




A Meta-Analysis of Online Impulsive Buying and the Moderating Effect of Economic Development Level

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Accepted: 25 June 2021 / Published online: 11 August 2021

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Abstract

Online impulsive buying has become increasingly prevalent in e-commerce and social commerce research, yet there is a paucity of systematically examining this particular phenomenon in the paradigm of information systems. To advance this line of research, this study aims to gain insight into online impulsive buying through a meta-analysis of relevant research. Derived from 54 articles, this meta-analysis categorized the critical factors that influence online impulsive buying into the website, marketing, and affective stimuli. This study further explores the moderating effect of economic development level. The empirical results reveal that the chosen 13 main factors are significantly and positively related to online impulsive buying except for website security, price, novelty, and negative emotion. Moreover, economic development level moderates the relationship between several factors (i.e., website visual appeal, ease of use, price, promotion, pleasure, and positive emotion) and online impulsive buying. This study contributes to both theory and practice. It not only extends the impulsive buying literature to the online context by emphasizing the IT-supported website stimuli, but also provides implications for future research on online impulsive buying behavior across different economic development levels. Moreover, it provides guidelines for practitioners on how to leverage information technology to induce online impulsive buying.

Keywords Online impulsive buying · Meta-analysis · Economic development level · Moderating effect

1 Introduction

With the prosperity of e-commerce, we have witnessed a paradigmatic shift where an increasing amount of people switch from offline to online shopping. Since 2015, the number of

global online shoppers has been on the rise, exceeding 1.7 billion in 2018 and reaching 1.92 billion in 2019. It is expected to maintain a significant upward trend in the future (iimedia, 2021). In particular, during the COVID-19 pandemic, online shopping has increased significantly across many categories, and consumers' intentions to shop online continue to grow (Tamara et al. 2020). In the online context, consumers are highly susceptible to irrational purchases, such as impulsive buying (Chen & Zhang, 2015). Impulsive buying, defined as consumers making unplanned purchases suddenly (Rook, 1987), occurs more online. Previous research suggested that impulsive purchases are 5% more likely online than offline (Nielsen, 2017), and money spent on online impulsive buying approximately accounts for 40% of consumers' online expenditure (Liu et al., 2013).

Noticing the trend, researchers have made comparisons between offline shopping and online shopping (Gilly & Celsi, 2000; Levin et al., 2005; Sarkar & Das, 2017; Wang et al., 2018). The key differences between online and offline shopping are the way product information being collected, perceived risk, and the ability of consumers to access similar products based on preference (Sarkar & Das, 2017). Additionally, compared with offline shopping, online

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shopping, supported by information technology, offers more favorable and facilitating conditions to impulsive buying in terms of the shopping environment (Eroglu et al., 2001), such as simplified product-searching process and easy to buy (e.g., one-click ordering) (Verhagen & Dolen, 2011). The impulse is more about motivating consumers to buy through human-computer interactions in the buying process (Nielsen, 2017).

In the extant studies, researchers have primarily explored the antecedents of online impulsive buying behavior based on the Stimulus-Organism-Response (SOR) framework, and online impulsive buying is seen as the result of being exposed to a stimulus (Mehrabian & Russell, 1974; Piron, 1991). In previous research, the main antecedents (stimuli) of online impulsive buying can be generally divided into three types: website, marketing, and affective. First, website stimuli are the key factors that distinguish online impulsive buying from offline one. E-commerce website plays as an intermediary between consumers and products, and consumers' online buying process has to interact with the website, which directly affects the possibility of online impulsive buying (Wells et al., 2011). For instance, Åberg and Kurdieh (2013) suggested that online grocery shopping sites can successfully trigger consumers' online impulsive buying by emphasizing features associated with interactivity. In terms of website stimuli, researchers have investigated website security, website navigability, website visual appeal, interactivity, ease of use, etc. All these features are realized by information technology and online exclusive. Second, marketing stimuli also play a crucial role in influencing online impulsive buying. Among marketing stimuli, some factors are similar to those in offline impulsive buying, such as discount price and promotion (Iyer et al., 2019). However, the online context has its unique advantages, because IT-facilitated online context can amplify the effect of scarcity on online impulsive buying (Wu et al., 2020). For example, online retailers can provide real-time inventory availability information, which underlines the scarcity effect. The results of field experiments on Amazon show that a 10% increase in past claims leads to a 2.08% increase in cart add-ins in the next hour (Cui et al., 2019). Third, affective stimuli as internal trigger cues were widely studied in prior research on online impulsive buying. Consumers' affective state is found to have an influence on their online impulsive buying behavior (Dawson & Kim, 2009). For example, researchers suggested that pleasure and arousal both positively affect online impulsive buying (Liu et al., 2020). The most widely studied affective stimulus factors include arousal, pleasure, positive emotion, and negative emotion.

As a research topic with many empirical studies, researchers have conducted meta-analyses on impulsive buying (Amos et al., 2013; Iyer et al., 2019). However, despite that the online context has its idiosyncrasies and warrants further investigation, there is a scarcity of comprehensive research on online impulsive buying, and the role of information

technology has yet to be investigated. Since consumers' shopping behavior in offline physical stores is rather divergent from that of online shopping, the triggers of impulsive buying are also different between the online and offline paradigms. Besides the antecedents of traditional offline impulsive buying, online impulsive buying is also affected by a myriad of factors, especially website-related factors. Websites play a crucial role in the shopping process, acting as the mediator between products and consumers that helps to build consumer relationships, facilitate consumer support, and convert visitors into consumers in the online context (Ghose & Dou, 1998). Hence, it is of vital importance to shed new light on and further examine consumers' online impulsive buying. Albeit considerable empirical research, results are inconsistent in the literature. Take online stores' navigability for an example, Zou (2018) found that it has a strong positive relationship with online impulsive buying, whereas Floh and Madlberger (2013) showed that the influence of online store's navigation is insignificant. Therefore, it is paramount to synthesize these inconsistent findings and further investigate the phenomenon. Meta-analysis, as an integrated statistical analysis, can quantify the inconsistency of results across studies and this method has been frequently applied to information systems research (Ismagilova et al., 2020; Tamilmani et al., 2020; Trang & Brendel, 2019).

This study aims to gain insight into online impulsive buying by conducting a meta-analysis of relevant research, hoping to further advance this line of research and fill the research gap that website stimuli have yet to be scientifically epitomized and there is no comprehensive review on online impulsive buying. In addition to emphasizing the IT-supported website stimuli, this meta-analysis also synthesizes the inconsistent findings and uncovers the key factors influencing online impulsive buying from the marketing and affective perspectives, as well as the moderating effect of economic development level. To our knowledge, this is the first meta-analysis on online impulsive buying where website stimuli are first included in the comprehensive research on online impulsive buying. 1354 sample papers were collected by retrieving a combination of keywords in academic databases, and they were carefully screened before the meta-analysis. Finally, 54 related empirical studies were used for the analysis. These studies were published during 2006–2020, which is in correspondence with the development process of e-commerce research from early to modern times. Regarding the development of electronic commerce, the second wave began in 2004 and the third wave began in 2010 (Schneider, 2017). In 2006, electronic commerce has reached a high development speed and received wide attention. After that, the advancement of information technology contributes to the fast growth of e-commerce, which has amplified impulsive buying behavior in the online context. To conclude, the time frame of this study is from 2006 to 2020, which includes the research on online

impulse buying from the early to the modern stage. The time frame covers the electronic commerce recent developing stages, and the results are comprehensive. Specifically, the results showed that the chosen 13 main factors are significantly and positively related to online impulsive buying except for website security, price, novelty, and negative emotion. Furthermore, the relationship between several factors (i.e., website visual appeal, ease of use, price, promotion, pleasure, and positive emotion) and online impulsive buying are significantly moderated by economic development level. This study contributes to the research on online impulse buying: first, this research fills the literature gap by synthesizing inconsistent results of the existing research on online impulsive buying and highlighting the importance of website stimuli; second, we provide a theoretical basis for future research on online impulsive buying by proposing a comprehensive framework that includes the website, marketing, and affective stimuli; third, we provide implications for future research on online impulsive buying behavior across different economic development levels; fourth, this study provides managerial guidelines for practitioners of e-commerce websites. With the analysis results, they can take appropriate actions to optimize consumers' online buying experience and use marketing methods to induce online impulse buying.

2 Literature Review and Hypothesis Development

2.1 Impulsive Buying and Online Impulsive Buying

According to Rook (1987), impulsive buying is defined as “a sudden, often powerful and persistent urge to buy something immediately”. Based on the definition, Beatty and Ferrell (1998) extended the definition as “a sudden and immediate purchase with no pre-shopping intentions either to buy the specific product category or to fulfill a specific buying task”. Although the definitions of impulsive buying varied in detail, the nature of it remains the same — unplanned. Previous studies have investigated it from various perspectives, including environment (Chang et al., 2011; Mattila & Wirtz, 2008; Mohan et al., 2013), individual (Peck & Childers, 2006; Sharma et al., 2010; Verplanken & Herabadi, 2001), product (Bellenger et al., 1978; Kacen et al., 2012; Liao et al., 2009). To integrate diverse findings and to provide a comprehensive overview of impulsive buying, researchers have made considerable efforts to review the literature (Amos et al., 2013; Iyer et al., 2019; Muruganatham & Bhakat, 2013).

