

THE BUTTERFLY EFFECT: INFORMATION OVERLOAD AND IMPULSE BUYING TENDENCY

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Abstract

Through the lens of Information Processing Theory and Regulatory Focus, this study aims to determine how information disclosure can have varying effects on distinct consumer types. This study utilized both experimental and causal approaches. Given the outcomes of the experiments conducted under highly controlled conditions, this is important. Consequently, causal research design is an option for validating experimental findings so that they can be extended. This experimental study used both between-subject and within-subject designs for data collection. A between-subjects design is used to compare participant reactions to each scenario, whereas a within-subjects design is used to compare responses to high- and low-involvement products. In this study, data collection is conducted via a manipulation check mechanism, in which most respondents grasped the scenario to be evaluated. The analysis then proceeded to the t-test and ANOVA for independent samples. Next is causal research employing the survey method, for which data is processed using AMOS and checked for goodness-of-fit. The findings of this study are as follows: (1) in the context of Information Processing Theory, which emphasizes the heuristic assessment process in consumer decision-making; (2) the use of celebrities is thought to cause excess information; and (3) this study confirms that the tendency of impulse buying behavior is different for each consumer character and that each consumer character processes information differently.

Keywords: Ubiquitous connectivity, information transparency, information overload, celebrity endorsement, impulse buying tendency.

Introduction

The openness of connectedness brought about by the evolution of Internet and information technology is everything for millennials, from engaging with people to shopping online (Koja-Odongo & Mostert, 2013). The growing number of social network users provides them with advantages such as access to rich information (Shenk, 2003). Staying connected to the rest of the world is crucial and has become an integral part of our existence (Gao et al., 2018; McGlinchey, 2017). In general, information in the context of online shopping or e-commerce includes products, suppliers, and payment processes (Pavlou, 2014; Pavlou et al., 2007; Zhou et al., 2018). Owing to the information provided by online reviews, potential consumers can reduce uncertainty and be more confident in the product or service to be consumed (Hanna et al., 2019). In addition, Mangold & Smith (2012) concluded in their analysis that informal information such as this will be more Successfully delivered to potential

consumers given the current state of information technology.

In fact, it turns out that excessive information creates new problems for society, as individuals will become confused and bewildered by the abundance of information on the internet (Hanna et al., 2019). The amount of information that potential customers can receive is both advantageous and disadvantageous due to the fact that humans have limitations in terms of processing the information obtained, and the ability of each individual in managing information varies (Jacoby, 1977). Consequently, with the phenomenon of information openness and connection in the digital sphere, the vast flow of information causes potential customers to feel confused regarding the criteria for good information. In addition to too much information, potential customers also face problems with the credibility of the information they receive. The simplest example is when they choose to trust online reviews over formally provided information. However, online reviews cannot

always be used as reference, as some of the reviews are fake. The reviewer's identity and chronology of their experience with the product or service are unclear (Filieri, 2015; Jeong & Koo, 2015). This is a cognitive constraint, and as a result, people tend to seek alternate facts to convince them and eliminate ambiguity.

With the dissemination of increasing amounts of product information, reviews, promotional messages, and endorsement cues, contemporary digital businesses often equate transparency, thus, information overload warrants managerial attention. However, when the volume or complexity of information surpasses consumers' processing capacity, it may diminish decision confidence and lead to reliance on simplified peripheral cues rather than thorough product evaluation (Eppler & Mengis, 2004; Peng et al., 2022; Roetzel, 2019). Recent research further shows that information overload in digital and social-commerce contexts may result in consumer confusion, platform-switching intentions, purchase avoidance, and reduced decision quality (Fan et al., 2024; Saranya P. & Joji Alex N., 2024; Shahrzadi et al., 2024). This phenomenon can be understood as a transition from systematic processing to heuristic and effect-driven processing: cognitive strain limits comprehensive comparison, making salient cues such as celebrity endorsements, ratings, visual appeal, and promotions more influential (Peng et al., 2022; Petty et al., 1983; Townsend & Kahn, 2014), potentially resulting in immediate purchase decisions. This process can enhance the tendency for impulse buying, although its impact depends on consumers' regulatory focus and the degree of fit between information load and motivational orientation (Peng et al., 2022; Rook, 1987; Z. Shao et al., 2024). Consequently, firms should aim for information optimization rather than maximization by providing transparent, credible, hierarchically structured, and progressively disclosed information. Transparency should not be equated with the mere accumulation of information; rather, it should enable consumers to identify, understand, compare, and evaluate decision-relevant attributes (Granados et al., 2010; Wang et al., 2024; Zhou et al., 2018). Recent evidence concerning online reviews also indicates that the increasing availability of text, images, and videos does not automatically improve information usefulness because the abundance and heterogeneity of review formats itself may contribute to information overload (Wang et al.,

2024). While overload-driven impulse purchases may yield short-term revenue, they can also lead to regret, returns, complaints, and diminished trust (Y.-C. Chen et al., 2009; Fan et al., 2024; Peng et al., 2022). Therefore, information architecture should be regarded as both a commercial capability and a component of responsible marketing and consumer welfare protection. This perspective is particularly important in digital commerce, where firms have substantial control over the quantity, order, visibility, and presentation of product information.

The rise in digital media users gives us more information, allowing consumers to find whatever they want and more. Online shopping is a common digital-dependent activity. Tankovic & Benazic (2018) claimed that online purchasing entails people accessing the digital world to find information and buy goods and services according to their needs. This simplifies the product evaluation for consumers. This study attempts to reduce impulse buying by consumers due to information overload. Rook (1987) described impulsive buying as an accidental purchase of a product that was not previously considered, while Koski & Mesiranta (2005) considered this definition overly simplistic. Kollat & Willett (1967) and Xiang et al. (2016) argued that cues cause impulse purchases. Rook (1987) added that impulsivity requires a strong emotional impulse.

Rook (1987); Weinberg & Gottwald (1982) and Xiang et al. (2016) all indicated that impulse buying might be driven by an individual's emotional condition. As Lucian (2009) noted, in the context of e-commerce, prospective customers are faced with a difficult situation in which they must analyze information about the brand of the product or service (limited) and the attributes (unlimited), which reduces their cognitive ability to choose the best option. Atkinson & Shiffrin (1968); M. Kim (2019); Richard & Chebat (2016) claimed that consumer cognition plays a role in the elaboration stage of their process, while Granados et al. (2010) found that information transparency depends on a balance between quantity and quality. This study examines the context of e-commerce, which is closely related to cognitive and emotional aspects. Tuan Pham (2004); Verhagen & Bloemers (2018); afterwards, Edy et al. (2021) conducted research indicating that self-control plays a role in online purchasing. Over time, the number of studies pertaining to regulatory emphasis has increased; however, few have examined the relationship between

regulatory focus and information processing, particularly in e-commerce settings (Kato & Hoshino, 2021).

