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# Knowledge mapping of impulsive buying behavior research: a visual analysis using CiteSpace

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With the development of e-commerce, impulse buying behavior has transitioned from offline to online, presenting significant exploration value. This study aims to provide a comprehensive knowledge map and in-depth analysis of research on impulsive purchase behavior, helping readers understand the latest global trends in this field from 1967 to September 30, 2023. The study offers a visual analysis using CiteSpace, encompassing 704 academic articles on impulsive buying behavior published over 55 years. The status is revealed through collaboration networks, co-citation networks, and trend analysis. Researchers explore impulsive buying behavior in various contexts, with “e-commerce” being a primary focus. Notable new keywords include technology, customer satisfaction, perceived value, and virtual reality, among others. These terms contribute to future research directions. Overall, this pioneering research combines visual analysis to provide valuable insights and research recommendations for academics studying impulsive buying behavior.

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## Introduction

Impulse buying refers to unplanned purchases, and this buying habit is sudden and immediate (Nigam et al., 2023). Over the last decades, researchers have examined impulsive buying behavior from different perspectives according to its significance (Wang et al., 2022b; Xiao and Nicholson, 2011). Impulse buying accounts for 39% of the total revenue generated by department stores based on past research (Miao et al., 2020). In addition to this, Goel et al. (2022) and Lin and Chuang (2005) discovered that eighty percent of customers buy on impulse at least occasionally. According to Moreira et al. (2017), purchasing items in physical stores may involve greater impulse buying than purchasing items online. Because offline shopping engages all five senses, while online shopping cannot replicate certain immediate experiences, such as touch, smell, and taste.

Because of the growth of e-commerce, impulsive buying may now be observed in online shopping as well (Hellemans et al., 2022). With the advent of the COVID-19 pandemic, social media, and mobile commerce, the number of studies related to online impulse buying in the digital age is rapidly increasing. According to the eMarketer report (2019), global e-retail sales are predicted to grow from US\$ 3.535 trillion in 2019 to US\$ 6.542 trillion by the end of 2023, accounting for 22% of total retail sales. This growth is driven by the increasing use of mobile devices and internet shopping. Additionally, a 2021 survey indicated that more than 80% of online buyers had made an impulse purchase at least once, accounting for over 40% of the total amount of money spent online by customers using e-commerce applications (Saleh Al-Omouh et al., 2021).

After 2020, the global COVID-19 outbreak and subsequent lockdowns prompted customers to participate in more online purchasing, which may have led to an increase in online impulse purchases (Goel et al., 2022). According to the literature record, during the pre-COVID period, e-buying represented 40% to 50% of all purchases; during the COVID-19 pandemic, it rose to 90% to 95% (Saleh Al-Omouh et al., 2021). Furthermore, the development of information technology fosters the growth of e-commerce, which has exacerbated impulsive purchasing behavior in the online environment (Zhao et al., 2022). As social networking sites (SNS) like Facebook, Weibo, and Meituan have developed, more and more customers and businesses have come to understand the value of social commerce (Xu et al., 2020). Over 70% of online purchases, according to a social commerce report, are affected by social commerce websites (Xu et al., 2020; Jingdong and Nielsen, 2017). Additionally, research into the live-streaming market and impulsive purchases are rapidly growing. In Asia, the percentage is higher (30%) than the global average of 16% of online buyers who make direct product purchases through live-streaming platforms, particularly in Thailand (51%), India (32%), Malaysia (31%), and China (27%) (Peng et al., 2021). Furthermore, live shopping may provide online customers with an easier shopping environment, and it may also encourage impulse buying behavior. Moreover, this study gives academics a basic idea of how this field will be researched in the future.

Therefore, research on impulse buying has always been at the forefront of the times and the world. Thus, this current study seeks to fully comprehend the research by using CiteSpace's knowledge mapping. Many fields have used knowledge mapping extensively to offer a comprehensive and unbiased perspective of a particular study topic (Fang et al., 2018). However, over the years, some literature articles on impulse buying have been published by scholars (Verma and Yadav, 2021; Xiao and Nicholson, 2013). Besides, some research has examined IBB from the standpoint of meta-analysis (Zhao et al., 2022; Iyer et al., 2020). Current studies still lack a visual perspective. Thus, we conducted a scientometric analysis using CiteSpace 6.1 to provide an overview and visual analysis of the subject, clearly showing the

bibliometric characteristics and visualizing relationships of articles published on this topic in reputable scholarly journals indexed in Web of Science (WoS) from 1967 to the end of September 2023. In addition, the following research questions put forward by us:

Q1: What is the current development trend of impulse buying behavior in the world?

Q2: What is the future direction of impulse buying behavior, and which fields are predicted to be most influential based on the highest citations and keywords?

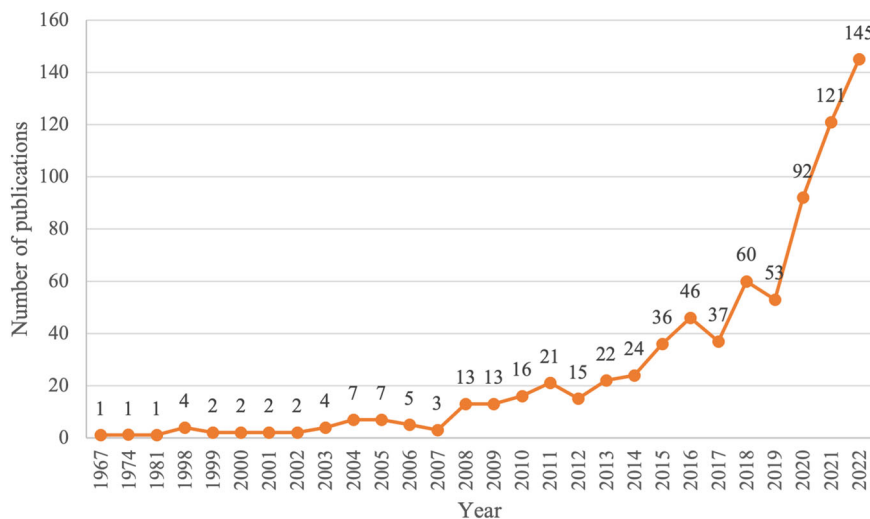
Q3: What are the newly introduced theories and models regarding impulsive buying behavior within the current collaboration networks and emerging trend analysis, compared to similar types of articles?

The structure of this article is as follows. First, it begins with a review of impulsive buying behavior. This is followed by an explanation of the materials and methods used. Next, the results of the collaboration network, co-citation network, and future trends of impulsive buying behavior are presented. Finally, the conclusion section summarizes the entire article and includes a discussion.

## Impulsive buying behavior (IBB)

As time has progressed, authors in the field of impulsive buying behavior have presented varying definitions and interpretations. Stern (1962) defined impulsive buying behavior as any purchase that a shopper makes without prior planning. Rook (1987) described impulse buying as a purchase behavior driven by a strong and irresistible urge. Rook and Fisher (1995) characterized buying impulses as part of a hedonically complex process. Later, Kacen and Lee (2002) explained impulse buying behavior as a spontaneous purchase characterized by moderately quick decision-making and a subjective desire for immediate possession of the goods. Sharma et al. (2010) discourse that impulsive buying denotes a relatively fast and hedonically complex purchasing behavior, which means that the impulse leading to the purchase being made omits any careful, deliberate evaluation of alternative or future consequences. Furthermore, they also highlight the term "impulsive buying," which refers to a quick and hedonistically complicated purchasing behavior, meaning that the surge that led to the purchase was uninformed and did not consider any other options or potential future results. Based on the opinions of the authors mentioned above, this article comes to the following general conclusion. Impulse buying is regarded as unplanned purchasing, characterized by sudden and immediate decisions. It is defined as a more thrilling, tempting, dynamic, and instantaneous buying behavior compared to planned purchasing.