In recent years, the advancement of information technology contributes to the fast growth of e-commerce, which amplified impulsive buying behavior in the online context. From the view of facilitators, taking advantage of information technology, consumers are experiencing a much smoother buying

decision process in the online context. First, navigation and search functions help consumers accelerate their searching process, and some people may come to a quick decision (Moe, 2003). Second, personalized recommendation efficiently optimizes consumers' product discovery process, which drives impulsive buying (Smith & Linden, 2017). Third, one-click buying online makes the path to purchase shorter and easier, which both increases the conversion rate and the incidences of impulsive buying (Verhagen & Dolen, 2011). In general, with all these IT-facilitated features, consumers' online shopping experience is smoother and the likelihood of impulsive buying may increase (Stern, 1962). However, from the view of prohibitors, consumers may have security concerns. That is, making consumers feel secure is the prerequisite for online shopping. Besides, people with little Internet experience may have higher shopping costs online. Even experienced online shoppers may get frustrated if the website is hard to use. In this regard, optimizing the website and making it easy to use is necessary. These are specific factors that influence consumers' online shopping experience dramatically. Therefore, exploring how different factors, especially website-related attributes, affect online impulsive buying is worthwhile (Liu et al., 2013; Parboteeah et al., 2009; Turkyilmaz et al., 2015).

Website-related attributes, supported by information technology, serve as environmental cues for online impulsive buying and they can be categorized into task-relevant cues and mood-relevant cues (Parboteeah et al., 2009). Task-relevant cues, such as navigability and search functions, can help consumers achieve their online shopping goals. On the contrary, mood-relevant cues, such as website visual appeal, mainly influence how much users enjoy browsing a website, but they do not directly support specific shopping goals (Parboteeah et al., 2009). Focusing on the website attributes as stimuli, Liu et al. (2013) found that website ease of use, website visual appeal, and product availability (scarcity) are crucial antecedents of online impulsive buying. Despite the meta-analysis of impulsive buying, to our knowledge, there is no meta-analysis on online impulsive buying, and hence these unique website stimuli were not emphasized. Therefore, this study aims to bridge this research gap and provide an amalgamation of the findings of online impulsive buying.

Traditional impulsive buying studies have divided influencing factors into two categories: internal and external ones (Iyer et al., 2019; Kalla & Arora, 2011; Wansink, 1994; Xiao & Nicholson, 2013). The most widely studied internal factors are consumer-related factors, like impulsive buying tendency and pre-purchase mood (Ozer & Gultekin, 2015). Take a step further, researchers explored more into consumers' emotion-related factors, which are defined as affective stimuli factors. As for external factors, environmental factors, such as window displays and in-store design are widely studied (Gudonavičienė & Alijošienė, 2015).

When it comes to the online context, internal factors remain unchanged. The main internal factors are still personality, hedonic motivation, trust, and so on. However, external factors are different from those of offline, mainly because online impulsive buying happens when a consumer interacts with the website (Verhagen & Dolen, 2011). That is, websites act as an intermediary between consumers and products. Consequently, online impulsive buying researchers have seen website-related attributes, such as IT-facilitated website attributes and media format (Adelaar et al., 2003; Liu et al., 2013), as the primary external environmental factors. For website attributes, perceived ease of use, visual appeal, and product availability (scarcity) are crucial cues of online impulsive buying (Liu et al., 2013). For media format, Adelaar et al. (2003) found that the media format of items' information presented in the online shopping environment could increase impulsive buying behavior.

To summarize, the key distinction between online and traditional impulsive buying is that e-commerce is full of IT features, and the external stimuli in online impulsive buying are website-related factors.

2.2 The Factors for Meta-Analysis

Based on the research emphasis of the collected online impulsive buying literature and following the guidelines of prior research,¹ this study included 13 main factors (i.e., website security, website navigability, website visual appeal, interactivity, ease of use, scarcity, novelty, price, promotion, arousal, pleasure, positive emotion, and negative emotion) that have been explored most in previous research and they fall into three categories of stimuli according to the Stimulus-Organism-Response (SOR) framework: two from external factors (i.e., website stimuli (Liu et al., 2013; Parboteeah et al., 2009; Wells et al., 2011)) and marketing stimuli (Chan et al., 2017; Park et al., 2014; Shim & Altmann, 2016)), and one from internal factors (i.e., affective stimuli (Dawson & Kim, 2009; Huang, 2016; Rook & Gardner, 1993)).

Website stimuli, as the important external factors that distinct online and offline impulsive buying, were extensively examined in online impulsive buying research. Therefore, website stimuli were included first in this meta-analysis. Besides website stimuli, another important external factor is the marketing stimuli. Moreover, as part of internal factors, factors related to individuals' emotions or moods were also included in the meta-analysis due to the importance of the affective process of online impulsive buying.

¹ In the process of meta-analysis, factors that have been studied three times or above in selected research were extracted according to the guidance of Rana et al. (2015). Therefore, constructs with few empirical studies and insufficient research were not included in this meta-analysis.

2.3 Website Stimuli

2.3.1 Website Security

Website security is the measures taken to ensure the confidentiality of personal information, the security of online payment, an explanation of confidentiality policy, and reliability of the website (Wu et al., 2012). Website security serves as a high task-relevant cue that can contribute to consumers' purchasing goal attainment and affects consumers' behavior (Wells et al., 2011). When people shop online, website security is one of the main concerns. In most cases, with higher website security, people will be more likely to feel assured when shopping on this website, which is the prerequisite for online impulsive buying. According to Zou (2018), users are more likely to make online impulsive buying if they feel secure shopping on this website. Therefore, we hypothesize that:

H1. There is a significant, positive relationship between website security and online impulsive buying.

2.3.2 Website Navigability

Website navigability is defined as the order of the pages, the organization of the layout, and the consistency of the navigation protocols (Palmer, 2002). Website navigability plays a crucial role when consumers browse the website and search for a specific product. Website navigability is an e-commerce interface characteristic that provides functional convenience (Wells et al., 2011). Moreover, navigation is important to improving users' experience for the website (Nielsen, 2000), and improve online impulsive buying tendency (Li et al., 2016; Zou, 2018). Therefore, website navigability is a facilitating factor, and we hypothesize that:

H2. There is a significant, positive relationship between website navigability and online impulsive buying.

2.3.3 Website Visual Appeal

Website visual appeal involves the choice of various visual elements such as fonts, graphics and so on to enhance the overall appearance of the website (Loiacono et al., 2007). If the website is visually appealing, it will increase the probability of browsing this website and also consumer intention to purchase products. In extant literature on online impulsive buying, website visual appeal is positively related to online impulsive buying behavior (Liu et al., 2013; Wells et al., 2011). Hence, website visual appeal can increase the probability of online impulsive buying, and the following hypothesis is put forward:

H3. *There is a significant, positive relationship between website visual appeal and online impulsive buying.*

2.3.4 Interactivity

Interactivity refers to “the extent to which users can participate in modifying the form and content of the mediated environment in real-time” (Steuer, 1992), which can also be defined as “the degree to which consumers perceive that the items manifestation is two-way, controllable, and responsive to input” (Mollen & Wilson, 2010). Better interactivity leads to a good sense of local presence for the consumer through the availability of options to manipulate the product (Vonkeman et al., 2017), which provides a better understanding of the item for consumers. With a comprehensive understanding of the product, it is more likely for consumers to be stimulated to make an instant online buying decision. Hence, we propose the following hypothesis:

H4. *There is a significant, positive relationship between interactivity and online impulsive buying.*

2.3.5 Ease of Use

Ease of use is a proxy for functional convenience (Chen & Yao, 2018). As one of the website elements, it significantly influences consumers’ attitudes toward the website (Elliott & Speck, 2005). In most cases, the easier to use the website, the more likely for people to use it. Ease of use positively affects online impulsive buying (Chen & Yao, 2018; Liu et al., 2013; Turkyilmaz et al., 2015). Therefore, we propose the following hypothesis:

H5. *There is a significant, positive relationship between ease of use and online impulsive buying.*

2.4 Marketing Stimuli

2.4.1 Scarcity

Scarcity is used to describe the state that a product or a service is in short demand (Kemp & Bolle, 1999), including two types: limited-time scarcity and limited-quantity scarcity (Lynn, 1989). As one of the marketing principles in e-commerce, scarcity can arouse the urgency of consumers thus motivating them to make more purchases (Aggarwal et al., 2011). It enhances the buying process by informing consumers that access to a particular product is limited (Lynn, 1989). According to Wu et al. (2020), both limited-quantity scarcity and limited-time scarcity can positively lead to online impulsive buying. Thus, the following hypothesis is proposed:

H6. *There is a significant, positive relationship between scarcity and online impulsive buying.*

2.4.2 Price

Price refers to the amount of money paid for the products, which is a decisive factor for shopping, especially for people with lower income or with a limited budget. Consumers shopping online are more sensitive to the price of products because they can do price comparisons easily with little cost (Xu & Huang, 2014). Park et al. (2012) found that while browsing the website, consumers are likely to take the impulsive buying action if the price is unusually attractive. The results of Zou (2018) confirmed that the price of a product has a significant effect on online impulsive buying behavior. Therefore, we propose the following hypothesis:

H7. *There is a significant, positive relationship between price and online impulsive buying.*

2.4.3 Novelty

Novelty is a triggering factor that inspires consumers to generate a desire for a new product or new experience; thus it can easily promote impulsive buying behavior in an online context (Khare et al., 2010). As one facet of hedonic shopping value, novelty makes shopping a way to explore the new world and if consumers seek novelty, they will feel excited about finding unique things (Yu & Bastin, 2010). Novelty was found to have a strong positive impact on online impulsive buying behavior (Yu & Bastin, 2010; Zou, 2018). Hence, the following hypothesis is put forward:

H8. *There is a significant, positive relationship between novelty and online impulsive buying.*

2.4.4 Promotion

Promotion is defined as a way to increase sales by giving a discount or offering an extra value or incentive for the product to persuade consumers into making the purchases (Haugh, 1983). When consumers are attracted by the promotion, it is easier for them to purchase something which is seemingly a bargain even if they do not need it. According to Nochai and Nochai (2011), promotion factors such as “a discount on membership”, “extending the warranty” and “being able to pay by installments” are the important influencing factors of consumers’ purchasing decisions. Studies have found that there is a significant positive relationship between sales promotion and online impulsive buying (Hasim et al., 2018;

Longdong & Pangemanan, 2015). Thus, we propose the following hypothesis:

H9. *There is a significant, positive relationship between promotion and online impulsive buying.*

2.5 Affective Stimuli

2.5.1 Arousal

Arousal reflects to what degree an atmosphere can influence stimulation (Shen & Khalifa, 2012). High arousal is associated with impulsive buying behaviors through mobilization (Rook & Gardner, 1993). Shen and Khalifa (2012) found that arousal is significantly positively related to impulsive buying when consumers feel the environment is pleasant. Also, arousal is positively related to online impulsive buying (Lin & Lo, 2016; Mattila & Wirtz, 2001). Therefore, we propose the following hypothesis:

H10. *There is a significant, positive relationship between arousal and online impulsive buying.*

2.5.2 Pleasure

Pleasure refers to “the hedonic valence of the affective response to a stimulus” (Mehrabian & Russell, 1974). More specifically, it measures “the degree to which a person feels happy and joyful when subject to a stimulus” (Menon & Kahn, 2002). If people perceive their previous shopping experience as pleasant, they are more likely to process information that is consistent with this positive mood (Adaval, 2001). Consistent with previous studies, Shen and Khalifa (2012) found that pleasure serves as an important determinant of online impulsive buying behavior, suggesting that a delighted emotional experience in online buying has a positive effect on their subsequent buying behavior tendency. Thus, the following hypothesis is proposed:

H11. *There is a significant, positive relationship between pleasure and online impulsive buying.*

2.5.3 Positive Emotion

Positive emotion refers to “the extent to which a person feels enthusiastic, excited, and inspired” (Chan et al., 2017). Previous studies have explored the effect of positive emotion on online impulsive buying behavior. Impulsive buyers are usually more emotional, they enjoy getting fun from browsing and shopping, and when they are aware of their desire to purchase something impulsively, they tend to take immediate action in a

state of hyperactivity and excitement (Weinberg & Gottwald, 1982). That is, positive emotion positively and significantly influences impulsive purchasing (Lu, 2013; Suhud & Herstanti, 2017). Thus, the following hypothesis is proposed:

H12. *There is a significant, positive relationship between positive emotion and online impulsive buying.*

2.5.4 Negative Emotion

Negative emotion refers to “the extent to which a person feels distressed, irritated, and disturbed” (Chan et al., 2017). It is also known as negative affect which is defined as the extent to which a person reflects the painful and unhappy engagement with one’s surrounding environment (Watson et al., 1988). Compared with positive emotions, negative emotions drain customers’ energy, resulting in less impulsive purchasing behavior (Rook & Gardner, 1993). However, Mano (1999) found that consumers with negative emotions are more likely to make purchases because they take it as a way to make themselves happy. Therefore, we propose the following hypothesis:

H13. *There is a significant, positive relationship between negative emotion and online impulsive buying.*

To summarize, factors influencing online impulsive buying were categorized into three types: website stimuli, marketing stimuli, and affective stimuli. Table 1 displays the 13 influencing factors included in this meta-analysis.

2.6 Moderating Variable: Economic Development Level

Consider budget constraint, consumption level tremendously affects consumers’ buying decision (Tian & Liu, 2011). Also, it affects consumers’ price sensitivities. In this regard, consumption level might moderate consumers’ online impulsive buying behavior. However, only the countries and regions were recorded in previous studies. To deal with this data availability issue, we chose the economic development level as a proxy of consumers’ consumption level. The solution is supported by the following reasons:

First, economic development level is usually positively correlated to consumption level. Statistically, consumers who live in countries or regions with a higher economic development level usually also have a higher consumption level. On the one hand, people in developed countries or regions are more likely to have higher disposable income. Hence, when they are faced with a buying decision, they are less likely to hesitate due to budget constraints. On the other hand, in terms of price sensitivity, the results of a PayPal study indicated that 56.0% of consumers in the USA shop online out of the price

Table 1 The factors ultimately involved in this study

Factor Category	Factor	Definition	Representative Studies
Website Stimuli	website security	The confidentiality of personal information, the security of online payment, an explanation of confidentiality policy, and reliability of the website.	Wells et al. (2011), Zou (2018)
	website navigability	The order of the pages, the organization of the layout, and the consistency of the navigation protocols.	Wells et al. (2011), Lin and Lo et al. (2016)
	website visual appeal	The choice of various visual elements such as the fonts, graphics and so on to enhance the overall appearance of the website.	Wells et al. (2011), Liu et al. (2013)
	interactivity	The extent to which users can participate in modifying the form and content of the mediated environment in real-time.	Shen and Khalifa (2012), Vonkeman et al. (2017)
Marketing Stimuli	ease of use	The extent of functional convenience.	Liu et al. (2013), Chen and Yao (2018)
	scarcity	The state that a product or a service is in short demand.	Wu et al. (2020), Akram, Hui, Khan, Yan, and Akram (2018b)
	price	The amount of money paid for the products.	Park et al. (2012), Xu and Huang (2014)
	novelty	The degree to which consumers perceive that the item's manifestation is two-way, controllable, and responsive to input.	Khare et al. (2010), Yu and Bastin (2010)
Affective Stimuli	promotion	A way to increase sales by giving a discount or offering an extra value or incentive for the product to persuade consumers into making the purchases.	Longdong and Pangemanan (2015), Lo et al. (2016)
	arousal	The degree to which an atmosphere can influence stimulation.	Mattila and Wirtz (2008), Lin and Lo et al. (2016)
	pleasure	The hedonic valence of the affective response to a stimulus and the degree to which a person feels happy and joyful when subject to a stimulus	Mattila and Wirtz (2008), Shen and Khalifa (2012)
	positive emotion	The extent to which a person feels enthusiastic excited and inspired	Lu (2013), Suhud and Herstanti (2017)
	negative emotion	The extent to which a person feels distressed irritated, and disturbed.	Park (2005), Lu (2013)

It is worth noting that these 13 factors were processed. First, some original research factors were divided into more specific ones. For example, the original website design and website quality factors were not included in this meta-analysis. Instead, they were subdivided into website navigability, website visual appeal, and other website-related factors. Second, factors that share similar meanings were merged. See Appendix 1 (Table 6) for the original 26 factors.

advantage as compared to 68.0% in India and 83.0% in China (Saxena, 2019). Besides, Kübler et al. (2018) analyzed the sensitivity of sales to price and user ratings across developing and developed countries. The result indicated that countries with a lower level of income inequality are more sensitive to rating volume when it comes to economic factors. To some extent, this demonstrates the difference in price sensitivity between consumers in developed and developing countries or regions. Second, the economic development level is also positively related to the development level of information technology. Online shopping has been widely accepted in many developed countries while it is still in the primary stage in many developing countries. In this regard, the online shopping experience, from the searching stage to the delivery, may be markedly different in developed and developing countries. That is, people from a country or region with higher development usually have a better online shopping experience, and it may further lead to online impulsive buying. Given

these reasons, we decide to use the economic development level as a proxy for consumption level, and we suppose that it may affect online impulsive buying.