Today's transparency makes it easier for people to connect, and staying connected is a crucial part of our daily routine (Gao et al., 2018; McGlinchey, 2017). Digital media is used more by millennials to obtain the latest news (Ladhari et al., 2019; Monteiro et al., 2019). E-commerce uses social media to promote its products and services, and millennials are particularly active in sharing statuses and commenting on others' (Nanjappan & Deshmukh, 2013). We can get more information from the growing number of digital media users (Shenk, 2003). Furthermore Zha et al. (2018) argued that this will cause Information Overload for users with limited ability to digest information, reducing consumers' ability to evaluate current alternatives (Gasimova, 2015; Roetzel, 2019), resulting in a non-optimal decision-making process. According to Kuvita & Karliček (2014), celebrity endorsements can increase consumers' desire to buy by creating a positive impression (Kusumasondjaja & Tjiptono, 2019), whereas Juntiwasarakij (2018) found that celebrities can affect customer behavior because of their superior position. However, Kusumasondjaja & Tjiptono (2019) stated that celebrity popularity sells more than expert opinions, and Hwang & Zhang (2018) stated that celebrities can create strong opinions in consumers' minds, thus consumers tend to believe anything the celebrity says, even without evidence. Celebrity information can lead to impulse purchases since customers like to listen to and emulate celebrities (Hwang & Zhang, 2018; Juntiwasarakij, 2018). In this regard, emotionally driven consumers tend to be strongly impulsive because they can gain pleasure that cannot be provided by planned purchases, whereas rational consumers tend to be more vigilant in the buying process (Das, 2016; Higgins et al., 1997; Semin et al., 2005).

Digital-commerce research has established that extensive and complex information may exceed consumers' processing capacity. Nevertheless, three issues remain insufficiently addressed. First, prior studies provided limited explanation of how ubiquitous connectivity, information transparency, and celebrity endorsement operate as distinct or interacting antecedents of information overload in an e-commerce environment. Existing studies have examined information abundance, online reviews, social-media exposure, and digital connectivity, but these factors are not always

integrated into one explanatory framework (Pentina & Tarafdar, 2014; Roetzel, 2019; Wang et al., 2024). Second, although information overload has been associated with confusion and decision difficulty, its relationship with impulse buying tendency remains underdeveloped. This is an important issue because information overload may not always produce deliberative delay; under certain circumstances, consumers may simplify their decisions and rely on salient emotional or peripheral cues, which can increase impulsive purchase responses (Y.-C. Chen et al., 2009; Rook, 1987; Z. Shao et al., 2024). Third, consumers are frequently treated as responding uniformly to information overload, despite differences in their cognitive experience and motivational orientation. To address these gaps, the present study integrates Information Processing Theory and Regulatory Focus Theory and employs complementary experimental and survey-based approaches. The experimental phase examines differences and interactions across controlled information conditions, whereas the survey phase evaluates the structural relationships among the constructs and the moderating role of regulatory focus among Indonesian e-commerce consumers.

Research Overview

Quantitative approaches are used in this study, and J. Hair et al. (2016) described methods that use statistical analysis to draw numerical conclusions. This study used both causal and experimental approaches. This is crucial because experimental procedures often assess only the impact of independent and bound factors, and the link between them is suggestive. To generalize this research, causal investigations must be conducted to confirm the association between variables (J. Hair et al., 2016; J. F. Hair et al., 2016).

Experimental technique aims to observe things differently, with more uniform data and stricter internal validity. Mitchell (2015) defined experimental research as modifying objects and controls. Experimental research is commonly employed in social psychology and organizational economics to study social problems (Cash et al., 2016). Experimental approaches also allow researchers to directly test hypotheses by performing numerous interconnected treatments, while controlling real-world elements that can disrupt research mechanisms (Agarwal et al.,

2009). This study also used causal research, in which Google Form was used to distribute research surveys to e-commerce sites and app users. This is done to look at different perspective and to confirm the experimental study outcomes so that they can be generalized.

Ubiquitous Connectivity, Information Transparency, and Information Overload

Ubiquitous connectivity refers to consumers' ability and tendency to remain connected to digital networks, platforms, and information sources across different times and locations. The construct reflects more than just the availability of Internet access; it also encompasses the frequency, continuity, and breadth of consumers' interaction with digital information environments (Pentina & Tarafdar, 2014; Roetzel, 2019). Consumers with high ubiquitous connectivity frequently access multiple online channels, receive real-time information, and remain continuously exposed to social-media content, product information, reviews, advertisements, and recommendations. Consumers with relatively low ubiquitous connectivity, by contrast, experience less continuous and less extensive exposure to these information streams.

High ubiquitous connectivity may generate both informational benefits and cognitive risks. Continuous access can improve consumers' familiarity with digital platforms and provide more resources for product evaluation. However, it can also expose consumers to a larger volume of repetitive, conflicting, and insufficient diagnostic information. Therefore, whether connectivity facilitates or obstructs decision-making depends partly on the transparency of the information encountered. Transparent information may help highly connected consumers organize and evaluate available alternatives when the information is relevant, credible, comparable, and easy to understand (Granados et al., 2010; Zhou et al., 2018). Conversely, opaque information may encourage additional searching across multiple sources, increasing uncertainty and the cognitive effort required to reconcile inconsistent claims. Under these conditions, consumers with high ubiquitous connectivity may be particularly vulnerable to information overload.

Roetzel (2019) stated that digital connectedness exposes people to all relevant and irrelevant information, making them vulnerable. Roetzel found that open connectivity in a digital environment makes information management

more difficult. Information overload occurs when there is too much information to process and not enough attention (Eppler & Mengis, 2004). Specifically, Roetzel (2019) stated that the rapid growth of the digital world is not comparable to the development of cognition and literacy related to the digital environment. Therefore, problems arise related to cognition in managing existing information because each person's ability to process information is different. Furthermore, the openness of social media to digital connectedness is a paradox that deserves consideration. Information disclosure has advantages and disadvantages, ranging from credibility to useless data (Gao et al., 2018). Information overload is caused by a person's inability to manage the information they receive, whether it is too much or too complex for their intellect (Eppler & Mengis, 2004). Open connections have become so complicated, real-time, and functionally widespread that people must be continually connected to the digital world and analyze all available information. This results in information overload (Pentina & Tarafdar, 2014). Thus, the method of informing individuals, typically by celebrities, must be carefully examined. This may improve the knowledge of sponsored items or services (Knoll & Matthes, 2017). Digital information from multiple sources is transparent and available through the digital media. Information openness has been extensively studied, especially in B2C, Financial Market (Yang et al., 2015), and digital privacy (Hung & Wong, 2009) in e-commerce, where openness or transparency of information in terms of availability and accessibility boosts consumer happiness (Sinha & Swearingen, 2002). If the product, vendor, and transaction transparency are met, consumers will be satisfied because information is the basis for purchase decisions (Zhou et al., 2018).

Based on the above explanation, the following hypotheses can be developed:

H_{1a} : Consumers with High Ubiquitous Connectivity characteristics experience Information Overload if they obtain opaque information.

H_{1b} : A relationship exists between Ubiquitous Connectivity and Information Overload.

H_{1c} : There is a relationship between Information Transparency and overload.