Traditional studies on impulse buying have classified contributing elements as either internal or external (Iyer et al., 2020; Kalla and Arora, 2011; Wansink, 1994; Xiao and Nicholson, 2013). Regarding internal factors, the most common ones are related to consumers, such as impulse buying propensity, pre-purchase emotions (Ozer and Gultekin, 2015), consumer characteristics, gender, age, motivations, and emotions. For external factors, environmental considerations like window displays and store design are widely studied by scholars (Gudonavičienė and Alijošienė, 2015). Moreover, previous research on impulse buying can be categorized into two types. The first type analyzes the potential consequences of impulsive shopping behavior (Dittmar and Drury, 2000; Rook, 1987; Vohs and Faber, 2007). The other type is pertinent to the factors that determine impulsive buying behavior, such as culture (Miao et al., 2020), self-interpretation (Zhang and Shrum, 2009), and the kinds of foods that are eaten (Mishra and Mishra, 2011). With the progress of the times, IBB



**Fig. 1** Published papers numbers on impulsive buying behavior between 1967 and 2022. The figure, which denotes the number of published papers on impulsive buying behavior between 1967 and 2022, is constructed by a curve chart.

has been gradually classified into online and offline categories (Goel et al., 2022). Still, the research on online impulse buying only started 20 years ago, and this part has excellent potential. Based on the enormous economic benefits behind impulse buying, the current research factors need to be continuously explored, and finding the latest research trends is conducive to innovation.

### Material and methodology

**Data sources.** The Web of Science (WoS) core collection was used to gather all relevant information. The WoS Citation database, created by American Thomson Reuters, is a platform for information retrieval. The primary indexes are the Science Citation Index Expanded, the Social Science Citation Index, and the Arts and Humanities Citation Index. This database includes over 9,000 academic publications from internationally renowned and significant academic journals (Abati et al., 2021; Liao et al., 2018). Thus, we obtained the WoS Core Collection's data because this database is recognized as one of the most essential literature indexes in the world (Saif et al., 2022). In this research, we primarily focused on the element of consumer behavior. Then, we used the keywords “impulsive buying” or “impulse buying” or “impulsive consumption” or “impulsive purchase” or “impulse purchase” or “impulse shopping” or “impulsive shopping” or “customer impulse purchasing” or “unplanned purchase” or “sudden purchasing behavior” to search for relevant papers. The term “impulse buying” was included in all literature investigations, whether in the keywords or abstracts. As far as we know, the first article concerning impulsive buying behavior was published in 1967, so we considered materials published between 1967 and 2023 (Data collection ended on September 30, 2023). Book chapters, review articles, and editorial materials were eliminated to obtain high-quality research papers; this left 704 articles that might move on with further analysis.

**Knowledge mapping.** According to Cui et al. (2017), knowledge mapping is a part of bibliometrics analysis, which is defined as “the quantitative analysis of publications in a given field.” Extracting and visually reorganizing the knowledge from several previously published scientific research documents is the aim of mapping and analyzing scientific knowledge (Chen, 2013). Fang et al. (2018) consider that knowledge mapping aids academics in having a better understanding of the intellectual structure in a particular field of study and research status. In bibliometrics

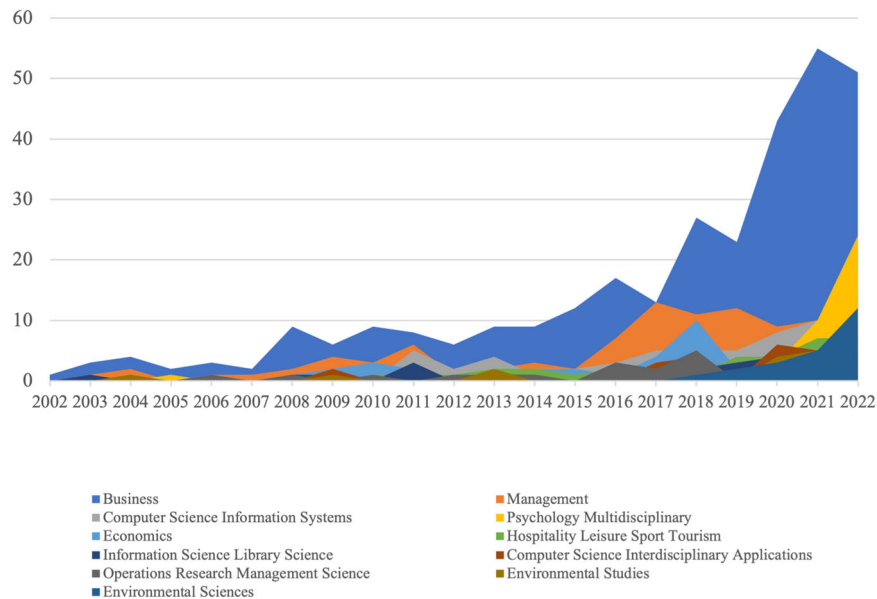
analysis, keyword analysis can show the hot research topics and future research paths. The data on authors, journals, institutions, and nations can assist other academics in identifying the authors who have contributed the most to a field or the institutions that are the most authoritative (Chen and Liu, 2020). The most important analysis in bibliometric studies is co-citation, as it can reveal the relationships between articles. High citation rates and numerous links to other articles indicate highly relevant and significant work (Small, 2003).

CiteSpace 6.1 software was used to do the visualization for this research. Professor Chen of Drexel University proposed CiteSpace, a Java-based application package (Cheng et al., 2021). CiteSpace quantitatively analyzes the literature in specific disciplines and bases its analysis and visualization of emerging patterns and trends in the body of scientific knowledge on the co-citation analysis theory and the pathfinder, minimum spanning trees method (Chen et al., 2008; Fan et al., 2020). In recent years, CiteSpace has been utilized by academics from various fields, such as marketing, environment, tourism, and so on (Geng and Maimaituerxun, 2022; Yao et al., 2020; Li et al., 2017). Analytical goals are represented by nodes (often circles) in CiteSpace's graph. The value of a node increases with its size. The multicolored links between the various nodes display their relationship, with the various colors denoting different publishing years.

### Results

**Research outputs and their categories.** As shown in Fig. 1, the development of articles on impulse buying behavior published over 55 years (1967–2022) is presented in chronological order. The initial publication on impulse buying dates back to 1967. Subsequently, the number of publications about this topic appears to have experienced a relatively gradual growth over the years that followed. From 2008 to 2011, growth occurred; however, it marginally increased. From 2016 to 2019, it fluctuated twice before reaching 53 in 2019 from 46 in 2016. Since then, publications on impulse buying behavior have increased dramatically. These data also suggest that the rising number of publications reflects a growing interest among scholars in impulse buying behavior.

Furthermore, Fig. 2 presents the top ten subject categories, including “Business” (312 articles, account for 27.5%), “Management” (104, 9.2%), “Computer Science Information Systems” (59, 5.2%), “Psychology Multidisciplinary” (53, 4.7%), “Economics” (40, 3.5%), “Hospitality Leisure Sport Tourism” (37, 3.3%),



**Fig. 2 Annual article output in the 10 subject categories.** The figure denotes annual article output in the 10 subject categories is constructed by a colorful stacked chart.