The source of the sample in articles that we chose to conduct the meta-analysis includes both developed and developing countries and regions (Zhao et al., 2019). Based on the existing online impulsive buying literature, we speculated that the influences of the antecedents of online impulsive shopping are different between developed and developing countries and took the economic development level as a moderator. Hence, the following hypothesis is proposed:

H14. *Economic development level has a significant moderating effect on the relationship between the website stimuli, marketing stimuli, and affective stimuli and online impulsive buying.*

Figure 1 presents the proposed research model.

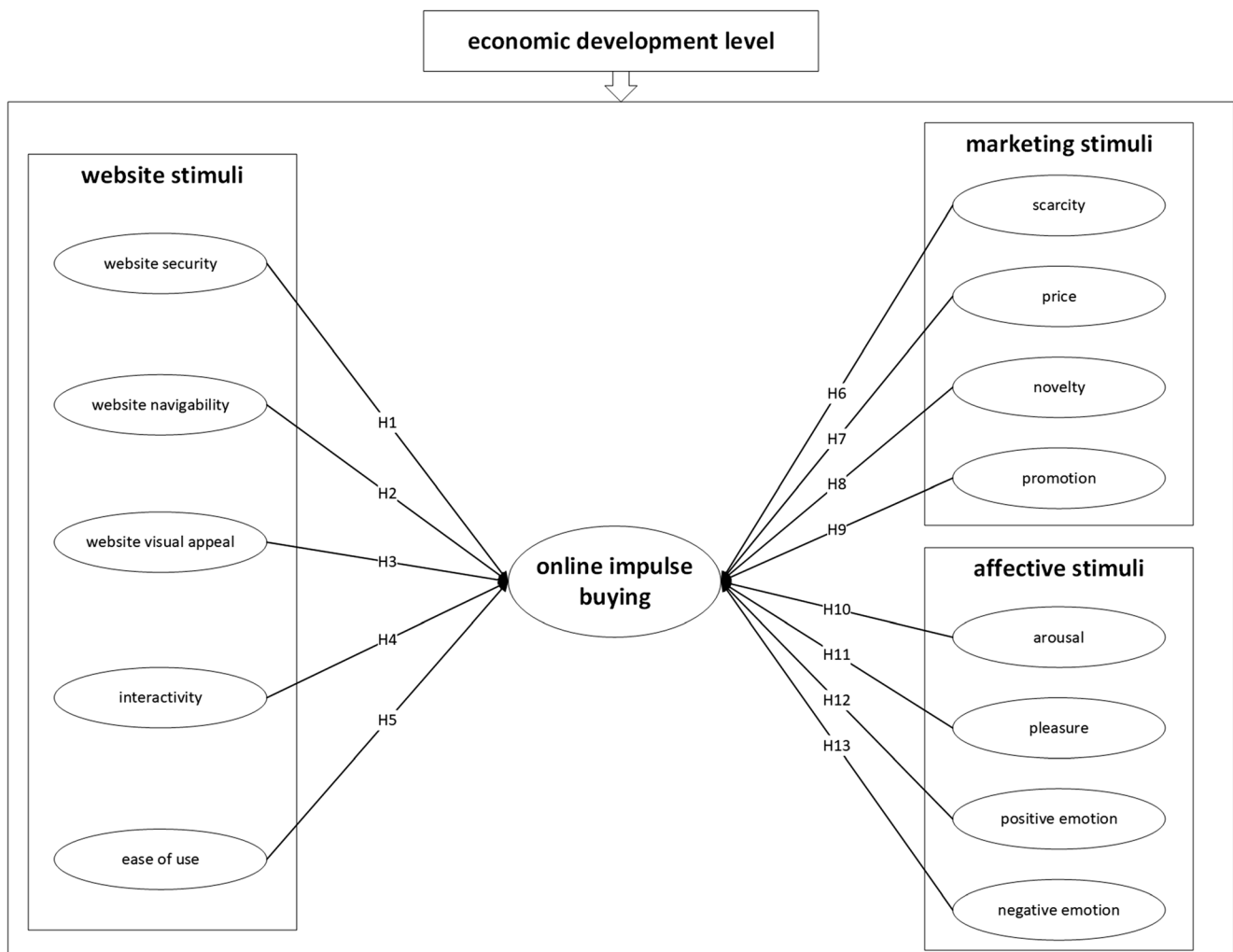


Fig. 1 Proposed Research Model

3 Methodologies

3.1 Data Collection

To ensure the accuracy of meta-analysis results, we made considerable efforts to search relevant literature, including published journals, conference proceedings, and dissertations. Following Webster and Watson (2002), “online impulsive buying”, “online impulsive purchasing”, “online impulsive shopping” were used as keywords and we added keywords such as “website stimuli”, “marketing stimuli” and “affective stimuli” to list the search formula with Boolean logic in the systematic retrieval of relevant articles in the following databases: Google Scholar, Web of Science, Science Direct, SpringerLink, etc. The preliminary search found 1345 initial papers. Then, we read the title and abstract of each paper carefully to check whether it is related to online impulsive buying and dropped the repeated articles. Finally, 121 articles were included.

Meta-analysis requires papers to meet the following criteria:

- (1) The paper must be an empirical study of online impulsive buying and quantitatively tested relationships between antecedent factors and online impulsive buying tendency or behavior.
- (2) The paper must have reported correlation coefficients or other values (e.g. F-value) that could be converted to correlation coefficients.
- (3) The paper must have reported the sample size.

Besides the above screening criteria, to ensure the independence of the research, we also excluded relevant research conducted by the same research team using the same sample.

Finally, 54 articles met all the above criteria and were used for the meta-analysis. Among the 54 articles, 37 are journal articles, 6 are published in conference proceedings, and 11 are dissertations. These studies were published during 2006–2020. In specific, 2 studies were published before 2010 (during the second wave of e-commerce), and 52 studies were published between 2010 and 2020 (during the third wave of e-commerce). The total sample size of the articles is 19,085 and the average sample size is 353. Figure 2 shows the paper selecting process. Figure 3 demonstrates the world distribution and coverage of the studies included in the meta-analysis. Selected papers are listed in Appendix 2 (Table 7).

3.2 Coding Procedure

Each article was scrutinized to extract key data to be used in the study. The key data include: author name, publication date, publications, investigated countries or regions, sample size, key constructs, and reported effect sizes. Considering

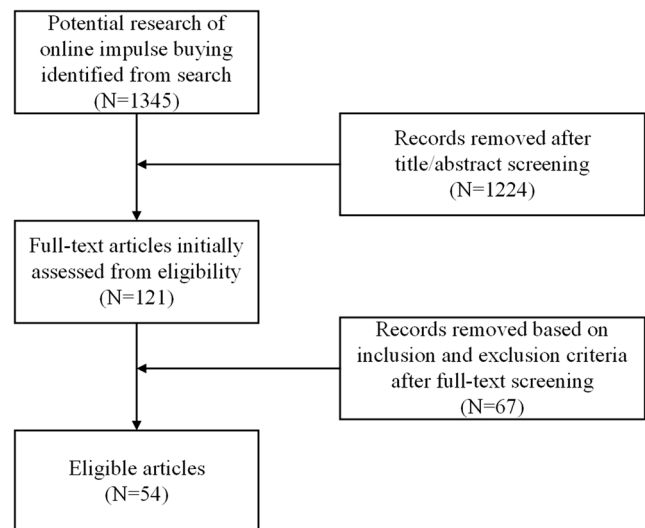


Fig. 2 The research progress of articles

that there are many constructs with different names expressing similar meanings, we merged constructs with similar meanings. For example, perceived enjoyment is similar to entertainment, and visual appeal is similar to aesthetic appeal. According to the guidelines of Rana et al. (2015), we only selected those relationships that have been explored three or more times in the literature in the meta-analysis, and finally, we got a total of 13 relationships.

To conduct the moderator analysis, all articles included in the meta-analysis were divided into two groups based on the economic development level of the country or region.²

A small number of studies did not report the correlation coefficient, but they reported the standard regression coefficient. In this case, we treated the standard regression coefficient as effect size. Very few studies reported F-value. For these studies, we used the formula proposed by Wolf (1986) to calculate the effect size: $r = \sqrt{\frac{F}{F+df}}$, where F is the F-value of the path, and df is the degree of freedom.

In order to ensure the accuracy of data coding, two researchers in this study conducted back-to-back coding on the literature samples according to the coding specifications proposed by Lipsey and Wilson (2001), and then cross-checked the coding results. The consistency ratio was 93.5%. Finally, the research team discussed the inconsistent results carefully and referred to previous classifications to reach agreements.

² It is worth noting that there has been no consensus on the definition of developing and developed countries and regions. The reference standard we used is the data published by The World Bank (2015). Please refer to Appendix 2 for the specific classification of the countries or regions of the selected article samples.