Celebrity Endorsement and Information Overload

Celebrities promote companies and services. Celebrity endorsements are believed to boost sales

(Albert et al., 2017; S. (Sam) Kim et al., 2018). This is important because consumers are more attracted to heuristic peripheral cues, such as celebrities, when presented with complex information (Lu & Chi, 2018; Petty et al., 1983). According to certain studies, consumers are more likely to misinterpret words than visual characters, since words are harder to understand (Townsend & Kahn, 2014). Humans are "cognitive misers" and avoid cognition. According to "visual preference heuristics," consumers prefer visual advertising to verbal advertising because images are faster and easier to process (Townsend & Kahn, 2014). "Visual preference heuristics" may only apply to non-consumer-related ads, forcing people to process information peripherally (MacInnis & Jaworski, 1989). When a product is relevant, consumers may be motivated to process cognitive signals using a systematic approach (i.e., verbal cues), which results in a full review of the product and prevents the customer from passing information, unlike visual cues (Townsend & Kahn, 2014). The Internet has transformed how we communicate, especially with the rise in media and information consumption, customers can choose which data to process and which to ignore (Pentina & Tarafdar, 2014). The tremendous accessibility of the Internet exposes customers to a variety of information that can influence their opinions (Pentina & Tarafdar, 2014).

Bright et al. (2015) also stated that increased information accessibility causes fatigue and confuses customers because of their inability to digest it. Thus, consumers choose reputable reference sources such as reviews, testimonials, ratings, and comments (Ghasemaghaei et al., 2018). Consumers observe that celebrities representing a product or brand can increase their purchasing desire (El Hedhli et al., 2021; Huang, 2021). Celebrities can be used as promotional material from two perspectives: credibility and attractiveness. Consumers react differently to these two perspectives (McCracken, 1989). Further, an endorser's credibility leads to trustworthy marketing communications, and the material given has been verified as true (valid) because credibility is based on the endorser's competence (expertise). Thus, customers internalize it, triggering cognition (Biswas & Roy, 2015; Hassan Fathelrahman Mansour & Mohammed Elzubier Diab, 2016). Erdogan (1999) and Mehta (1994) noted that consumers' cognition differs depending on the endorser's celebrity status.

Based on this explanation, the following hypotheses can be formulated:

H_{2a}: Consumers with High Ubiquitous Connectivity characteristics receive product information from celebrities and experience an Information Overload.

H_{2b}: Consumers will experience information overload if they obtain information that is not transparent and is given by celebrities.

H_{2c}: There is a relationship between celebrity endorsements and Information Overload.

Information Overload, Regulatory Focus, and Impulse Buying Tendency

'Experiencing a sudden, unanticipated drive to hedonically gratifying conduct that is momentarily pleasing and then acting on impulse without careful consideration of subsequent negative repercussions' is impulsive behavior. Impulse buying is considered involuntary. Non-reflective, rapid, and frequent purchases of wants. Some people are impulsive because they offer pleasure and passion that a planned purchase cannot offer. Promotion-focused individuals are more receptive to change, pay more attention to innovative traits, and buy more products or new brands compared to prevention-focused individuals (Herzenstein et al., 2007).

Promoters are free to explore, attend to relationships between items, think more abstractly, and better analyses and assess ambiguous inputs and experiences (Semin et al., 2005). Promotion-focused people may be impulsive. Prevention-focused individuals are more aware of dangerous environments (Friedman & Förster, 2001). Prevention-focused people are more planned, analytical, and go through the product in depth before buying it (Semin et al., 2005), while promotion-focused people may make more spontaneous purchases due to their aspirations, achievement-seeking, and risk-taking behavior. Impulse purchases are unplanned (Rook, 1987; Rook & Fisher, 1995). According to the regulation focus theory (Higgins et al., 1997; Moriarty & Higgins, 2015) approach and avoidance are not defined by expected consequences (i.e., pleasure or pain) or end-state reference (desired or undesirable). Instead, self-regulation strategies were used. Maintaining a constant regulatory reference, or self-regulation. People prefer information that supports their beliefs. Under heavy information load, people selectively use information that matches their regulatory orientation (Yoon et al., 2012).

Promotion-focused people rely more on positive information than prevention-focused people under heavy information loads. When the

information load is heavy, promotion-focused people rate brands more than prevention-focused people do. Under low information load, people also use non-regulatory information. Prevention-focused people rely more on positive information than promotion-focused people under low information loads. When information load is minimal, prevention-focused people rate brands more than promotion-focused people (W. Shao et al., 2015; Wang et al., 2020).

Based on this explanation, the following hypotheses can be formulated:

H₃: There is a relationship between Information Overload and Impulse Buying Tendency.

H₄: Regulatory focus moderates the relationship between Information Overload and Impulse Buying Tendency.

Research Methods

This study employed a sequential quantitative design comprising an experimental phase and a cross-sectional survey phase. A quantitative approach was selected because the study aimed to test theoretically derived hypotheses, compare consumer responses across systematically varied information conditions, and estimate relationships among latent constructs (J. F. Hair et al., 2019). The experimental phase was conducted to examine whether variations in information transparency and celebrity endorsement generated differences in information overload across consumer connectivity characteristics. This phase strengthened internal validity by allowing the information conditions to be controlled. The subsequent survey phase examined whether the proposed relationships among ubiquitous connectivity, information transparency, celebrity endorsement, information overload, regulatory focus, and impulse buying tendency are observable in a broader e-commerce consumer sample (J. F. Hair et al., 2019).

ANOVA was used in the experimental phase because of the mean differences of information-overload scores across categorical treatment groups and the interaction effects of the manipulated conditions. In the survey phase, covariance-based structural equation modeling was performed using AMOS. This approach was selected because the study tested a theoretically specified model involving multiple latent variables, each measured through several indicators (J. F. Hair et al., 2019). It also enabled simultaneous evaluation of the measurement model, overall model fit, direct structural relationships, and the moderating role of

regulatory focus. The experimental data were collected from May 2021 to July 2021, followed by survey data collection from August 2021 to September 2021.

270 participants were recruited through purposive sampling, in which researchers selected respondents based on predetermined criteria. This was done for sampled respondents to offer representative data (Sekaran & Bougie, 2016). This study's sample consisted of college students who were avid e-commerce consumers.

This study separated stimuli into four situations with high and low ubiquitous connections, and each participant was assigned to a group. Electronic commerce presidential regulations have also introduced information transparency. Each participant's average weekly internet usage time determined the division of the group. For information to be considered transparent, it must include (1) specifications of goods or services, (2) prices, (3) terms in agreements, (4) payment mechanisms and systems and payment grace periods, (5) delivery mechanisms and systems, (6) risks and expected conditions, and (7) limitations of liability in the event of unexpected risks. Information transparency and celebrity endorsements affect treatment. After the advertisement banner at the start of the questionnaire, participants received a task filter before responding to the variable questions.

The experimental phase involved 270 undergraduate students from Universitas Ciputra Surabaya who were recruited through purposive sampling. Eligible participants were required to be in their sixth semester or above, to have completed relevant courses in marketing management, consumer behavior, global marketing strategy, and/or management information systems, and to have prior experience using e-commerce platforms. These criteria were applied to ensure that participants possessed sufficient familiarity with online shopping, marketing communication, and consumer decision-making concepts to understand the experimental stimuli appropriately.

