous technologies, such as conversational AI. These technologies enhance users' sense of competence and are designed to be engaging and enjoyable to interact with. Conversational AI, for instance, can make jokes, give compliments, and communicate in a friendly manner. Based on our results, this could lead consumers to perceive fewer potential risks. Therefore, regulators need to discuss not only the importance of algorithmic transparency but also the manipulative aspects of these technologies.

Finally, the impact of less autonomous technologies on willingness to disclose enhances the importance of regulatory attention, particularly as the current focus predominantly centers on more autonomous technologies (Bellis & Johar, 2020). Investing in consumer technological literacy could serve as a means of enhancing awareness about the functionalities of smart retailing technologies while highlighting the associated risks. Moreover, companies should embrace a transparency policy to ensure that consumers are adequately informed about the uses and applications of the data required. Consequently, when consumers engage in self-disclosure, they do so consciously and with full awareness of the implications. Overall, based on our results, policymakers and firms should exercise caution with technologies that provide enjoyable experiences while collecting data from customers. We demonstrate that enjoyable experiences can reduce risk perception, which may lead to misjudgments.

6.4. Limitations and future research

Future studies should further investigate perceptions of enjoyment associated with different types of technology used in consumption contexts, alongside exploring the diverse effects that enjoyment can have on consumer responses. While this research focused on the level of technology autonomy, other aspects warrant consideration (Jorling et al., 2019). Moreover, personal characteristics were not incorporated into this study (Sankaran et al., 2023). Hence, future research could evaluate the influence of elements such as risk aversion and levels of innovativeness on consumers' perceptions of enjoyment, as well as responses like self-disclosure or intentions to adopt new technologies (Guha et al., 2021; Puntoni et al., 2021). Additional important attributes to be explored include self-efficacy and privacy literacy.

Limitations of this study can also be explored in the future. Firstly, we relied on lab experiments, with scenarios depicted through images, prompting respondents to imagine themselves in the given situation. Despite the positive aspects of this method, such as the ability to control for confounds and variables that could influence main effects, there are also limitations. Conducting experiments in real retailing settings could increase the effect of enjoyment and provide further validation to our findings.

Using single factor studies is a limitation of this research, as more complex experimental designs would allow for testing boundary conditions. Our research encompassed smart mirrors, digital kiosks, mobile apps, and robots. Nonetheless, considering the different technologies available, we recommend that future studies explore other additional retailing technologies such as augmented reality, voice assistants, and recommendation agents, which could enhance the external validity of

findings and improve our understanding of enjoyment perceptions. Testing retail technologies in online *versus* in-store contexts and examining their impact on consumer enjoyment could provide valuable insights for both practitioners and academics (Barta et al., 2025). Another possibility would be to compare thinking *versus* feeling AI (Huang & Rust, 2021), or investigate the deployment of these technologies in different business models, such as the circular economy (Dutta et al., 2023). Furthermore, new research could involve deploying a within-subjects experiment to compare participants' responses to different technologies.

Additionally, our sample was restricted to European countries, which are typically known as more individualistic and better informed about privacy regulations, since Europe was a pioneer in regulations regarding data (GDPR – General Data Protection Regulation). The possibility of generalizing results may depend on this specific geographical context; therefore, research findings should be considered with caution. Consumers in regions of the global south might exhibit differing susceptibilities to privacy risks, possibly due to limited access to privacy education and cultural disparities. Factors such as power distance and collectivism could also influence perceptions, as countries with higher power distance and collectivism tend to place more trust in authority figures, institutions, and social groups.

Another promising direction for future research involves addressing the impact of enjoyment on risk perception. These findings suggest an ethical dilemma since more enjoyment when interacting with technology reduces the focus on risk and privacy issues. The question that still needs to be answered is how brands can offer a fun and joyful experience to customers while upholding ethical principles in the utilization of their personal information (Steinhoff & Martin, 2023). Future studies could explore strategies for educating customers or increasing the salience of risks, even within hedonic experiences.

CRedit authorship contribution statement

Simoni F. Rohden: Writing – original draft, Resources, Project administration, Investigation, Conceptualization. **Carla Freitas Silveira Netto:** Writing – original draft, Software, Methodology, Formal analysis, Conceptualization. **Lélis Balestrin Espartel:** Writing – original draft, Validation, 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 A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.chb.2025.108647>.

Appendix

A. Description of facial recognition technology use in Study 1

We ask you to observe the pictures and read the following text about a technology that retailers might implement in stores in the near future.



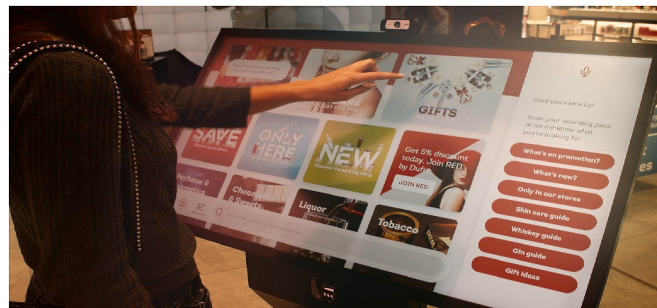
The pictures you just saw show a touchable and interactive mirror that uses facial recognition and allows other images to be superimposed on the reflected image as if the mirror was a computer screen. With these mirrors, consumers can view different product versions that are not on display in the store, enlarging the space and capacity of the store to showcase its catalog and increasing the possibilities that consumers find the product they need.