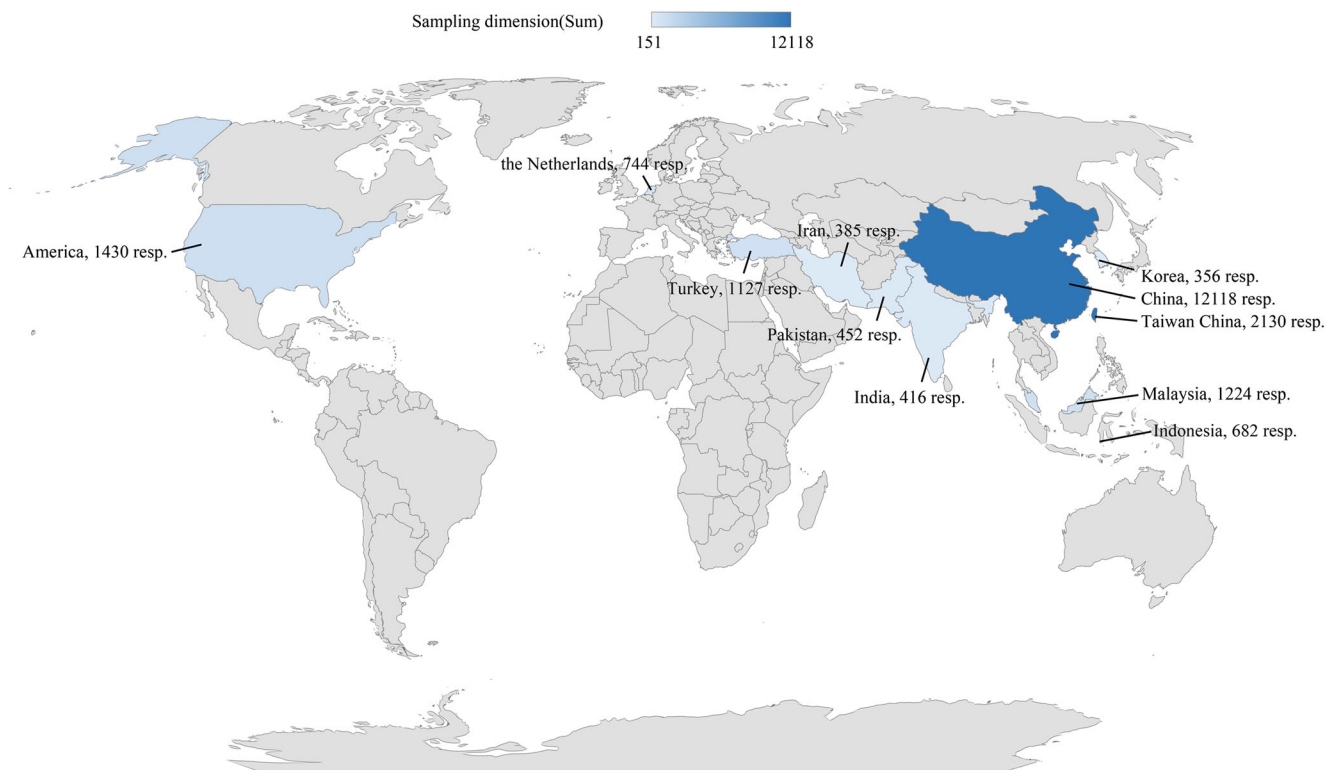


Fig. 3 World distribution and coverage of the studies included in the meta-analysis

3.3 Analysis Procedure

First, we provided descriptive statistics of each antecedent factor to roughly observe the impact of each antecedent factor on online impulsive buying.

Second, we calculated the combined effect of each pair of relationships (Fleiss, 1993). Besides, to ensure the normal distribution of the correlation coefficient of each pair of relationships, we made the Fisher r to z transformation.

Then, we used a heterogeneity test (Q-test) to test the heterogeneity of the distribution of effect sizes and find potential moderator effects. The economic development level in each study was used as the categorical moderator factor. A forest plot was used to visualize the results of the subgroup analysis.

Finally, to avoid publication bias, we calculated the fail-safe N for each relationship. Publication bias refers to the phenomenon that in academic research, researchers tend to report significant results and avoid reporting results that are not statistically significant (Kraemer & Andrews, 1982).

4 Results

4.1 Descriptive Statistics

This research examined 13 antecedent factors. The average sample size of each path is over 200. The descriptive statistics of each relationship are shown in Table 2.

4.2 Correlation Analysis

In this section, we used the correlation coefficient and sample size to calculate the relationship between website stimuli factors, marketing stimuli factors, affective stimuli factors, and online impulsive buying.

It is worth mentioning that the choice of the fixed-effect model or random-effect model is very important. According to Borenstein et al. (2007), when there is a single effect in the hypothesis sample, the fixed-effect model should be selected. Otherwise, the random-effect model should be selected. Given the differences in the samples, the random-effect model is selected to calculate the combined effect.

The results of the meta-analysis are shown in Table 3. Except for the combined effect sizes of the relationship between website security, price, negative emotion, and online impulsive buying, all 95% confidence intervals of combined effect sizes exclude zero, and all Z -scores are significant, indicating that these combined effect sizes are statistically significant.

According to Cohen (1988), the combined effect sizes can be categorized into weak (around 0.1), moderate (around 0.3), and strong (around 0.5). The findings indicated that the website stimuli factors have a significant and positive relationship with online impulsive buying except for the website security factor. Among them, the correlation between interactivity and online impulsive buying is the weakest and the combined effect size of it is only 0.17. It can be inferred that in

Table 2 Descriptive statistics

Factor Category	Factor	Number of studies	Correlation coefficients		Range of sample sizes		Total sample size	Average sample size
			lower	upper	lower	upper		
website stimuli	website security	5	0.01	0.82	166	513	1557	311
	website navigability	4	0.22	0.48	216	402	1105	276
	website visual appeal	10	-0.20	0.58	200	888	3607	361
	interactivity	9	-0.09	0.44	151	385	2237	249
marketing stimuli	ease of use	6	0.01	0.57	318	1161	3353	559
	scarcity	3	0.23	0.40	331	671	1405	468
	novelty	3	0.11	0.68	249	402	1036	345
	price	5	-0.27	0.96	182	687	2163	433
affective stimuli	promotion	15	-0.12	0.86	60	1161	6419	428
	arousal	11	0.11	0.67	120	385	3263	252
	pleasure	17	0.02	0.64	115	687	5179	305
	positive emotion	9	0.04	0.59	209	532	3697	411
	negative emotion	5	-0.65	0.41	430	532	2367	473

previous studies, the interactivity of websites is not the main factor affecting online impulsive buying. With regard to the marketing stimuli factors, price, novelty, and promotion are crucial factors affecting online impulsive buying, with their combined effect size over 0.3. In addition, the relationships between price, novelty and online impulsive buying are not significant. As for affective stimuli factors, although the relationship between the negative emotion factor and online impulsive buying is insignificant, the rest of the affective factors are significantly and positively related to online impulsive buying at a moderate level. By observing the results of correlation analysis, it is easy to find that the number of studies with insignificant relationships is no more than five, and the maximum and minimum correlation coefficients for each study varied greatly. Therefore, the limited number of studies and the large differences in the effect sizes reported in the selected studies may account for the insignificant results of these four relationships.

The heterogeneity test of the effect size of our study was estimated using the Q statistic to determine whether each effect size can be merged into a new value. The result of the Q-test in Table 3 revealed that the heterogeneity of the effect sizes is significant and this confirmed the validity of choosing the random-effect model in this study. Also, the Q-values in Table 3 are significant, indicating that all the relationships have significant heterogeneity. Therefore, we can further examine the existence of moderators that affect each pair of relationships.

4.2.1 Moderator Analysis

In this study, the economic development level of countries or regions was used as a moderator. The selected 54 studies were divided into two subgroups to conduct moderator analysis, and the Z-score was calculated to see if there was a significant difference between the two subgroups (Cohen & Cohen, 1985; Preacher, 2002). Due to the limited number of selected

Table 3 The results of correlation analysis

Factor Category	Factor	Q-value	I ²	Combined effect size	95% CI	Strength
website stimuli	website security	311.40***	98.70%	0.32	[-0.12; 0.65]	moderate
	website navigability	15.12**	86.40%	0.36***	[0.23; 0.47]	moderate
	website visual appeal	170.72***	94.70%	0.29***	[0.15; 0.41]	moderate
	interactivity	48.60***	83.50%	0.17***	[0.07; 0.27]	weak
marketing stimuli	ease of use	232.43***	97.40%	0.22*	[0.02; 0.40]	moderate
	scarcity	9.26**	78.40%	0.32***	[0.21; 0.42]	moderate
	price	1587.28***	99.70%	0.42	[-0.39; 0.86]	moderate
	novelty	111.39***	98.20%	0.38	[-0.06; 0.70]	moderate
affective stimuli	promotion	597.29***	97.70%	0.37***	[0.23; 0.51]	moderate
	arousal	106.03***	91.50%	0.40***	[0.29; 0.50]	moderate
	pleasure	279.96***	94.30%	0.41***	[0.31; 0.50]	moderate
	positive emotion	238.27***	96.60%	0.41***	[0.25; 0.54]	moderate
	negative emotion	828.47***	99.50%	0.21	[-0.35; 0.66]	moderate

* for $p < 0.05$, ** for $p < 0.01$, *** for $p < 0.001$.

articles, the relationships between website security, novelty, interactivity, negative emotion, scarcity, and online impulsive buying were not examined because only one developed country's data had been collected. Therefore, only 8 pairs of relationships could be analyzed. Table 4 shows the moderator analysis results.