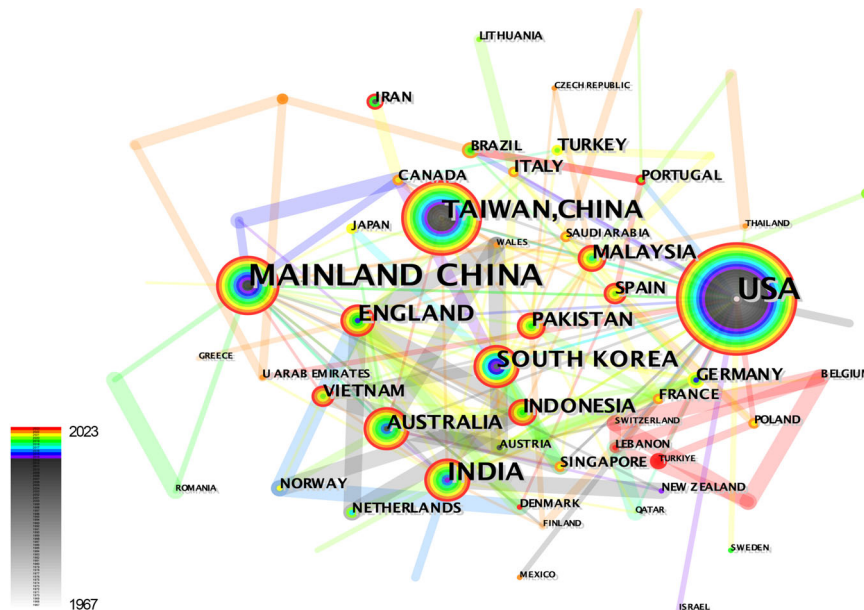
“Information Science Library Science” (30, 2.6%), “Information Science Library Science” (30, 2.6%), “Computer Science Interdisciplinary Applications” (25, 2.2%), “Operations Research Management Science” is associated with 24 articles (2.1%), while “Environmental Studies” and “Environmental Sciences” both have 23 articles each in tenth place, representing 2% of all publications. The distribution of the top ten subjects suggests that the study of impulsive buying behavior is an interdisciplinary one. It exhibits close ties with various disciplines, including environmental science, computer science, psychology, and management.

Over the past two decades, online impulse purchasing has drawn much scholarly attention and created publishing opportunities (Bashar et al., 2022). The rapid development of information technology has facilitated the speed of e-commerce growth in the last few years, which amplified impulsive buying behavior in an online setting (Zhao et al., 2022). Therefore, impulse buying is closely related to the field of computer science information systems, which is especially reflected in social commerce, live-streaming, artificial intelligence (AI), etc. First, it is about social commerce. Based on the background of WeChat social commerce, Chen et al. (2019b) offer a model to investigate the impact of product recommendations on social media on users’ impulsive purchasing tendencies. Under the context of the C2C Facebook “buy and sell” group, Chen et al. (2016) did an online experiment and found that higher textual information quality and numbers of “likes” can usually increase consumers’ urge to buy impulsively. Second, for the live-streaming portion, Jiang and Cai (2021) created a live e-commerce supply chain pricing model with online influencers regarded as retailers. Moreover, this model examines the influence of customers’ satisfaction levels and impulsive purchasing patterns. Besides, two pieces of research explore the antecedents of live-streaming under the stimulus–organism–response framework. One is to take the consumption vision and telepresence as the organism to link with the urge to buy impulsively (Khoi et al., 2023). The other put perceived enjoyment and perceived usefulness in the organism part to connect with the urge to buy impulsively. It is worth noting that the research of Zhang et al. (2023) combines artificial intelligence with live-streaming shopping. It tested the influence of artificial intelligence-driven virtual influencers by investigating the underlying emotional mechanisms and persuasive factors that

influence audiences’ parasocial interaction and impulse purchase intentions and confirmed the assessment-emotion-action scheme. Furthermore, it highlights the significance of the AI workforce applied to retailing and marketing managers.

In addition, as impulse buying becomes more widespread, people investigate the underlying mechanisms. As a result, more academics are using psychological models and theories to explain this behavior. The theory of planned behavior and stimulus-organism-response theory were used by most scholars to define impulsive buying behavior (Vazquez et al., 2020; Wu et al., 2020). Additionally, some researchers use the cognitive-affective personality system theory to investigate why impulsive purchases occur in emergencies and crises (Xiao et al., 2022). Similarly, based on the regulatory focus theory and emotion-cognition-behavior loop, Yu (2022) investigated the function of cognitive traits in modulating the relationship between unpleasant emotions and impulsive purchases during the COVID-19 epidemic. Third, a large part of related articles in the field of economics is about COVID-19. During the COVID-19 epidemic, scholars worldwide have studied related impulse buying behaviors because shopping is closely associated with the economy. Ahmed et al. (2020) investigate patterns of impulsive purchases made by US residents during the COVID-19 epidemic in key US cities and conclude that COVID-19 is a crucial moderator of this behavior. Likewise, Küçükkambak and Süler (2022) focus on the Turkish consumer as the target audience and find people’s fear of COVID-19 impacts compulsive and impulsive buying behaviors. Gupta et al. (2021) research on Indian consumers’ impulsive buying behavior during COVID-19 shows that the COVID-19 pandemic had a major effect on consumer purchasing behaviors, as evidenced by stockpiling and impulsive purchases.

Finally, regarding the Hospitality Leisure Sport Tourism discipline, currently, some studies have incorporated time scarcity (Li et al., 2021) or time pressure (Sohn and Lee, 2017) into exploring tourists’ impulsive behavior. What’s more, Chen et al. (2019a) provide a model that demonstrates how website quality (as determined by hedonic value) influences impulsive purchasing behaviors in online tourism, along with some recommendations. Compared with the disciplines mentioned, impulsive buying research in tourism is fewer; however, it is valuable for scholars to explore it deeply. Currently, wireless



**Fig. 3 Country collaboration network.** The figure denotes country collaboration network based on impulsive buying behavior research for the year from 1976 to 2023.

Table 1 Top ten countries based on frequency.		
Country	Frequency	Centrality
USA	164	0.58
MAINLAND CHINA	164	0.26
INDIA	85	0.17
TAIWAN, CHINA	62	0.05
ENGLAND	34	0.14
SOUTH KOREA	34	0.01
AUSTRALIA	30	0.04
MALAYSIA	28	0.10
PAKISTAN	27	0.07
INDONESIA	24	0.01

technology is used in tourism and hospitality services. Therefore, to increase sales, tourist and hospitality businesses must better comprehend the connection between technology and impulsive buying (Ahn et al., 2020).

Consequently, the research on impulse buying behavior has progressed with the progress of times, and there has been a phenomenon of continuously extending from the field of management and business to Computer Science Information Systems, Psychology Multidisciplinary, Economics, Hospitality Leisure Sport Tourism, and other fields.

**The collaboration of impulsive buying behavior**

*Country collaboration network.* Between 1967 and 2023, the country collaboration network, depicted in Fig. 3, comprises 70 nations and 182 linkages. Countries have established a relatively mature cooperation network based on their close ties in this field. Table 1 lists the top 10 countries in terms of frequency which shows that the USA and Mainland China both have the highest frequency with 164 articles. However, the centrality score of 0.58 with the USA surpasses that of China by 2.23 times. Next, the countries ranked in descending order of publication frequency are India (85 articles), Taiwan, and China (62 pieces). It is noteworthy that despite South Korea and England having 34 articles each, their centrality differs greatly. Although the number of

articles in Malaysia does not exceed 30, its centrality is 10 times that of South Korea.