Note: This description was based on the scenarios developed by [Pizzi and Scarpi \(2020\)](#).

B. Scenarios used in Study 2

B1. Interactive screen

An interactive screen is a technology that can give the consumer information about the store or the availability of products and services. The following image shows an example of this technology in a retail context.



B2. Robot

A robot is a technology that can give the consumer information about the store or the availability of products and services. The following image shows an example of this technology in a retail context.

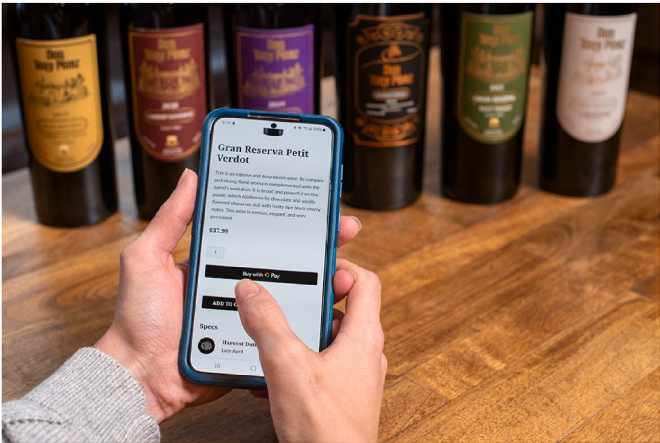


C. Scenarios used in Study 3

C1. Mobile app

Imagine that you go to a Wine Store and you have an interactive app available. By reading a QR code you can access this app on your mobile and explore different product options. This technology requires some of your personal information, and based on your responses and preferences the app will recommend wines that match your profile. Then you can locate and purchase the wines you prefer.

The following image shows an example of this technology:



C2. Robot

Imagine that you go to a Wine Store with a robot available. By talking to the robot you can receive information and it can offer different product options. This technology requires some personal information, and based on responses and preferences the robot will recommend wines that match your profile. The robot can choose the best wines and assist you in the purchase.

The following image shows an example of this technology:



D. Scales

Variable	Items	Authors
Perceived Enjoyment (Study 1)	I was deeply engrossed I was absorbed intently My attention was focused I concentrated fully Happy Pleased Satisfied Contented Fulfilling Rewarding Useful	Lin et al. (2008)

(continued on next page)

(continued)

Variable	Items	Authors
Perceived enjoyment (Study 2)	Worthwhile I believe using this technology would be nice. Using this technology could be pleasant. I would have fun using this technology.	Venkatesh and Bala (2008)
Perceived risk	Providing the facial recognition technology* with my personal information would involve many unexpected problems. It would be risky to disclose my personal information to the facial recognition technology*. There would be a high potential for loss in disclosing my personal information to the facial recognition technology*. * in Study 2 we changed “the facial recognition technology” to “this technology”.	Hayes et al., 2021; Xu et al., 2011
Willingness to disclose	I would be willing to share my personal information when using this technology in the future. I would probably disclose topics about myself if necessary. I would likely share my personal information with this kind of technology if necessary.	Wang et al. (2017)
Personal autonomy	This technology would provide me with an opportunity to express my ideas and opinions freely. This technology would provide me interesting options and choices.	Than et al., 2014; Reer et al., 2022
Personal competence	I feel I would experience a lot of freedom in using this technology. I feel that I could perform my shopping activities using this technology. I would feel competent in using this technology.	Than et al., 2014; Reer et al., 2022
Relatedness	This technology would keep me occupied but would not overwhelm me. I would feel connected with other people that also used this technology. By using this technology I would feel that I was a part of a group that shared similar goals. This technology would allow me to create an open channel of communication with other people that share similar interests.	Than et al., 2014; Reer et al., 2022
Previous experience w/privacy violation	I have had bad experiences with regard to my online privacy before. I experienced misuse of data from friends or family. I have not yet made bad experiences with the misuse of my data.	Schomakers et al. (2019)
Familiarity with AI	I am familiar with AI facial recognition systems. I am more familiar than the average person regarding AI facial recognition systems. I am familiar with how AI facial recognition work.	Chi et al. (2021)
Technology autonomy	This technology determines itself how it conducts tasks. This technology takes decisions by itself. This technology takes the initiative. This technology does things by itself.	Lucia-Palacios and Pérez-López (2021)
Involvement with purchase	I choose wine very carefully. Purchasing wine is an important decision for me. I consider myself a wine expert. Which wine purchase I buy matters a lot to me.	Laurent & Kapferer, 1985

Data availability

Data is available at <https://doi.org/10.5281/zenodo.15057691>.

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