First, focusing on each subgroup (developing or developed in each pairwise relationship), most of the confidence intervals excluded zero except the relationship between ease of use and online impulsive buying in the developed subgroup, price and online impulsive buying in both subgroups, and positive emotion and online impulsive buying in the developed subgroup. After scrutinizing the raw data, we speculate that the insignificance may be caused by too few studies in the subgroup and the large variance of correlation coefficients within these subgroups.

Second, the moderator analysis indicated that the economic development level moderates 6 pairwise relationships. The differences in subgroups caused by the economic development level are significant in the relationship between website visual appeal, ease of use, price, promotion, pleasure, positive emotion, and online impulsive buying. Specifically, from Table 4, the combined effect size of website visual appeal on online impulsive behavior in developed countries or regions is close to 0.5, significantly higher than that in developing countries or regions, suggesting that website visual appeal is a vital predictor for high consumption level in developed countries or regions. This phenomenon shows that shopping websites in developed countries or regions are mature. That is, compared with developing counterparts, the use of visual

elements in developed countries is more ingenious and attractive. Similarly, the combined effect size of promotion is higher than that in developing countries or regions, which shows that consumers in developed countries or regions are more likely to be influenced by sales promotion to make impulsive online consumption than those in developing countries or regions. This may be explained by that in developed countries, companies are using big data techniques to design their online promotion strategy, which is more precise, so the promotion effect is better than that in developed countries. On the contrary, ease of use, price, pleasure, and positive emotion are more useful stimulating factors for online consumers in developing countries.

Besides, to visualize the effect of moderator analysis, this study used the forest plot to show the subgroups with significant differences. The 6 pairs of relationships (i.e., website visual appeal, ease of use, price, promotion, pleasure, and positive emotion) with significant moderator effects are shown in Fig. 4(1)–(6) respectively.

4.3 Publication Bias

The fail-safe N is used to test the publication bias. In Table 5, the fail-safe N of all the relationships is greater than the corresponding “ $5 \cdot K + 10$ ” (K is the number of studies) standard, indicating that publication bias is not a concern (Rosenthal, 1979).

Table 4 Moderator analysis

Factor Category	Factor	Economic development level	Number of studies	Combined effect size	95% CI	Z-score
website stimuli	website navigability	developing	2	0.36	[0.08; 0.59]	0.13
		developed	2	0.35	[0.26; 0.43]	
	website visual appeal	developing	8	0.23	[0.07; 0.38]	-8.62***
		developed	2	0.50	[0.33; 0.63]	
marketing stimuli	ease of use	developing	5	0.27	[0.02; 0.48]	4.63***
		developed	2	0.10	[-0.08; 0.26]	
	price	developing	3	0.64	[-0.43; 0.96]	18.53***
		developed	2	-0.04	[-0.47; 0.41]	
affective stimuli	promotion	developing	11	0.36	[0.19; 0.50]	-3.07**
		developed	4	0.43	[0.06; 0.69]	
affective stimuli	arousal	developing	9	0.39	[0.27; 0.51]	0.61
		developed	2	0.42	[0.18; 0.61]	
	pleasure	developing	13	0.44	[0.34; 0.53]	3.85***
		developed	4	0.33	[0.01; 0.58]	
	positive emotion	developing	6	0.43	[0.24; 0.58]	5.41***
		developed	2	0.22	[-0.14; 0.53]	

* for $p < 0.05$, ** for $p < 0.01$, *** for $p < 0.001$.

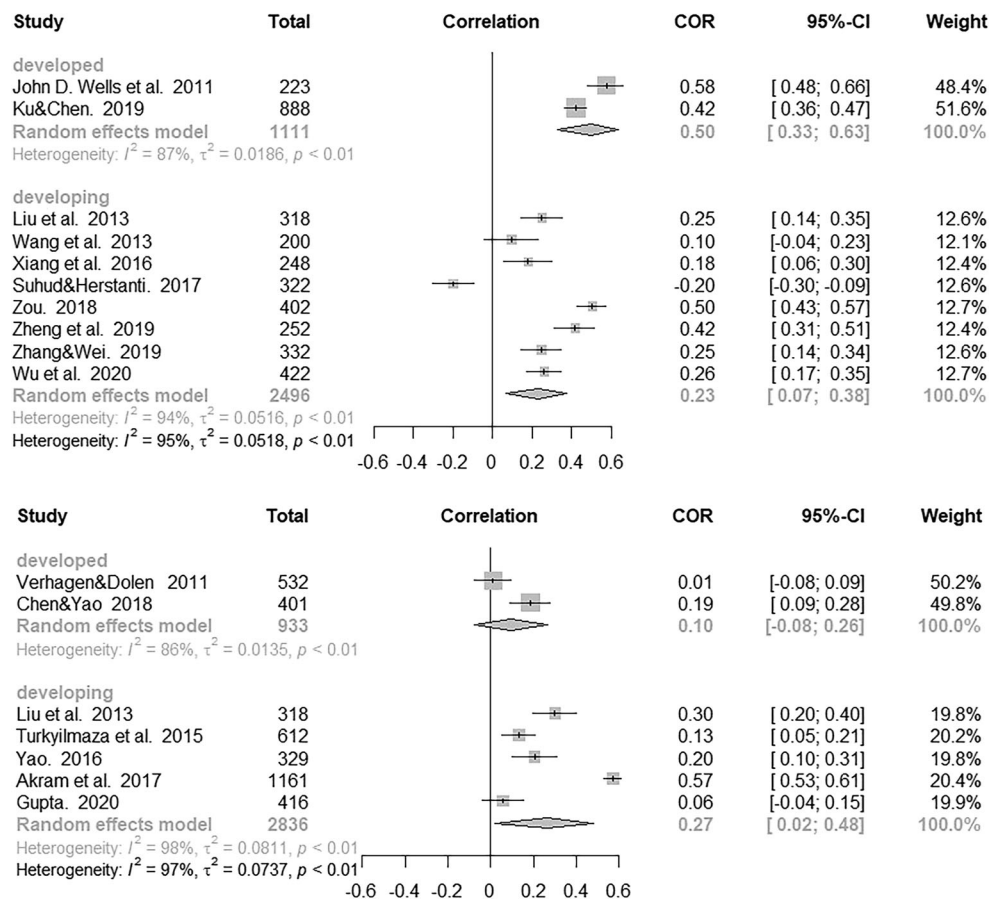


Fig. 4 (1) Website visual appeal, (2) Ease of use, (3) Price, (4) Promotion, (5) Pleasure, (6) Positive emotion. Note: The authors’ names, Melis Kaytaz Yiğit and Mehmet Tıgılı, includes non-English characters which cannot be recognized by R 3.6.0, so this paper uses “?” as a substitute.

5 Discussion

Based on 54 prior empirical studies on the influencing factors of online impulsive buying, this study conducted a meta-analysis to explore 13 main factors affecting online impulsive buying.

From the correlation analysis results, all factors are significantly and positively related to online impulsive buying except website security, price, novelty, and negative emotion. According to the statistics, the number of studies on insignificant relationships is no more than 5 and there is a great difference between the maximum and minimum of the correlation coefficient of each relationship. Hence, we speculated that the insignificant results may be caused by the limited number of studies and the large differences in the effect sizes reported in the selected studies.

H1-H5 assumed that the website stimuli factors have positive and significant relationships with consumers’ online impulsive buying. From the results, H2-H5 were supported, which is consistent with the previous studies. For example,

Zou (2018) found that website navigability and website visual appeal are positively related to online impulsive buying among undergraduates. As for the website stimuli factors, the website security factor (H1) with the combined effect size of 0.32 is the most critical factor of online impulsive buying. However, the website security factor was not significantly associated with online impulsive buying. H1 was not supported, which may be attributed to the small number of studies selected.

H6-H9 proposed that marketing stimuli factors have significant positive relationships with online impulsive buying. H6 (scarcity) and H9 (promotion) are supported, but H7–8 (price and novelty) are not supported, which may be explained by the limited samples.