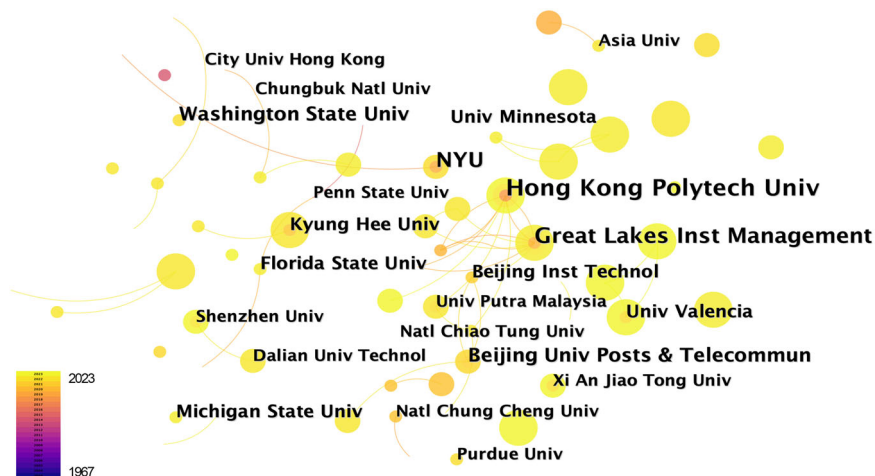
*Institution collaboration network.* Figure 4 shows the 413 nodes and 262 lines that make up the institution collaboration network from 1967 to 2023. There is cooperation between the agencies, but it is not close. Most of these networks are now made up of small groups. Because of this, it is understood that the subject is still developing and not fully developed. However, we are aware that there are two groups of institutions that have a close relationship based on the links between institutions. One includes Hong Kong Polytechnic University, Great Lakes Institute Management, and Beijing Institute of Technology. The other is Florida State University and Kyung Hee University.

As can be seen from the table ranking the top 10 institutions by number of papers, the Hong Kong Polytechnic University has published the most articles on impulsive buying (10), closely followed by Great Lakes Institute Management (8), New York University (7), Beijing University of Posts & Telecommunications (6), Washington State University (6), Beijing Institute of Technology (5), Florida State University (5), Kyung Hee University (5), Michigan State University (5), University of Minnesota (5) and University of Valencia (5). Five of these institutions are from the US, three are from China, and the rest are from India, South Korea, and Spain.

As the ranking indicated in Tables 1 and 2, the top three countries are the United States, China, and India. The following section elaborates on the reasons for the countries' ranking in Table 2 from the chronological order displayed in the WoS database and the external factors.

Firstly, in 1967, the United States was the first country to publish research on impulsive purchase behavior, 25 years far ahead of second-ranked England (the first research published time is 1992). Many influential studies on offline impulse buying emerged during this period. It has been estimated that almost 90% of customers occasionally make impulsive purchases in the United States (Awan and Abbas Nayyar, 2015). In a word, impulse buying is part of American culture.

Between 2000–2009, countries such as South Korea, China, Indonesia, and Australia began to enter the initial research



**Fig. 4 Institution collaboration network.** The figure denotes institutional collaboration network based on impulsive buying behavior research for the year from 1976 to 2023.

Table 2 Top 10 Institutions.		
Frequency	Institution	Country
10	Hong Kong Polytechnic University	CHINA
8	Great Lakes Institute Management	INDIA
7	New York University	USA
6	Beijing University of Posts & Telecommunications	CHINA
6	Washington State University	USA
5	Beijing Institute of Technology	CHINA
5	Florida State University	USA
5	Kyung Hee University	SOUTH KOREA
5	Michigan State University	USA
5	University of Minnesota	USA
5	University of Valencia	SPAIN

Table 3 Top 10 authors based on frequency of publications.		
Author	Frequency	Institution
Umair Akram	6	Jiangsu University
Bharadhwaj Sivakumaran	5	SRM University
J Jeffrey Inman	4	University of Pittsburgh
Rambabu Lavuri	4	Indian Institutes of Management
Sanjeev Prashar	4	Indian Institute of Management Raipur
T Sai Vijay	4	Indian Institute of Management Ranchi
Chandan Prasad	4	Indian Institutes of Management Bodh Gaya
Zubair Akram	3	Beijing Institute of Technology
Shobhit Kakaria	3	University of Valencia
Muhammad Kaleem Khan	3	Liaoning University

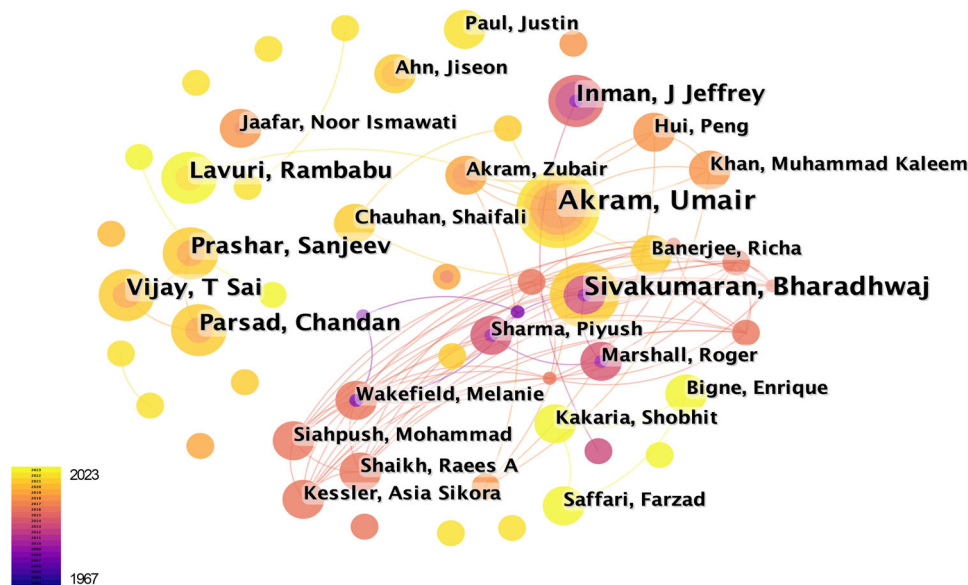
indicates there will be more research to publish in this field. Second, China’s e-commerce has been in a stage of rapid development since 2003, and online shopping has become mainstream. Bashar et al. (2022) found that the number of articles published on online impulsive buying behavior in China is 2.88 times that of the United States, which is over 2 times more than the multiple of articles published in this research (The ratio of the number of articles published by China and the United States in this article is 1.38). From this vantage point, it is also more determined that research on Chinese consumers’ impulsive buying behavior has been mainly influenced by the rise of online shopping. Third, in June 2000, the China Electronic Commerce Association (CECA) was established, which means that the Chinese government greatly values the growth of e-commerce.

In 2010, Asian countries, such as Malaysia, Pakistan, and India, started to research this area progressively, and India has the highest publication growth rate among the three. One of the reasons is that it currently has the largest population in the world. Besides, out of 30 emerging economies, India is ranked as the “second most attractive retail destination” globally (Mehta and Chugan, 2013). By 2025, the Indian consumer market is anticipated to have quadrupled, placing it among the world’s top five economies (Cheng, 2014). As for Malaysia, from 2012 to 2014, five major e-commerce platforms, including Lazada, Zalora, Rakuten, etc, joined in, which drove the online shopping market of this country (Kiu and Lee, 2017).

In conclusion, the ranking publishing numbers shown in Tables 1 and 2 are closely related to each country’s culture, time of internet development background, and population base.