The use of senior undergraduate students also provided a relatively homogeneous participant group, thereby reducing uncontrolled variations in educational background and basic marketing knowledge. This homogeneity was important for strengthening the internal validity of the experiment. Nevertheless, participants were not selected merely because of their status as students; they represented digitally connected consumers who regularly encountered product information, online advertisements, reviews, and endorsement messages in e-commerce environments.

Before the main experiment, a pretest was conducted with 40 participants, with five participants assigned to each of the eight experimental scenarios. The pretest was used to evaluate the clarity of the scenarios and to determine whether the manipulations of information transparency, celebrity endorsement, and ubiquitous connectivity were perceived as intended. In the main experiment, 240 participants were distributed equally across the eight treatment scenarios, with 30 participants assigned to each scenario. An additional 30 participants were included as a control group, resulting in a total experimental sample of 270 participants. Each participant was assigned to one treatment condition in the between-subject component and evaluated under both high- and low-involvement product scenarios in the within-subject component.

The survey data were analyzed using covariance-based structural equation modeling with AMOS. This approach was selected because the research aimed to test a theoretically specified model comprising multiple latent constructs and hypothesized relationships. Covariance-based SEM enabled the measurement properties of the constructs, overall model fit, and structural relationships to be evaluated within an integrated analytical framework (J. F. Hair et al., 2019; Kline, 2015). The measurement model was evaluated before testing the structural hypotheses. Indicator loadings were examined to determine whether the observed items adequately represented their intended constructs. Average variance extracted was used to assess convergent validity, while construct reliability was examined to evaluate the internal consistency of the measures. The adequacy of the overall model was assessed using multiple goodness-of-fit indices, including the chi-square probability, GFI, AGFI, TLI, CFI, and RMSEA. The use of several fit indices reduced dependence on a single statistical criterion and provided a more comprehensive assessment of model adequacy.

After establishing an acceptable measurement model, the structural relationships were evaluated using standardized path coefficients, critical ratios, and significance values. These estimates were used to test the proposed relationships between ubiquitous connectivity, information transparency, celebrity endorsement, information overload, and impulse buying tendency. The moderating effect of regulatory focus was examined after the direct structural relationships had been assessed. The moderation analysis evaluated whether the relationship between information overload and impulse buying

tendency differs according to consumers' regulatory orientation (Crowe & Higgins, 1997; Higgins, 1997). A significant interaction or difference between the relevant structural paths was interpreted as evidence that regulatory focus altered the strength or direction of the relationship between information overload and impulse buying tendency. All statistical decisions were evaluated using the significance thresholds reported in the study. Effect estimates and model-fit evidence were considered alongside significance values to avoid interpreting the findings exclusively through p-values.

The causal study targeted Indonesian consumers with prior experience purchasing products through e-commerce platforms. Respondents were recruited using purposive sampling because the proposed relationships required individuals who were familiar with online shopping and had been exposed to product information, online reviews, promotional messages, and celebrity endorsements in digital commerce environments. A total of 810 questionnaires were distributed to Indonesian e-commerce users. Of these, 726 questionnaires were returned, resulting in a response rate of approximately 89.6%. Following the data-screening process, only 408 questionnaires were retained for further statistical analysis. The remaining questionnaires were excluded because they did not satisfy the required data-quality and normality assumptions for covariance-based structural equation modeling.

The final sample of 408 respondents represented consumers with direct experience of e-commerce transactions and digital product-information environments. These respondents were considered appropriate for examining the relationships among ubiquitous connectivity, information transparency, celebrity endorsement, information overload, regulatory focus, and impulse buying tendency. Unlike the relatively homogeneous participant group used in the experimental phase, the causal-study respondents represented a broader consumer population. This heterogeneity strengthened the external applicability of the findings and enabled the relationships observed under controlled experimental conditions to be examined in a more natural online-shopping context.

Development of Experimental Treatment Conditions

The experimental design was formulated by converting the conceptual framework into observable treatment conditions. Information

overload was designated as the outcome variable, as the study investigates whether consumers encounter cognitive challenges when processing product-related information. Information transparency and celebrity endorsement were chosen as the manipulated factors, given their relevance to the presentation of product information to consumers. Information transparency was manipulated at two levels—high and low—based on the completeness and clarity of the information provided. Similarly, celebrity endorsement was manipulated at two levels, by presenting the product with either a celebrity or a non-celebrity endorser.

The combination of these two manipulated factors resulted in four treatment conditions: high information transparency with celebrity endorsement, high information transparency without celebrity endorsement, low information transparency with celebrity endorsement, and low information transparency without celebrity endorsement. Ubiquitous connectivity was not manipulated as part of the advertising stimulus; however, it was employed to classify participants into high- and low-connectivity groups based on a pre-test assessment. This classification facilitated comparisons of consumer responses to the four information conditions based on their digital connectivity characteristics. Each participant was subsequently exposed to scenarios involving both high- and low-involvement products. Table 1 provides a summary of the resulting experimental treatment structure.

Table 1
Experimental Design Treatments

STIMULI	HIGH UBIQUITOUS CONNECTIVITY			
	INFORMATION TRANSPARENCY		CELEBRITY ENDORSEMENT	
	HIGH	LOW	CELEBRITY	NON-CELEB
1	✓	-	✓	-
2	✓	-	-	✓
3	-	✓	✓	-
4	-	✓	-	✓
HIGH / LOW INVOLVEMENT PRODUCT				
STIMULI	LOW UBIQUITOUS CONNECTIVITY			
	INFORMATION TRANSPARENCY		CELEBRITY ENDORSEMENT	
	HIGH	LOW	CELEBRITY	NON-CELEB
1	✓	-	✓	-
2	✓	-	-	✓
3	-	✓	✓	-
4	-	✓	-	✓
HIGH / LOW INVOLVEMENT PRODUCT				

Source: Data Processed, 2023

The main study used Zoom virtual conference app; 270 people were divided into 9 virtual rooms (Breakout Rooms). Each Breakout Room had a leader and different stimuli. This trial included 270 students from Ciputra University. This experiment showed that participants had taken and

passed courses on marketing management, consumer behavior, and global marketing strategies. This ensures that everyone knows the basics of marketing and customer behavior. Four methods were used for two customer qualities. We identified participants with high and low Ubiquitous Connectivity during the pre-test. Each consumer attribute is treated in one of four ways: (1) high information transparency and celebrity endorsement; (2) high information transparency and non-celebrity endorsement; (3) low information transparency and celebrity endorsement; and (4) low information transparency and no celebrity endorsement. Each treatment group was assigned to a different group. Each consumer receives the same two scenarios, one for a high-involvement product and one for a low-involvement product.

Participants in the virtual room are unaware of the stimuli they will receive. In its implementation, the Universitas Ciputra students were used; and before completing the questionnaire, they were given a poster relating to high-involvement products that have been given stimuli in the form of high or low Information Transparency and celebrity or non-celebrity endorsement. Next, the participants completed two variable surveys. They then watch movies unrelated to these two factors during the filtering phase. The second scenario, with limited engagement products, continues this exploratory inquiry. In the second scenario, participants were given posters for low-involvement items and then asked to complete surveys about the two variables.