With regard to the affective stimuli factors, the results indicated that arousal, pleasure, and positive emotion have a significant positive relationship with online impulsive buying, supporting H10-H12. The results are consistent with previous studies. For example, Lin and Lo et al. (2016) found that arousal and pleasure have a significant positive relationship

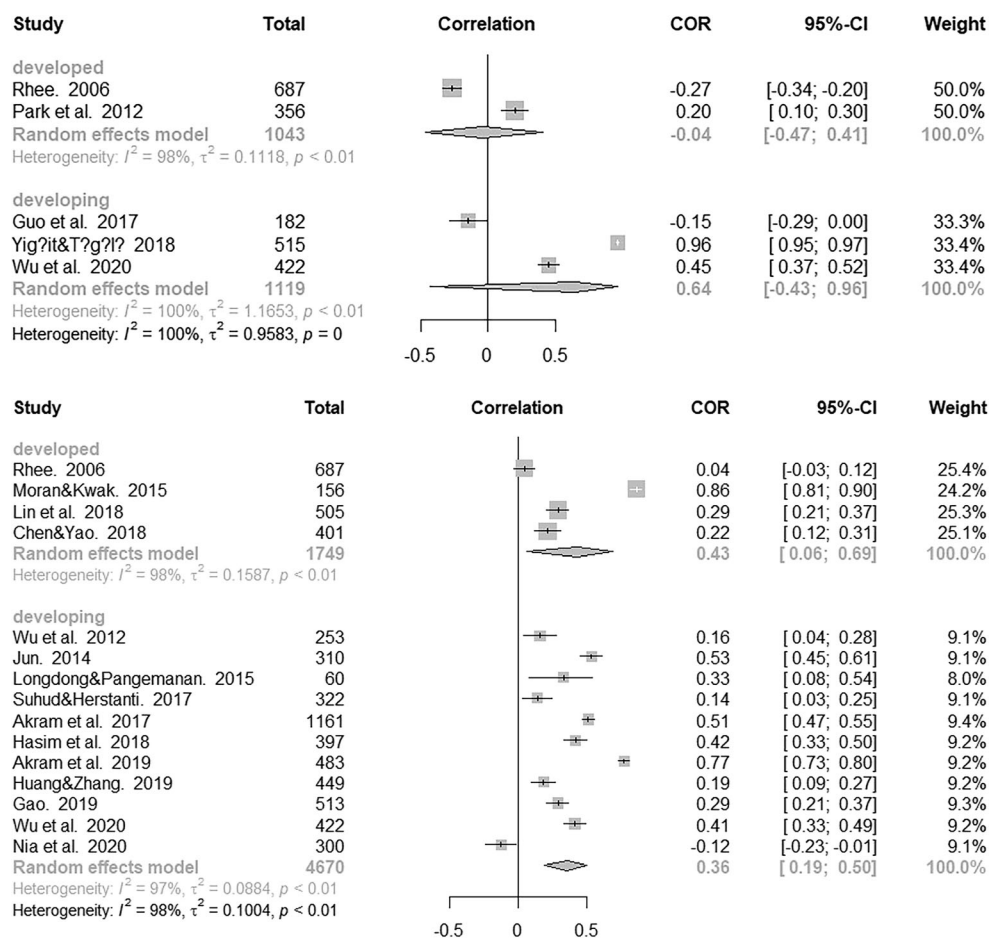


Fig. 4 (continued)

with online impulsive buying. However, H13 (negative emotion) was not supported, which may be explained by the large differences in the effect sizes reported in the selected studies. It is worth mentioning that from the values of combined effect size, all affective factors are positively related to online impulsive buying at a moderate level. Among them, the combined effect value of pleasure, positive emotion, and promotion are greater than 0.4, showing their importance in online impulsive buying.

Finally, in moderator analysis, economic development level significantly moderated the relationship between website visual appeal, ease of use, price, promotion, pleasure, positive emotion, and online impulsive buying. H14 was partially supported. Specifically, consumers in developed countries or regions are more sensitive to the websites' visual appeal and promotion. However, ease of use, price, pleasure, and positive emotion are more important stimulating factors for online consumers in

developing countries or regions. The moderator analysis can provide some guidelines for cross-border e-commerce practitioners.

6 Conclusion

6.1 Theoretical Implications

In recent years, impulsive buying has received wide attention from consumer behavior researchers. However, the current meta-analysis research on impulsive buying mainly focused on the offline market, and few studies have involved the unique factors of the online market. This study fills this literature gap by focusing on the factors that influence online impulsive buying, especially the IT-supported website stimuli. Meanwhile, this study can extend the influence of different factors on the impulsive buying of digital products. Digital products can

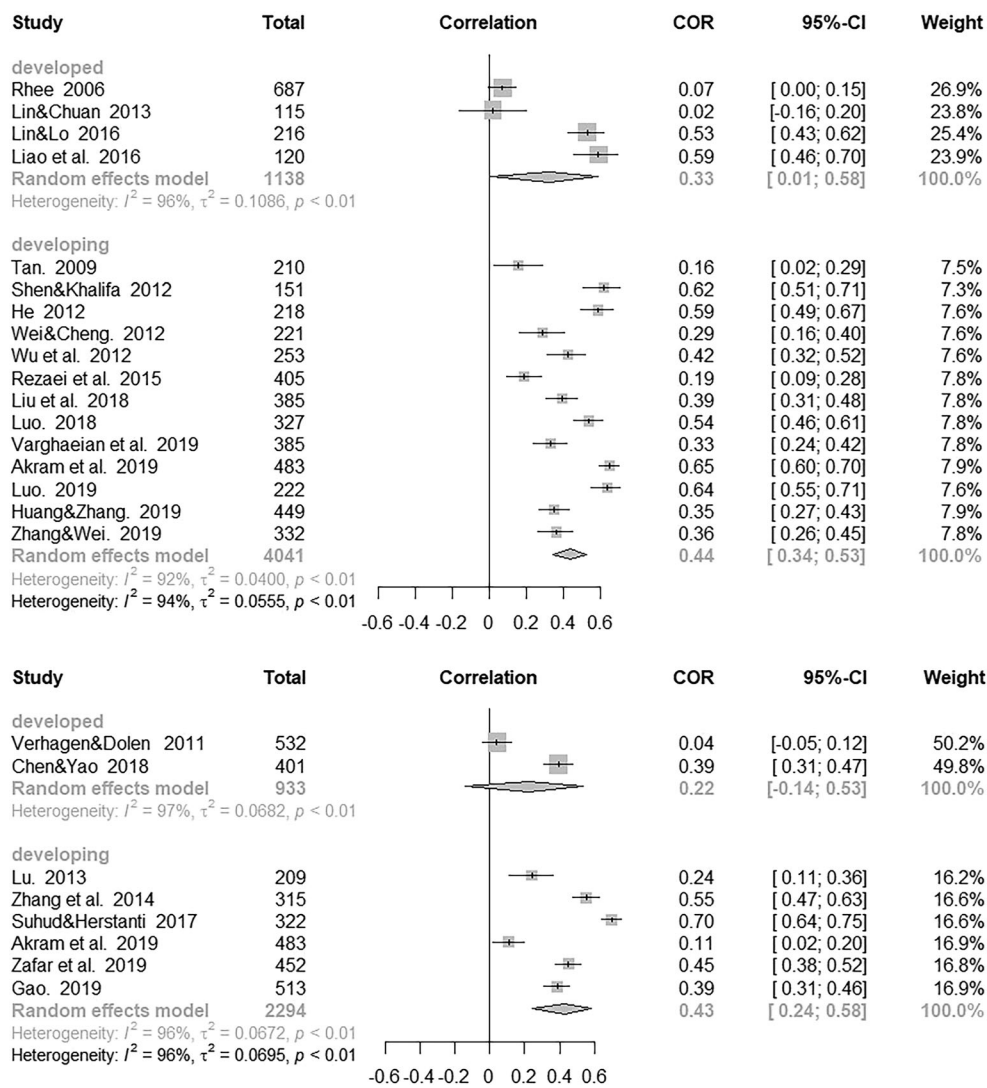


Fig. 4 (continued)

only be sold through online channels. Thus, the conclusions of research on offline impulsive buying behavior may not apply to these products. Therefore, compared with the traditional offline impulsive shopping behavior research, this study can be applied to a wider range of product types.

To address the research bias caused by inconsistent findings in the existing research results on online impulsive buying, this study conducted a meta-analysis to integrate 54 empirical studies and proposed a comprehensive framework for studying the influencing factors of online impulsive buying based on quantitative statistical analysis. In this research, 54 relevant empirical studies were analyzed. From these articles, we selected the

factors that have been explored three times or above, and finally focused on 13 main factors. Particularly, factors were classified into the following three categories: website stimuli (website security, website navigability, website visual appeal, interactivity, and ease of use), marketing stimuli (scarcity, novelty, price, and promotion), and affective stimuli (arousal, pleasure, positive emotion, and negative emotion). According to the results of the study, these factors are significantly and positively related to online impulsive buying except website security, price, novelty, and negative emotion.