*Author collaboration network.* Figure 5 (since the CiteSpace software automatically reversed the order for the first and last name of the author, the name order in this paragraph has been corrected) displays the 492 authors and 423 collaboration links for the impulsive buying behavior study between 1967 and 2023. Only a few authors in the study on impulse buying behavior demonstrate tight collaboration, and overall, there isn’t much academic interaction. The top ten authors of linked papers are listed in Table 3, along with their names. For instance, Jiangsu University’s Umair Akram has contributed more to this area and has written six articles. One of the first scholars to study Internet impulse purchasing was Umair Akram. He classified conventional and online impulsive buying behavior to let subsequent readers research more clearly; at that time, most studies researched

period. In terms of publication growth rate, most countries are developing very steadily except China, which is the fastest-growing of these countries. There are three reasons to explain this: First, China ranked second in the world’s most populous country. Population, on the one hand, determines its purchasing power, which emerges in a lot of study cases; on the other hand, it



**Fig. 5 Author collaboration network.** The figure denotes author collaboration network based on impulsive buying behavior research for the year from 1976 to 2023.

traditional impulse buying behavior exclusively (Akram et al., 2017). Additionally, he researched the environmental effects of social commerce in China and how the survey website’s quality influences online impulse buying behavior, etc., offering multiple perspectives on China’s online retail industry (Akram et al., 2018). The number of articles contributed by Professor Bharadhwaj Sivakumaran is 5, ranking after Umair Akram. He is currently working at SRM University. It’s worth noting that his articles have a high-impact factor, meaning his research significantly contributes to impulse buying. He can think outside the box and explore impulse buying from the perspective of service and store environment (Mohan et al., 2013; Sharma et al., 2014). He can consider the standpoint of consumers and advise them on how to alleviate or lessen impulsive buying when most researchers are researching how impulse buying benefits marketers (Upadhye et al., 2021), which has a certain amount of innovative value. Next, the writers who contributed four articles to the table are J Jeffrey Inman, Sanjeev Prashar, T Sai Vijay, and Chandan Prasad. Finally, the writers who published three articles were Zubair Akram, Shobhit Kakaria, and Muhammad Kaleem Khan. Research on impulse buying is currently in a developmental phase, characterized by a relatively limited number of authoritative scholars in the domain. Umair Akram and Bharadhwaj Sivakumaran currently represent academics who study impulse buying. Among them, Bharadhwaj Sivakumaran focused on impulse buying behavior in India and cross-cultural comparison, whereas Umair Akram mainly researched impulsive buying behavior in China.

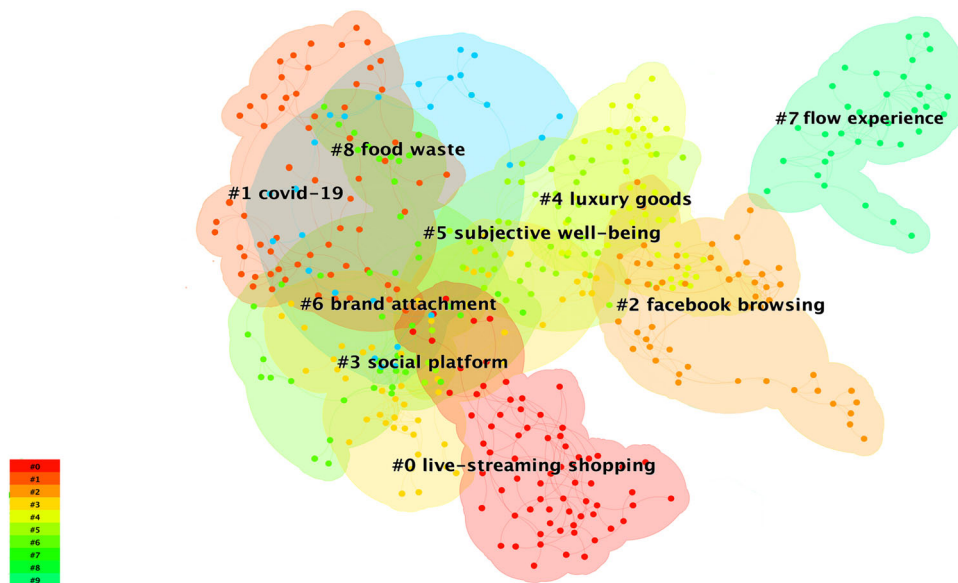
*The collaboration of impulsive buying behavior*

Co-citation network for documents: Figure 6 represents the co-citation network for documents, which, between 1967 and 2023, contained 983 references and 3649 co-citation relationships. The clusters were labeled using the log-likelihood ratio (LLR) with the title extraction and indexing terms. It is commonly used and advised to utilize LLR, one of the algorithms, to extract cluster labels from the cited literature at various locations (Fang et al., 2018). The document co-citation networks silhouette scores are all higher than 0.7, which suggests the clusters have dependable quality. Based on the clusters in the impulsive buying realm, the following section is divided into four parts: Changes in times,

social platforms and their extensions, product types for impulse buying, and consumers’ impulsive buying factors.

First, it is about Changes in time. As Fig. 6 shows, Cluster #1 COVID-19 (silhouette score = 0.975, cited mean year is 2019) ranks second in the size comparison. It is a known fact that the COVID-19 pandemic has wreaked havoc on the world economy and healthcare, instilling fear, terror, and uncertainty in the hearts of billions of people (Islam et al., 2021). During this period, people make crazy impulse purchases of necessities, food, fitness products, etc. In this regard, scholars worldwide have explored Covid-19 and impulse buying. Naem (2021) showed that fear of illness, fear of empty shelves, concern of price increases, and social pressure to buy extra items to justify staying at home enhanced panic and impulsive shopping behavior among consumers. Similarly, the study of Anas et al. (2022) found that the two main factors influencing consumers’ impulsive purchasing decisions during COVID-19 were fear and the availability of resources. Furthermore, based on the view of Chiu et al. (2022), it was evident that the perception of COVID-19 had a positive impact on fear, which in turn contributed to impulsive purchases of exercise products. In general, although COVID-19 has passed, these connected studies continue to offer insights into fear-induced panic impulsive buying, and future studies might further explore the relationship between negative emotions and impulse buying.

Next, for the social platforms and their extensions. Web 2.0 has given rise to social platforms, which are online shopping services that link customers and let them find, share, recommend, rate, and buy products (Hajli, 2015). However, Cluster #3 social platforms (profile score = 0.96) ranked fourth with 52 sizes; the average cited year was 5 years ago. Social platforms, including Facebook, TikTok, blogs, Instagram, and Pinterest, are developing in full swing. Its emergence has also led to different research derivatives: Cluster #0 live-streaming shopping (silhouette score = 0.882, cited mean year is 2020), Cluster #9 social media celebrity (silhouette score = 0.96, cited mean year is 2017), Cluster #2 facebook browsing (silhouette score = 0.959, cited mean year is 2017). In terms of Cluster #0: Live-streaming shopping with the largest cluster size. It is a novel shopping model developed with social platforms. Compared with the traditional online shopping model, live-streaming shopping pays more attention to the interaction between merchants and consumers. Moreover, the effects



**Fig. 6 Document co-citation network.** The figure denotes document co-citation network based on impulsive buying behavior research for the year from 1976 to 2023.

Table 4 Summary of top 10 clusters.				
Cluster ID	Size	Silhouette	Label (LLR)	Mean (cite year)
0	71	0.882	live-streaming shopping	2020
1	63	0.975	covid-19	2019
2	53	0.959	Facebook browsing	2017
3	52	0.96	social platform	2017
4	52	0.92	luxury goods	2014
5	49	0.954	subjective well-being	2011
6	43	0.952	brand attachment	2017
7	35	0.956	flow experience	2010
8	26	0.994	food waste	2019
9	12	0.994	social media celebrity	2020