Figure 1. Mockup for Experimental Study
Source: Data Processed, 2023

In addition to the data collection devices for the experimental procedures, a mockup displaying advertisements sponsored by celebrities and non-

celebrities was also employed by researchers; advertisements with celebrities, athletes, and experts as product endorsers. The selected endorser was a low-conflict, non-controversial individual. To avoid interfering with the findings of this experiment, the colors chosen in this model were neutral and not too solid. This was performed to reduce the annoyance effect of the experimental stimuli. Figure 1 are examples of the marketing stimuli used in the experiment.

Results and Discussion

Based on Table 2, the p value for treatment related to Ubiquitous Connectivity is 0.218, indicating that participants in this manipulation check did not comprehend treatment related to High and Low Ubiquitous Connectivity. This can be attributed to the fact that openness connectivity has become an integral part of students' lifestyles, so that there is no significant difference. However, the p-value for the treatment of Information Transparency and Celebrity Endorsement is less than 0.1; therefore, it can be concluded that participants comprehended the treatment provided in relation to these variables. Thus, this experimental study proceeded to the next phase.

Table 2
Manipulation Check

Group Descriptives							
	Group	N	Mean	SD	SE	t	p
UC	1	25	4.303	0.522	0.078	1.246	0.218
	2	15	4.111	0.788	0.133		
IT	1	25	3.946	0.639	0.095	-1.71	0.091*
	2	15	4.163	0.498	0.084		
CE	1	25	3.779	0.695	0.104	-1.95	0.055*
	2	15	4.051	0.558	0.094		

Sig = 10%(*)

Sig = 5%(**)

Sig = 1%(***)

Source: Data Processed, 2023

In addition, this study continued to employ the independent sample t-test and ANOVA to evaluate whether participants' views of the test variables differ. The independent sample t-test assesses whether each independent variable is seen differently. The results of the t-test for the independent samples are shown in table below.

With a t-value of -0.480 and a p-value of 0.631, the results in Table 3 indicate that ubiquitous connectivity has no effect on information overload. This is because from the perspective of students as participants, digital connectivity has become so widespread that staying linked to the

digital world has become a need. For information transparency, however, a substantial difference can be observed, as indicated by the t value of -2.29 and the p value of 0.022. Regarding this variable, it is evident that, even in the setting of students as participants, when each student has prior Access with internet access and the digital world, their capacities to comprehend incoming information vary. The final item is the celebrity endorsement variable, which does not appear to significantly affect information overload.

Table 3
Independent sample t-test

Independent sample t-test				
Dependent variable	Independent Variables	t	df	P
Information_Overload	Ubiquitous_Connectivity	-0.480	477.362	0.631
	Information_Transparency	-2.293	479.313	0.022
	Celebrity_Endorsement	-0.982	477.828	0.326

Note. Welch's t-test.

Source: Data Processed, 2023

Table 4
ANOVA (F-Test) – Ubiquitous Connectivity_Information Transparency

ANOVA - IO					
Cases	Sum of Squares	df	Mean Square	F	p
Ubiquitous	0.132	1	0.132	0.238	0.626
Information Transparency	2.972	1	2.972	5.375	0.021
Ubiquitous * Information Transparency	6.781	1	6.781	12.26	<0.001
Residuals	263.203	476	0.553		

Note. Type III Sum of Squares

Source: Data Processed, 2023

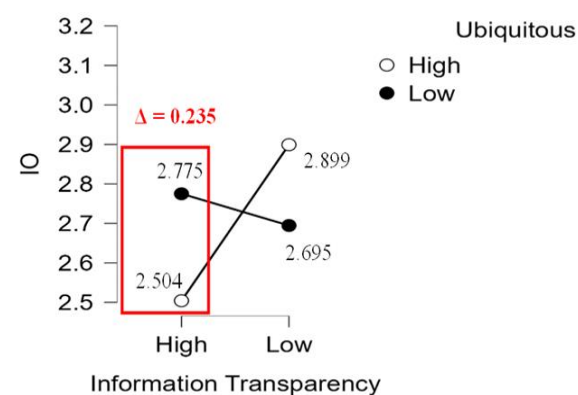


Figure 2. ANOVA_1

Source: Data Processed, 2023

Based on Table 4, the F-test on the connectedness of Ubiquitous Connectivity and

Information Transparency is fulfilled with an F-value of 12.26, $p < 0.001$. In addition, in Figure 2, it is also clear that when consumers have very transparent information, consumers with High Ubiquitous Connectivity tend to experience lower Information Overload compared to consumers with Low Ubiquitous Connectivity. The opposite also applies, where consumers with High Ubiquitous Connectivity will more easily experience Information Overload if faced with non-transparent information. Therefore, it can be concluded that H1a hypothesis, which states that consumers are more vulnerable to Information Overload if they have a High Ubiquitous Connectivity and are exposed to information that is not transparent, is significantly supported ($F = 12.26$, $p < 0.001$).

Another ANOVA test examined the association between Ubiquitous Connectivity and Celebrity Endorsement, the findings of which are summarized in Table 5.

Table 5
ANOVA (F-Test) – Ubiquitous
Connectivity_Celebrity Endorsement

ANOVA - IO					
Cases	Sum of Squares	df	Mean Square	F	p
Celebrity Endorsement	0.55	1	0.55	0.99	0.32
Ubiquitous	0.132	1	0.132	0.237	0.627
Celebrity Endorsement* Ubiquitous	8.006	1	8.006	14.413	<0.001
Residuals	264.399	476	0.555		

Note. Type III Sum of Squares

Source: Data Processed, 2023

Based on Table 5, it can be seen that the F-test for the connectedness of Ubiquitous Connectivity and Celebrity Endorsement is satisfied with an F value of 14.413 and p value of 0.001. Therefore, it can be concluded that H2a, which states that consumers will be more susceptible to Information Overload if the consumer has high ubiquitous connectivity and if the product is endorsed by celebrities with significant endorsements, is supported. Table 5 test results are shown in figure 3.

It can be observed from the image that consumers with high Ubiquitous Connectivity are more likely to face Information Overload due to Celebrity Endorsement than if the product is not promoted by celebrities. This is possible because the general effectiveness of the use of celebrities

in conveying information about a product is still a subject of much debate, despite claims that it has a positive effect on the product or service represented (Albert et al., 2017; El Hedhli et al., 2021). The legitimacy and congruence of an endorsement must also be examined, because they are tied to the nature of the product being promoted.

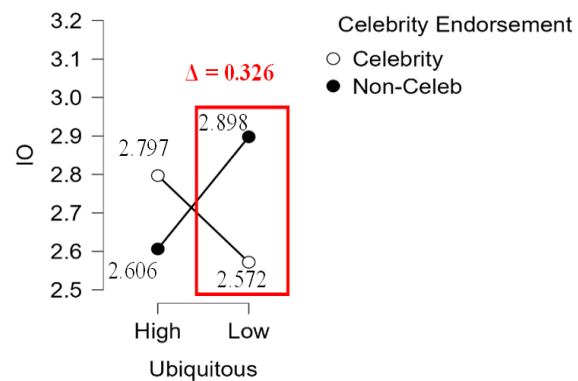


Figure 3. ANOVA_2

Source: Data Processed, 2023

In addition, we observed that the use of celebrities as product or service endorsers plays a significant role in the creation of Information Overload, particularly for Low Ubiquitous customer types. As indicated by the figure of 0.326, this is plausible because, as stated in earlier research, celebrities have a greater impact than expert endorsers (Kusumasondjaja & Tjiptono, 2019). Some customers experience information overload due to the generic nature of celebrity information (Kuvita & Karlíček, 2014; Urrutikoetxea Arrieta et al., 2019). The next test examined the link between Information Transparency and Celebrity Endorsement variables, and the findings are shown in Table 6.