In addition, this study also verifies the applicability and effectiveness of meta-analysis methods in the field of information systems, providing new ideas and

Table 5 The results of the fail-safe N test

Factor Category	Factor	Nfs.05	5*K+10
website stimuli	website security	250	35
	website navigability	126	30
	website visual appeal	815	60
	interactivity	138	55
	ease of use	402	45
marketing stimuli	scarcity	29	25
	price	610	35
	novelty	135	25
	promotion	3383	85
affective stimuli	arousal	1347	65
	pleasure	3904	95
	positive emotion	891	55
	negative emotion	967	35

methods for related research. To our knowledge, this study is the first attempt to conduct a meta-analysis to study online impulsive buying. This study takes full advantage of the meta-analytic approach to expand the limited small sample of a single independent study into a large sample of data to verify the relationships of variables in existing empirical studies at a higher logical level. It provides effective research ideas and methods to clarify the sources of heterogeneity, avoid potential measurement errors, and then propose more credible and robust research conclusions. The results of our study will provide a theoretical basis for future research on online impulsive buying.

Further, this study selected economic development level as a moderator and categorized the sample into developed and developing countries or regions to explore the moderating effect on the relationship between influencing factors and online impulsive buying. The results of the moderator analysis illustrate that the economic development level has a significant moderating effect on the relationship between website visual appeal, ease of use, price, promotion, pleasure, positive emotion, and online impulsive buying. Specifically, in terms of website stimuli factors, consumers in developed countries or areas attach more importance to website visual appeal. Nevertheless, for consumers in developing countries or areas, the ease of use of websites is a more important factor to trigger their impulsive buying intention or behavior compared with consumers in developed countries or regions. With regard to marketing stimuli factors, consumers in developed countries or areas pay

more attention to promotional factors, while consumers in developing countries or areas are more susceptible to price factors. For affective stimuli factors, this study confirmed that consumers in developing countries or areas are more likely to be stimulated by pleasure and positive emotion factors and induce online impulsive buying. With the moderator analysis, this study provides implications for future research on online impulsive buying behavior across different economic development levels.

6.2 Practical Contributions

This study also provides managerial insights for practitioners of e-commerce websites. First, managers of online stores should pay attention to the website stimuli, marketing stimuli, and affective stimuli, and take steps to optimize consumers' online buying experience. Specifically, in terms of website stimuli, IT capacity should be enhanced. To enhance the visual appeal of websites, the navigability, interactivity, and ease of use of websites, e-commerce websites should improve the interactive design of websites and website performance. Online shopping websites can use VR and AR technology to provide a more interactive consumer experience so as to stimulate consumers to buy. For example, many online clothing retailers have begun to launch AR/VR applications such as AR shoes and virtual reality fitting mirrors. This allows customers to try on clothes virtually, greatly improving customers' shopping experience. Besides, checking the updating of the system and software patch regularly can help to improve the consumer experience, and it would be helpful to upgrade the professional network security firewall to improve website security. With regard to marketing stimuli, besides using traditional promotion activities to persuade consumers into consumption, managers can use IT-enabled inventory availability to underline product scarcity as well as use big data techniques to conduct precision marketing. Therefore, e-commerce websites may employ hunger marketing to induce impulsive buying, use inventory availability information to emphasize the scarcity effect and maximize the marketing effect by targeting consumers. Specifically, hunger marketing is to give a surprisingly attractive price with limited quantity, creating the illusion of hot sales in short supply. Thus, companies can not only benefit from the raised price but also make the brand more appealing. Finally, for affective stimuli, managers should: (1) keep the purchasing flow smooth to provide consumers with a pleasant online buying experience, (2) design an easy-to-use interface to keep

users in a good mood when shopping online, and (3) provide customized service and precision marketing to increase consumers pleasure or arousal level. For example, to provide a better shopping experience, online stores should provide quick and valid responses to consumers’ questions and requests to improve the feedback efficiency and recommend products according to consumers’ consumption history and characteristics.

Second, the moderator analysis can help cross-border e-commerce. Concretely, cross-border e-commerce practitioners should pay more attention to website visual appeal and promotion activities in developed countries or regions to increase the likelihood of online impulsive buying. In contrast, in developing countries or regions, to provide users with a pleasant buying experience, more efforts should be put into website performance optimization and product pricing strategy, simplifying the website operation process and improving user satisfaction. In short, managers should develop targeted strategies to stimulate consumption according to the economic condition of the area and the consumption level of the consumers.

Finally, with the rapid development of Internet technology and the prosperity of e-commerce, the proportion of online shopping in retailing is increasing steadily. Meanwhile, in the context of the COVID-19 pandemic, to avoid cross-infection, more and more consumers tend to buy goods online. Our research focuses on the factors that influence online impulsive shopping by improving consumers’ shopping experience, which has strong significance for serving consumers better in the context of the COVID-19 pandemic.

6.3 Limitations and Directions for Future Research

Despite attempts to conduct this meta-analysis rigorously, there are still some limitations. First, the number of relevant studies that can be used for the meta-analysis of online impulsive buying is limited. Moreover, some online impulsive buying studies were excluded because they did not provide the necessary data for statistical calculation.

Second, this study emphasized website-related factors. Although we have included the most investigated antecedents of online impulsive buying in the meta-analysis, there are other factors that may also have a significant effect. Future research could include more factors, such as consumer personality.

Third, due to the data availability issue, we took the economic development level as the proxy of consumers’ consumption level, which may not be as accurate as the real

individual-level data. If possible, future research can employ individual-level data.

Fourth, due to the fact that some articles included in the meta-analysis suffer from poor data quality, for example, the collected data may be sparse, or the sample is biased, we do not have enough data to analyze the moderating effects of age, product type, context, etc. However, the moderating effects of these factors are worth studying. Therefore, in the future, researchers can conduct more in-depth and detailed studies on these factors to find boundary conditions.

Finally, only quantitative studies were used in the meta-analysis. Future research could consider weight-analysis that allows the inclusion of qualitative studies while evaluating the strength between antecedents and consequences. Moreover, researchers can attempt to use the structural equation modeling technique to test the relationship in and out of the study.

Appendix 1

Table 6 The factors formed by preliminary screening

Factor Category	Factor
website stimuli	website security website navigability website visual appeal interactivity website design website quality ease of use comment number social presence
marketing stimuli	scarcity novelty price promotion
affective stimuli	arousal pleasure entertainment positive emotion negative emotion browsing perceived value utilitarian value hedonic value impulsiveness social norms/influence attitude trust

Appendix 2

Table 7 Articles involved in the meta-analysis

Study	Sample size	Country/region	Economic development level
Zou (2018)	402	China	developing
Rhee (2006)	687	America	developed
Li et al. (2016)	264	China	developing
Dodoo and Wu (2019)	249	America	developed
Lin et al. (2018)	505	Taiwan	developed
Hasim et al. (2018)	397	Malaysia	developing
Suhud and Herstanti (2017)	322	Indonesia	developing
Yiğit and Tıgılı (2018)	515	Turkey	developing
Lin and Lo et al. (2016)	216	Taiwan	developed
Varghaeian et al. (2019)	385	Iran	developing
Longdong and Pangemanan (2015)	60	Indonesia	developing
Akram, Hui, Khan, Tanveer, Mehmood, and Ahmad (2018a)	1161	China	developing
Liu et al. (2018)	385	China	developing
Verhagen and Dolen (2011)	532	Holland	developed
Wells et al. (2011)	223	America	developed
Turkyilmaz et al. (2015)	612	Turkey	developing
Vonkeman et al. (2017)	212	Holland	developed
Shen and Khalifa (2012)	151	The United Arab Emirates	developing
Rezaei et al. (2016)	405	Malaysia	developing
Moran et al. (2015)	156	America	developed
Liao et al. (2016)	120	Taiwan	developed
Lin and Chuan (2013)	115	America	developed
Zhang et al. (2014)	315	China	developing
Liu et al. (2013)	318	China	developing
Park et al. (2012)	356	South Korea	developed
Ku and Chen (2019)	888	Taiwan	developed
Akram, Hui, Khan, Yan, Tanveer, and Hashim (2018c)	483	China	developing
Xiang et al. (2016)	248	China	developing
Zafar et al. (2019)	452	Pakistan	developing
Zheng et al. (2019)	252	China	developing
Liu et al. (2019)	430	China	developing
Chen and Yao (2018)	401	Taiwan	developed
Guo et al. (2017)	182	China	developing
Tan (2009)	210	China	developing
Han (2014)	310	China	developing
Yao (2016)	329	China	developing
Wang et al. (2013)	200	China	developing
Luo (2019)	222	China	developing
Huang and Zhang (2019)	449	China	developing
He (2012)	218	China	developing
Liu (2017)	373	China	developing
Xu and Xu (2016)	166	China	developing
Lu (2013)	209	China	developing
Luo (2018)	327	China	developing
Wei and Cheng (2012)	221	China	developing
Wu et al. (2012)	253	China	developing
Zhao et al. (2014)	214	China	developing
Zhang and Wei (2019)	332	China	developing
Gao (2019)	513	China	developing
Wu et al. (2020)	422	Malaysia	developing
Sari and Hermawati (2020)	300	Indonesia	developing
Gupta (2020)	416	India	developing
Akram, Hui, Khan, Yan, and Akram (2018b)	671	China	developing
Zhuang (2015)	331	China	developing

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