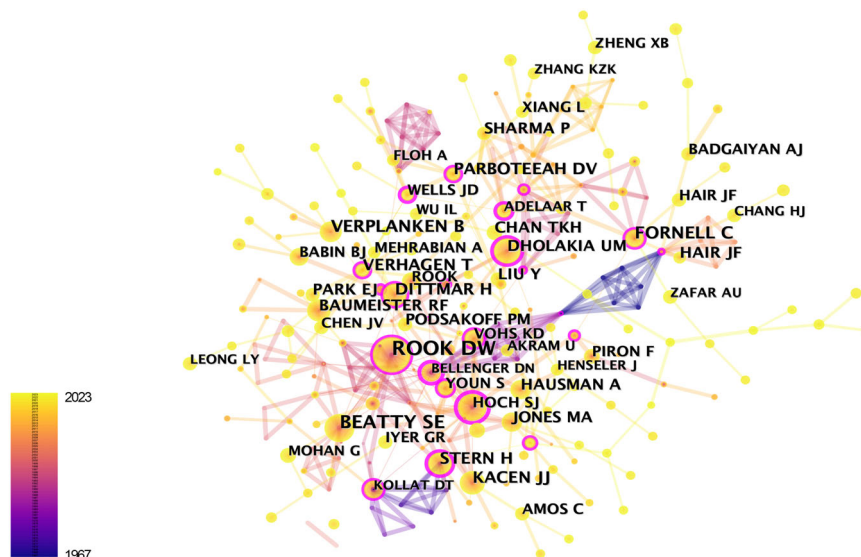
of the time scarcity characteristic are the icing on the cake of this kind of shopping which provides favorable conditions for stimulating consumers' impulse purchases (Hao and Huang, 2023). Besides, the study of Xu et al. (2020) examines the impact of contextual and environmental factors, such as the streamer attractiveness on viewers' cognitive and emotional states and subsequent reactions. From this, it can be seen that the study view of streamers is also an essential research perspective in live-streaming shopping. It is also closely related to another cluster, the #9 social media celebrity. Currently, various studies are exploring the relationship between social media celebrities and impulse purchases in the background of social platforms. According to Chen et al. (2021), consumers' recognition of social platform celebrities can increase their trust in marketing activities and thus increase impulse purchases. Similarly, Xiang et al. (2016) explored the relationship between shoppers' intimacy with media personalities (parasocial interaction PSI) and impulse buying tendency and found a positive correlation. And for cluster #2 Facebook browsing, it's a unique variable source from the Facebook social platform. Although it is a niche cluster, it also occupies the third cluster. This shows that the Facebook platform, with a huge population base, performs outstandingly among other social platforms. At present, social platforms are still developing and extending. Most of the research on impulse buying with social platforms comes from China. Future exploration can be done from the perspective of

Cross-country comparison, new-style social platforms, and new forms of consumption.

Third, in terms of the product types for impulse buying. Among the top ten clusters, the most prominent is Cluster #4 luxury goods (silhouette score = 0.92, mean the cited year is 2014), and Cluster #8 food waste (silhouette score = 0.956, the mean the cited year is 2010). The cluster #4 luxury goods, which ranked fourth in the forefront of size, with the COVID-19 pandemic and digital transformation, the luxury goods industry has also gradually introduced online models (Hoang et al., 2022). The impulse buying behavior of luxury products represents a new group. First, scholars have confirmed that material goods or services represent unique personality traits of materialistic people (Islam et al., 2021). Second, it is about the element of trust. Trust has a significant influence on impulse buying (Chen et al., 2021). Luxury products have been shown to boost people's feelings of trust, encouraging them to make impulsive purchases (Chen et al., 2021). For cluster #8 food waste, the average year is within 5 years. The relationship between food waste and impulse buying varies greatly from different angles. Lahath et al. (2021) consider impulsive buying to be a factor in food waste, and their study reveals the mediating role of impulse buying and the moderating role of neuroticism on food waste during the coronavirus (COVID-19) pandemic. This kind of food waste caused by anxiety and panic is highly negative.

On the contrary, the results of Liao et al. (2022) show that impulse buying is one factor that significantly affects food waste reduction intention. The purpose of the differences between these two studies is the main reason for the relationship differences. The former believes that impulse leads to food waste. The latter supposes that discount promotion induces impulsive buying, solving the problem of wasted expired products.

Finally, for the consumer's impulsive buying factors, Cluster #5 subjective well-being (silhouette score = 0.954, cited mean year is 2011), Cluster #6 brand attachment (silhouette score = 0.952, cited mean year is 2017), and Cluster #9 flow experience (silhouette score = 0.882, cited mean year is 2020) are all subjective factors of impulse buying consumers in Table 4. For #5 subjective well-being, many researchers have integrated personality traits into subjective well-being and impulse buying behavior. Seinauskiene et al. (2016) discovered that lower well-



**Fig. 7 Author co-citation network.** The figure depicts the documents’ co-citation network based on impulsive buying behavior research for the year ranging from 1976 to 2023.

Author	Frequency	Centrality
ROOK DW	415	0.15
BEATTY SE	294	0.12
FORNELL C	175	0.15
VERPLANKEN B	161	0.17
KACEN JJ	146	0.11
STERN H	145	0.22
DITTMAR H	136	0.14
PARBOTEEAH DV	121	0.19
VERHAGEN T	118	0.14
CHAN TKH	110	0.09

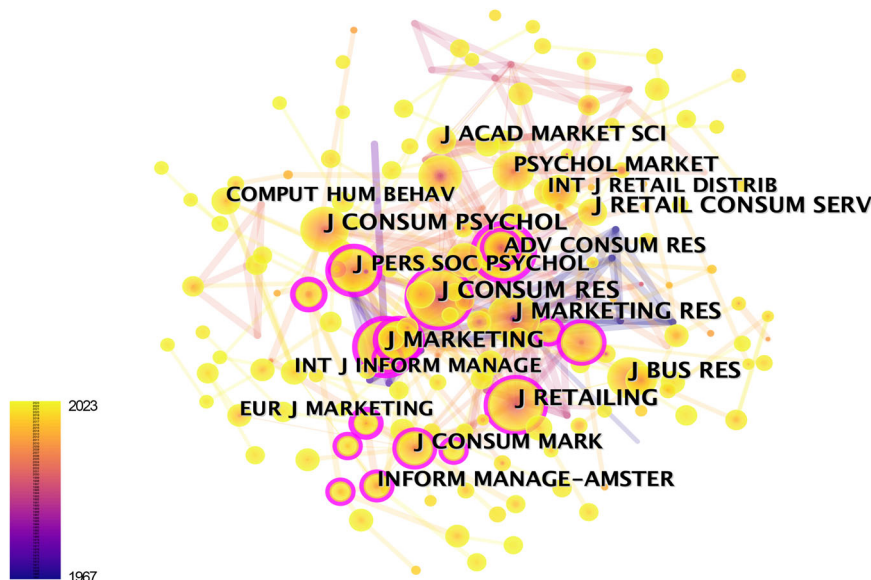
being levels enhance materialism, which then fuels a higher level of impulsive purchase tendencies. Besides, the research of (Silvera et al., 2008) also integrated Interpersonal variables in related studies. It was proven that, at the cognitive level, impulsive purchasing has a negative correlation with subjective well-being but that, at the emotional level, it has a positive correlation with social influence and emotional sensitivity. Concerning Cluster #6: Brand attachment, many scholars have integrated brand attachment into impulse buying research. According to the study of Japutra et al. (2019), brand attachment entirely mediates the association between ideal self-congruence. Besides, findings from Japutra et al. (2022) demonstrate a positive relationship between impulsive and obsessive-compulsive purchasing and the three aspects of brand attachment: passion, prominence, and anxiety. Then, it is about the #9 flow experience cluster closely related to social platforms and online shopping. Bao and Yang (2022) discovered that consumers’ flow experience, trust, and customer’ serendipity encourage impulse buying.

**Author co-citation network:** The author co-citation network is represented in Fig. 7, and 786 authors and 5245 links are linked with collaboration. The relationship between scholars’ co-citations is close. More authors are cited when the font and node are larger. It is essential to note that in this analysis, only an article’s first author will be considered (Fang et al., 2018). Lists the

top 10 researchers according to citation counts. With 415 citations, ROOK DW was the author who received the most attention, yet his centrality (0.15)—a measure of how impactful a scientific contribution may be—ranked fourth, not first. As a USC Marshall School of Business professor, he offered a novel understanding of its phenomenology when consumer impulse buying was still not fully understood (Rook, 1987). Furthermore, the normative features of impulsive buying were also first empirically examined by him as a researcher. In the article of Rook and Fisher (1995), the authors demonstrated that only when customers feel that acting on impulse is acceptable does the association between the buying impulsiveness trait and related purchase behaviors become meaningful.