Table 6
ANOVA (F-Test) – Information Transparency_
Celebrity Endorsement

ANOVA - IO					
Cases	Sum of Squares	df	Mean Square	F	p
Celebrity Endorsement	0.55	1	0.55	0.98	0.32
Information Transparency	2.972	1	2.972	5.32	0.02
Celebrity Endorsement* Information Transparency	3.555	1	3.555	6.36	0.01
Residuals	266.009	476	0.559		

Note. Type III Sum of Squares

Source: Data Processed, 2023

Based on Table 6, we may conclude that the H2b hypothesis, which claims that consumers will be more sensitive to Information Overload if (a) exposed to non-transparent information and (b) backed by celebrities, is significantly supported with an F value of 6.360, $p = 0.01$. In addition, the findings is shown in Table 6.

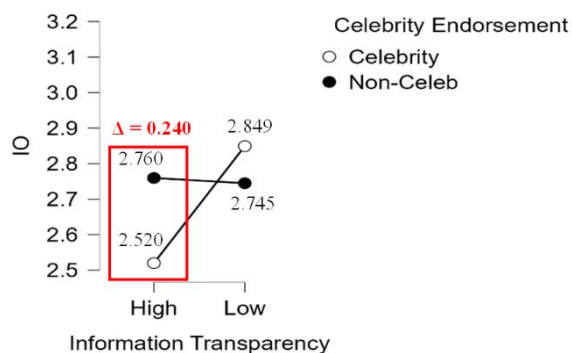


Figure 4. ANOVA_3

Source: Data Processed, 2023

Figure 4 demonstrates that when consumers are exposed to non-transparent materials supported by celebrities, they are more likely to experience Information Overload than when they are exposed to non-celebrity endorsements. This is because when consumers are exposed to opaque information and celebrities endorsement Simultaneously it is possible that the information cannot be processed properly. Huang (2021) found that the use of celebrities as promotional media is an effective method of advertising. Furthermore, celebrities are believed to be able to vouch for the quality of a product, so they are frequently used as spokespersons to represent the product (McCracken, 1989).

Causal Research

According to Indonesia E-commerce Mapping 2018, 95.4% of online marketplace consumers are Generation Z or Y. According to Choirul & Artanti (2019), millennials favor spontaneous purchases and are closely tied to internet purchases (Salim et al., 2019). Thus, this study used 16- to 37-year-olds. The number of questionnaires administered in this study was 810, and only 726 were returned, resulting in a response rate of 89.62 percent. However, not all returned questionnaires could be processed because of (1) indications of incomplete filling (missing data) and (2) failure to meet the criteria. This is possible because of the online distribution of this questionnaire; hence, the obtained inaccuracy was substantial. A total of 560

respondents were employed in this study, with 246 female (44 percent) and 314 male (56 percent) respondents, selected based on the criteria provided. Only about 18 percent of respondents were located outside Java, and the majority of respondents were older than 29 years old (43 percent), followed by those younger than 21 years old (22 percent), those between 21 and 24 years old (21 percent), and those between 25 and 29 years old (14 percent). In addition, the online shopping frequency of these respondents was three transactions per month for 49 percent, 3-5 to transactions per month for 34 percent, and more than five times per month for 17 percent.

Results

The values of the loading factor and extracted Average Variance represent the outcomes of the validity test (AVE). Table 7 displays the results of the validity and reliability tests.

Table 7
Validity and Reliability

Variable	Dimensions	Items Operational	Factor Loading		Relia-Validity	
			Lowest	Highest	bility (AVE)	
Ubiquitous Connectivity	Communi-cation	4 Items	0.553	0.882	0.879	0.544
	Digital Services	4 Items	0.613	0.919	0.936	0.646
Information Overload	Limited Information Processing	4 Items	0.507	0.901	0.871	0.610
	Working Memory	2 Items	0.708	0.732	0.708	0.519
Information Transparency	Quality	3 Items	0.413	0.839	0.828	0.516
	Reputation	3 Items	0.671	0.801	0.878	0.569
	Ordering	3 Items	0.878	0.925	0.97	0.801
	Warranty	4 Items	0.733	0.909	0.994	0.56
	Feature	4 Items	0.692	0.839	0.934	0.603
Impulse Buying Tendency	Cognitive	5 Items	0.638	0.814	0.886	0.534
	Affective	9 Items	0.582	0.770	0.896	0.500
Regulatory Focus	Prevention	3 Items	0.702	0.745	0.683	0.524
	Promotion	2 Items	0.709	0.742	0.688	0.527
Celebrity Endorsement	Attractiveness	5 Items	0.796	0.866	0.949	0.711
	Expertise	5 Items	0.861	0.916	0.966	0.773
	Trustworthy	7 Items	0.822	0.899	0.969	0.782

Source: Data Processed, 2023

The loading factor values of the eight operational items modified from the Ubiquitous Connectivity variable meet the minimum requirement of 0.5, as shown in Table 7. The Average Variance Extracted (AVE) value for each dimension is above 0.5, meeting the validity assumption. Table 7 shows that reliability tests are met, with results over 0.6 for each dimension. This study used Information Overload with two dimensions and seven operational items. Six items

were used, as one item did not meet the loading factor requirements. The validity assumption is met as the loading factor is over 0.5, and the AVE value is above 0.5. The reliability test was conducted for Cronbach's alpha values greater than 0.6. Information Transparency has five dimensions (features, quality, reputation, ordering process, and warranty) with 17 operational elements (one was excluded due to insufficient loading factor). All operational components have a loading factor value > 0.5 , and an AVE value > 0.5 , meeting the validity and reliability tests. Impulse Buying Tendency has two dimensions: cognitive (9 questions) and affective (11 items). Validity tests suggest that only 14 of the 20 items could be used, and Impulse Buying Tendency variable is legitimate because the loading factor value for each operational item is above 0.5, and the validity test is based on the value of AVE, which is above 0.5. Reliability testing using the Cronbach alpha value above 0.6 is also met. Next is the Regulatory Focus variable, which has two dimensions: Promotion Focus, which contains seven operational items, and Prevention Focus, which has four out of a total of 11 operational items. Only five operational items could be used to measure this variable. According to Table 7 the loading factor value is above 0.5, the AVE value is above 0.5, and Cronbach's value is above 0.6, indicating that the variable is valid and reliable. The final component, Celebrity Endorsement, comprises three dimensions: attractiveness, expertise, and trustworthiness. Seventeen operational components comprise this variable. The validity test is passed since each operational item, dimension loading factor, and AVE values are above 0.5, as shown in Table 7. With a Cronbach's rating above 0.6, reliability testing also satisfied these standards. This study will continue if all operational items are valid and reliable.

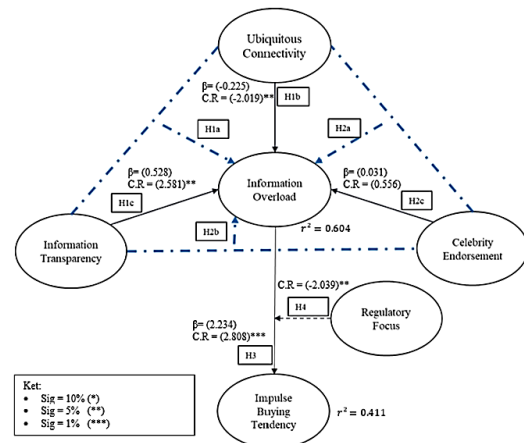
Probability = 0.124, CFI = 0.995, GFI = 0.973, and RMSEA = 0.024 are all within acceptable ranges, indicating that the overall model fit for the constraint model is satisfactory. The significance probability value is 0.124, which is higher than the minimum threshold of 0.05, indicating that the analyzed model is satisfactory overall. Furthermore, the GFI and AGFI values are higher than 0.9, demonstrating that the model has a good fit. Likewise, TLI and CFI values higher than 0.9 demonstrate that the model studied has an outstanding overall fit. Furthermore, the RMSEA value for this study is 0.026, demonstrating

that the model has a strong correlation with the population covariance matrix.

Table 8
Goodness of Fit

Goodness-of-Fit Index	Cut-Off Value	Observed Value	Interpretation
CMIN	Expected to be small	64.705	Fit
Significance Probability	≥ 0.05	0.124	Fit
RMSEA	$\geq 0.08^*$	0.024	Fit
GFI	≥ 0.90	0.973	Fit
AGFI	≥ 0.90	0.929	Fit
TLI	≥ 0.95	0.989	Fit
CFI	≥ 0.95	0.995	Fit

Source: Data Processed, 2023



Notes: Sig = 10% (*); Sig = 5% (**); Sig = 1% (***)

Figure 5. t-test

Source: Data Processed, 2023

Figure 5 shows that in the constraint model test, which takes moderation variables into account, Hypothesis 1b, which states that there is a relationship between ubiquitous connectivity and information overload, is significantly supported ($C.R. = (-)2.091$, $p = 0.043$) and marked by the value of $\beta = (-)0.225$, indicating that the connection is significant. Digital connectivity skills improve information management. This is consistent with previous research that found that while the increased use of technology and digital services promotes overload, it depends on service users (Roetzel, 2019). When a person is exposed to varied digital connectivity and cannot effectively handle information, it will be difficult for said customer or individual to make an ideal buying decision, generating an information overload issue (J. V. Chen et al., 2019; Teofilus et al., 2020).

Hypothesis 1c, which links information transparency to overload, is also supported ($C.R. =$

2.581, $p = 0.010$). Sun et al. (2019) found that confusing or overwhelming information can cause information overload for consumers. The value of $\beta = 0.528$ implies that the more information supplied to consumers, the harder it will be for them to make purchasing decisions based solely on the seller's information because they mistrust the seller's product or service descriptions and more profitable information by service provider. Thus, they seek subjective personal consumer reviews (Ghasemaghahi et al., 2018). Filieri et al. (2018) claimed information from multiple sources can produce confusion and Information Overload, making it hard for customers to make judgments. Hypothesis 2c suggests that celebrity endorsements and information overload are generally correlated. Although the results of testing this hypothesis are not significantly supported ($C.R=0.556$, $p=0.578$), several studies support the hypothesis proposed by Bright et al. (2015) that high accessibility of information will make consumers feel tired and confused because of their inability to process the information. Thus, consumers will favor trustworthy reference sources such as reviews, testimonials, ratings, and comments (Ghasemaghahi et al., 2018).

With a value of $\beta = 0.031$, celebrities as promotional media depends on two factors: trustworthiness and attractiveness, which leads to distinct consumer responses (McCracken, 1989). Furthermore, an endorser's credibility will lead to trustworthy marketing communications and validated information because the endorser's competence is what is viewed (expertise). Consumers internalize and think about it (Biswas & Roy, 2015; Hassan Fathelrahman Mansour & Mohammed Elzubier Diab, 2016). Several studies linked celebrity endorser characteristics to information overload (Huang, 2021; McCracken, 1989). However, Erdogan (1999) refuted this by saying that the use of celebrities as promotional media is not necessarily effective and suggested that companies should use someone who can be controlled to convey marketing communications optimally to consumers because celebrities are considered to already have their own persona that can captivate the public and can be overpowering. Consumers may be more interested in the celebrity persona than in the brands or products.

Over time, celebrity stimuli become unfocused because the celebrity is associated with numerous things besides the object being represented (Park & Yim, 2020). Hypothesis 3, that the Information Overload variable is

associated with impulse buying ($C.R = 2.808$, $p = 0.005$), is supported by multiple prior studies, including Tankovic & Benazic (2018)'s study on online shopping information overload. This is supported by a study by Soto-Acosta et al. (2014), who found that Information Overload affects a person's buying interest because of the lack of face-to-face interaction when shopping online and the overemphasis on visual attention to influence consumer impulsive behavior. Hypothesis 4, which states that regulatory focus variables moderate the link between information overload variable and impulsive buying, is also supported ($t = 3.983$, $p < 0.01$). Table 9 shows that information overload and regulatory focus can predict impulse buying tendency ($F = 47.309$, $p < 0.001$), and regulatory focus can considerably decrease information overload and impulse buying tendency ($t=3.879$, $p<0.001$). In this moderation test, regulatory focus reduces the connection between information overload and impulse buying. The moderating variable reduces the direct effect of information overload on impulse purchase tendency from 2.234 to -0.424.

Table 9
Goodness of Fit

Model	Coefficients			ANOVA			
	Un-standardized	Standard Error	Standardized	t	p	F	p
H1 (Intercept)	4.013	0.447		8.975	< .001		
IO	-0.424	0.153	-0.515	-2.78	0.006	47.309	< 0.001
RF	-0.24	0.125	-0.394	-1.92	0.055		
IO*RF	0.158	0.041	1.242	3.879	< .001		

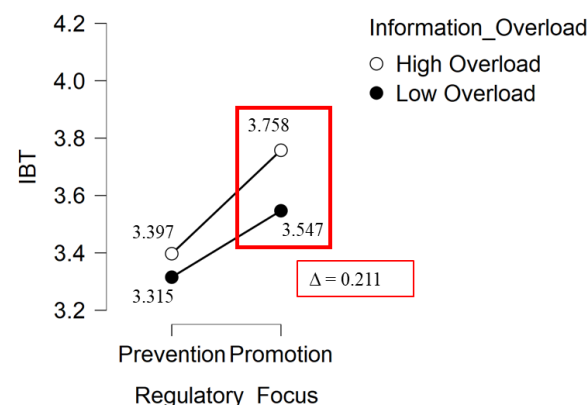


Figure 6. Moderating Effect

Source: Data Processed, 2023

Figure 6 reveals that customers who concentrated on prevention have no significant difference in character with value (PrevHi = 3.397; Prev Low = 3.315), but those who focus on promotion have a significant difference in value (PromHi = 3.758; PromLow = 3.547). This suggests that if a

promotion-focused character has information overload he/she will be less impulsive in online transactions, but if he/she does not, he/she will be more impulsive. Under a high information load, consumers with a promotion focus selectively depend on information that supports their views and decisions (Hartmann et al., 2020; Wang et al., 2020). Promotion-focused people rely more on positive information than prevention-focused people under heavy information loads. When the information load is heavy, promotion-focused people rate brands more than prevention-focused people do.