As table 5 shows, it is worth noting that although BEATTY SE and KACEN JJ are both in the top five in frequency, their centrality is relatively low in the top ten. Scholar Beatty SE’s citations (276) came in second place. Her position at The University of Alabama is as a professor of marketing. Besides, she put forth a precursor model of impulsive buying and used data extracted at two points in time (during post- and pre-shopping interviews) from a regional shopping mall setting, providing a basis for future research and Management impact (Beatty and Ferrell, 1998). KACEN JJ is a Clinical professor at the University of Houston, College of Business Administration. Her research is full of great originality and focuses on the impact of cultural differences on impulse buying. Most of the research was on impulse buying in the United States at that time, but she started doing cross-cultural studies. Her team discovered that the impulse buying scale is suitable for the United States but not for other countries, and then they analyzed the moderating role of culture different from the perspectives of individualism and collectivism. Additionally, they concentrated on cultural differences in consumers’ satisfaction with planned and impulsive purchases, which contribute to this realm (Lee and Kacen, 2008; Kacen and Lee, 2002).

On the contrary, although the frequency of STERN H and PARBOTEEAH DV is not in the top five, their centrality enters the top two. STERN H is the founder of the impulse buying theory, which provides fresh eyes on consumer purchasing behavior. The article he published in 1962 has been highly cited over 1900, in which he is the first to define impulse buying as divided into four categories: Pure Impulse Buying, Reminder Impulse Buying, Suggestion Impulse Buying, and Planned Impulse Buying (Stern, 1962). PARBOTEEAH



**Fig. 8 Journal co-citation network.** The figure denotes the journals’ co-citation network based on impulsive buying behavior research for the year from 1976 to 2023.

Table 6 Top ten most-cited journals with co-citation frequency.		
Publication number	Journal	Impact factor
544	Journal of Consumer Research	8.612
463	Journal of Business Research	10.969
454	Journal of Retailing	11.19
419	Journal of Marketing Research	6.664
391	Journal of Marketing	15.36
383	Journal of Retailing and Consumer Services	10.972
349	Journal of Consumer Psychology	4.551
324	Advances in Consumer Research	\
315	Psychology & Marketing	5.507
280	Journal of the Academy of Marketing Science	14.904

Table 7 Top ten most prolific journals.		
Journal	Publication number	Impact factor
Journal of Retailing and Consumers Services	29	10.972
Frontiers in Psychology	28	4.232
Journal of Business Research	17	10.969
Sustainability	13	3.889
International Journal of Retail Distribution Management	12	4.743
Asia Pacific Journal of Marketing and Logistics	10	4.643
European Journal of Marketing	10	5.181
Internet Research	9	6.353
Journal of Consumer Behavior	9	3.199
Psychology and Marketing	9	5.507

DV is an Associate Professor at Eastern New Mexico University. She mainly contributes to online impulsive buying behavior. When online impulse buying emerged, she applied environmental psychology theory to expand on prior impulse buying (Parboteeah et al., 2009). Through the authors’ co-citation analysis, future researchers can find more research inspiration from related authors’ perspectives.

In summary, scholars read the most influential articles based on their needs to explore impulse purchases. If readers are interested in original empirical research or the precursor model of impulse buying, they can refer to these articles. Moreover, they can read more articles by ROOK DW and BEATTY SE. In addition, KACEN JJ is one of the most influential researchers in this field. She mainly focuses on exploring the differences in cross-cultural research on impulse buying. Thus, readers can learn the information from her studies comparing impulse buying behaviors among different countries. As for readers who want to learn more about the deep classification of impulsive buying behavior, it is recommended to read the articles about impulse buying theory from STERN H. Finally, the articles by PARBOTEEAH DV can provide more inspiration for academics studying environmental psychology and online impulsive buying.

Journal Co-citation network: The journal co-citation network represents the network of journals that contribute to a particular

field of research. Figure 8 displays the publications that have contributed the most over the past 21 years about impulsive buying behavior. A journal receives more citations, the more significant the node diameter (Mustafee et al., 2014). The top ten most-cited journals out of the 790 that were currently retrieved are displayed in Table 6. More than 280 frequencies have been cited in conjunction with the top ten journals. With 544 co-citations, the Journal of Consumer Research leads the field, followed by the Journal of Business Research with 463 co-citation frequencies. Most publications of impulsive buying articles concentrate on marketing, psychology, and computer science. This analysis can be a valuable reference for academics looking for a relevant journal to publish their research in this area.

The most prolific journals in the study of impulsive behavior are listed in Table 7. With 29 articles published between 2001 and 2022, the Journal of Retailing and Consumers Services is the top journal in this area. Frontiers in Psychology (28), Journal of Business Research (17), Sustainability (13), and International Journal of Retail Distribution Management (12) round out the top five most prolific journals. It should be noted that while Table 7 highlights high-impact factors journals that published articles relating to impulsive buying behavior, Table 6 emphasizes the

**Table 8 Top twenty-six references by the number of citations.**

References	Strength	Duration	1967-2023
Beatty and Ferrell (1998)	4.07	2001	2003
Vohs and Faber (2007)	7.92	2009	2012
Parboteeah et al. (2009)	4.6	2011	2013
Sharma et al. (2010)	4.63	2012	2014
Wells et al. (2011)	6.15	2013	2016
Verhagen and Van Dolen (2011)	6.15	2013	2016
Verplanken and Sato (2011)	6.15	2013	2016
Bell et al. (2011)	4.57	2013	2015
Park et al. (2012)	6.18	2015	2017
Flight et al. (2012)	4.32	2015	2017
Badgaiyan and Verma (2014)	8.36	2016	2019
Liu et al. (2013)	8.35	2016	2018
Floh and Madlberger (2013)	7.15	2016	2018
Shen and Khalifa (2012)	4.44	2016	2017
Kacen et al. (2012)	4.44	2016	2017
Mohan et al. (2013)	4.16	2016	2018
Xiang et al. (2016)	14.28	2017	2021
Chen et al. (2016)	11.43	2017	2021
Badgaiyan and Verma (2015)	7.4	2017	2020
Thompson and Prendergast (2015)	6.41	2017	2020
Huang (2016)	8.93	2018	2021
Wu et al. (2016)	7.26	2018	2021
Bellini et al. (2017)	6.01	2019	2020
Lo et al. (2016)	5.17	2019	2021
Sundström et al. (2019)	4.49	2020	2021
Aragoncillo and Orus (2018)	6	2021	2023

contributing journals with the highest frequency of citations in the impulsive buying behavior field. According to Fang et al. (2018), it is generally accepted that high-impact factors journals may also have more excellent citation rates.

*Emerging trends of impulsive buying behavior*

References with the highest number of citations: Citation bursts are formed when an article acquires a lot of citations in a short period. These bursts can help reveal some of a specific topic’s research dynamics (Fang et al., 2018). Albeit impulsive buying behavior is a developing topic, particular articles obtained a lot of citations, as seen in Table 8. The table ranks the top 26 articles about impulsive buying behavior based on their citation quantity and popular period. The following will analyze this from three perspectives (long history, strength ranking, and potential).

The article of Beatty and Ferrell (1998) was the first popular citation published about 20 years ago to offer a model of the precursors for impulse buying and empirically evaluate it using information obtained from pre- and post-shopping interviews at two different intervals in time, and its studies served as the basis for later studies on impulsive buying behavior.