Managerial Implication

The findings indicate that digital businesses should prioritize the optimization of information rather than its maximization. An increase in product descriptions, reviews, ratings, promotional claims, and endorsements does not inherently lead to improved consumer decision-making. Managers must ensure that the information provided is relevant, credible, well-structured, and proportionate to the complexity of the purchasing decision (Roetzel, 2019). The information architecture should facilitate the rapid identification of essential product attributes by consumers. E-commerce platforms can employ comparison tools, filters, concise summaries, verified reviews, visual hierarchies, and progressive disclosure to alleviate unnecessary cognitive load (Eppler & Mengis, 2004; Roetzel, 2019). Critical information regarding price, product specifications, delivery, warranties, risks, and return policies should be consistently presented and not obscured by repetitive promotional content. This recommendation is consistent with recent research showing that online reviews can become difficult to process when consumers encounter a large number of text, image, and video elements without sufficient organization or diagnostic value (Wang et al., 2024).

Furthermore, managers should differentiate between transparency and information abundance. Transparent communication necessitates the disclosure of decision-relevant information in a format that consumers can comprehend and evaluate. Excessive disclosure without proper organization may lead to confusion and diminish decision confidence (Fan et al., 2024; Granados et al., 2010; Saranya P. & Joji Alex N., 2024). Therefore, firms should assess the usability and diagnostic quality of the information provided,

rather than relying solely on the volume of content displayed. The findings related to celebrity endorsement suggest that managers should not rely exclusively on celebrity visibility to influence consumers. Celebrity endorsers should be chosen based on their credibility, expertise, trustworthiness, and alignment with the product (McCracken, 1989). Recent research also indicates that social-media celebrity endorsements may affect impulsive buying through consumer trust, observational learning, and social-commerce mechanisms (Z. Shao et al., 2024).

The endorser should enhance the communication of product value rather than overshadow the advertisement or distract consumers from critical information. When celebrity-based promotion is paired with opaque or excessive information, consumers may focus on the celebrity while neglecting to adequately evaluate the product.

The moderating role of regulatory focus also has implications for market segmentation and message design. Promotion-focused consumers may respond more positively to communication that emphasizes aspiration, enjoyment, novelty, and potential gains. Conversely, prevention-focused consumers may be more receptive to messages that highlight reliability, safety, responsibility, and risk reduction (Crowe & Higgins, 1997; Higgins, 1997). Nonetheless, such personalization should aid informed decision-making rather than exploit consumers' cognitive limitations. Information overload should be regarded as a consumer-welfare issue. Although overload-induced impulse buying may generate short-term sales, it can subsequently lead to regret, returns, complaints, reduced trust, and weakened customer relationships (Y.-C. Chen et al., 2009; Fan et al., 2024). Responsible information design can thus support both commercial performance and long-term consumer confidence. Firms should consider clear and manageable information as an integral component of customer relationship management, ethical marketing, and sustainable digital-platform governance.

Theoretical Implication

This study advances research in consumer behavior and information processing by integrating Information Processing Theory and Regulatory Focus Theory within the context of e-commerce. Information Processing Theory posits that consumers have limited cognitive capacity,

which may be challenged when the quantity, complexity, ambiguity, or organization of product information surpasses their processing abilities (Atkinson & Shiffrin, 1968; Eppler & Mengis, 2004). The findings extend this perspective by illustrating that the behavioral outcomes of information overload are partially contingent on consumers' regulatory orientation. The moderating role of regulatory focus suggests that information overload does not affect all consumers uniformly. Consumers with a promotion focus and those with a prevention focus differ in the information they prioritize, the risks they perceive, and the decision strategies they employ (Crowe & Higgins, 1997; Higgins, 1997; Peng et al., 2022). Thus, regulatory focus serves as a critical boundary condition in the relationship between information overload and impulse buying tendency.

This study further differentiates between the presence of information and its processability. An increase in information availability does not inherently reduce uncertainty or enhance decision quality. Information may appear formally transparent yet remain cognitively challenging to evaluate when it is excessive, fragmented, repetitive, or insufficiently diagnostic (Granados et al., 2010; Wang et al., 2024). Therefore, the theoretical significance of information transparency should be evaluated not only by information quantity but also by clarity, relevance, credibility, and organization. Additionally, the non-significant direct relationship between celebrity endorsement and information overload offers a more nuanced understanding of endorsement effects. The mere presence of a celebrity may not suffice to induce information overload. Its impact may depend on the transparency of the accompanying information, product–endorser match, message credibility, and the consumer's existing level of digital exposure (McCracken, 1989; Z. Shao et al., 2024). Consequently, celebrity endorsement should be viewed as a contextual information cue rather than a universally effective or detrimental stimulus.

The positive relationship between information overload and impulse buying tendency further implies that constrained information processing may lead to behavioral consequences. When comprehensive evaluation becomes challenging, consumers may simplify their decisions and rely more on salient, affective, or heuristic cues (Y.-C. Chen et al., 2009; Petty et al., 1983; Rook, 1987). However, this study did not directly test cognitive strain, decision

confusion, emotional arousal, or heuristic reliance as mediating variables. These mechanisms should thus be considered theoretically grounded explanations that warrant direct investigation in future research.

Conclusions and Implications

Both methodologies suggest that experimental research can generally address the problem formulation. Causal study testing revealed that most variable links were significant, confirming the problem formulation. However, differences emerged between experimental and causal investigations. Independent variables, such as information openness, consistently influence information overload in both experimental and causal investigations. Celebrity endorsement is not associated with information overload in either experimental or causal research. In causal research, Ubiquitous Connectivity can affect Information Overload; however, in experimental study, it does not. This discrepancy arises because the experimental approach involved university students, who are predominantly proficient in the digital world, whereas causal research involved average consumers, who may have financial or cognitive limitations in the digital realm.

Limitation and Further Research

This study has some limitations: (1) This research is experimental in nature and examines the effect of independent variables on the creation of information overload, without assessing the amount of information overload itself. Thus, future studies can be conducted to determine if there are individual variations in the amount of surplus information. (2) The drawback of this study is that it only takes into account three independent variables: ubiquitous connectivity, information transparency, and celebrity endorsement. Consequently, future experiments should incorporate additional variables such as culture and digital literacy to provide a more comprehensive set of results. Third, this study was conducted at a specific time; therefore, it will be necessary to conduct similar research with a time gap to assess the consistency of this phenomenon over time. Finally, the results of this study suggest that celebrities do not contribute to information overload. In the future, it may be possible to gain a better understanding of how celebrity communication is linked to the dissemination of

information by analyzing high- or low-eclipsing communication.

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