Then, we analyze the strengths of the top three articles from the perspective of the top three articles. All the top three articles lasted for four years in burst. To begin with, Xiang et al. (2016) have the number one Strength Value (14.28), which is also one of the earlier articles based on parasocial interaction with the social platform. The article introduces parasocial interaction theory to examine the influence of social relationship factors on the formation of impulse buying behavior on the Mogujie ([www.mogujie.com](http://www.mogujie.com)) social platform. The theoretical contribution part combines psychology, marketing, and communication theory and laid the foundation for subsequent researchers to conduct an in-depth exploration of social relationships and purchasing behavior. Following it, the article of Chen et al. (2016), with the second Strength Value (10.34), uses C2C Facebook as background research and empirically studies the impact of advertising

information quality, impulsive traits, and the number of “likes” on advertising. These factors can be combined with the recent past and combined with popular social media wins with novelty. After that, the article of strength (8.93) at position third discusses the impact of social networking website content on users’ emotional reactions. The study expanded on the SOR paradigm’s use in social commerce impulsive buying and clarified the distinction between impulsive buying and buying (Huang, 2016). In fact, these three articles have the common keyword “social platform”, consistent with the hot clustering tag words mentioned earlier.

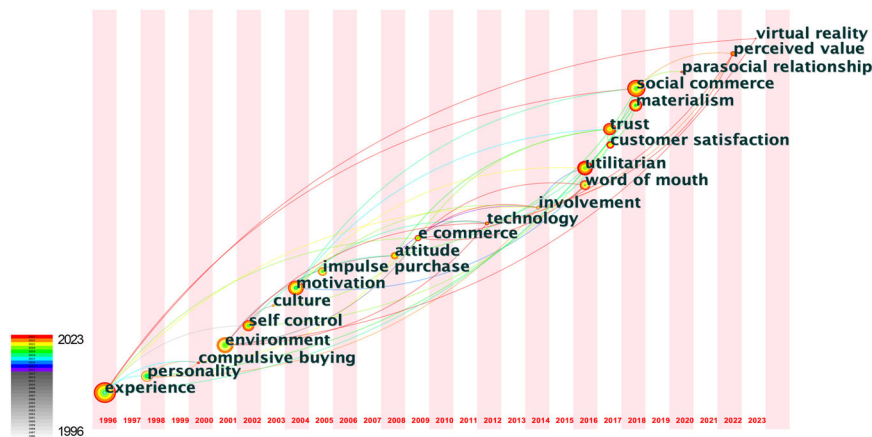
Next, we will introduce some articles with a strength value within the top 20, but with relatively recent publication years. For example, an article by Aragoncillo and Orus (2018), ranked as having the highest recent burst year, offers the first step in validating a scale that effectively measures the influence of social media on impulse buying behavior. Comparing online and offline channels and obtaining results that indicate increased impulse buying behavior, provides direction for subsequent scholars to explore further comparisons between online and offline impulse buying.

Secondly, another recent article ranked 16 in strength, offers a novel perspective based on pre-purchase tendencies and impulse buying behavior. Furthermore, it proposes a new model encompassing personal characteristics, addressing a current gap in the literature (Bellini et al., 2017).

Another newer burst year article is from (Wu et al., 2016), which mainly proposes a novel research model to examine impulse buying behavior in a complete manner (starting from the trust belief and technology use with the mediator of flow experience).

Overall, among these three newer burst year articles, two of them start from the impulse buying models, and one compares from the online and offline channels. These mindsets provide scholars with many different ideas for impulse buying extension.

Analysis of keywords: Examining keywords might reveal the direction in which a topic trends. Identifying the research



**Fig. 9 Time zone view of keywords.** The figure illustrates the time zone view of keywords based on impulsive buying behavior research for the year ranging from 1996 to 2023.

hotspots or the most critical topic in the field also helps to understand future study paths. Figure 9 depicts the time zone of impulsive purchasing behavior. It shows the changing process of keywords. Starting from the period 1996 to 2009, some keywords first appeared a long time ago, but they are still popular at present, such as experience, environment, personality, compulsive buying, motivation, etc. Since 2009, in the rapid development of e-commerce year, the keyword e-commerce has been integrated into the field of impulse buying. Meanwhile, more scholars are exploring online impulse buying further. Besides, many studies are related to high-level consumer demand, such as perceived value, and customer satisfaction. The following content will introduce the keywords regarding their interconnection in a roughly chronological order.

The first part is the keyword “experience”, which appeared in 1996. It emerged at the earliest in this field; however, the frequency will peak in 2021. This keyword has a broad research scope. It is closely related to keywords like “environment”, “flow experience”, “motivation”, “self-control”, etc. According to studies from Selby and Joiner (2013), arousal brought on by music and perfume increases pleasure levels, which in turn improves approach behavior and shopping satisfaction and explores the moderating effects of store environment on the impulse shopping process. In the same year, Chen and Teng (2013) discovered a comprehensive model of the effects of online store image on purchase intention in an e-commerce environment and proposed in the future section to explore more specifically which online store features lead to impulse buying behavior. Furthermore, experience is often discussed in conjunction with flow theory as a motivation for impulse buying (Wu et al., 2020) considering that pleasant experience and website attributes are both critical driving factors for impulse purchases. Similarly, in the research of Wu et al. (2016), flow experience was used as a mediating factor driving online shopping. In a word, the flow experience is deeply integrated into online shopping. For self-control, it can suppress emotions, and impulsive consumption is often related to the benefits of hedonic experience. In the desire-willpower model, impulse buying is emphasized as a struggle between desire and willpower (Wang et al., 2020a; Hofmann et al., 2009). In short, self-control and hedonic experience are also antagonistic. Thus, if we explore the relationship between experience and self-control from the perspective of confrontation and combine it with dual-system theory, we will find discoveries. In the future, this part can also do more to innovate impulse purchase models.

Moreover, some studies currently explore personality and materialism together. Then, about another classic word, “personality.” This keyword only appeared three times before 2013 and

did not reach its frequency peak until 2018. Currently, most research on personality explores the five-factor personality model and impulse buying. According to Thompson and Prendergast (2015), the five-factor personality model’s extraversion, conscientiousness, and neuroticism measurements unanimously predicted impulse buying. Based on the research of Verplanken and Herabadi (2001), they found that impulsive buying in the big five model background, the cognitive facet, was inversely associated with conscientiousness, the desire for personal organization, and the shopping need. The affective aspect was associated with action orientation and a lack of autonomy. Otero-López and Villardefrancos (2013) showed some relationship between the Five-Factor Model personality traits, materialism, and over-purchasing. Authors find extraversion has a positive association with materialism. However, openness and agreeableness have negative relations with materialism, which, in turn, is associated with higher excessive buying propensity. Furthermore, Badgaiyan and Verma (2014) test the impact of five intrinsic causes on impulsive purchase behavior, including personality, culture, materialism, shopping enjoyment propensity, and impulsive buying tendency. Presently, the part about personality can be explored from different perspectives. There are three categories of personality traits: high-order, low-order, and mid-order. Most of the 5-Factor Model of Personality belongs to high-order. In the future, impulsive buying behavior can be explored with different levels of personality traits. In addition, there is also a blank in the cross-culture exploration of personality, and discoveries will be made comparing the perspectives of individualism and collectivism (Olsen et al., 2016).

With the proliferation of e-commerce, the research hotspot trend form of impulse buying gradually changed from offline to online. In a 20-year study on e-commerce, there have been many articles analyzing the factors of online impulse (Kumar et al., 2021). The e-commerce keywords in Fig. 9 are shown in 2009, which was also a year of rapid development of e-commerce. The development of e-commerce not only activates the deep needs of consumers but also drives the development of Technology.

As for the consumers’ deep needs, it is divided into value level and interpersonal interaction level. Regarding the consumer value level, perceived value (2022) is first to be mentioned. Perceived value includes different dimensions, such as utilitarian value, emotional value, conditional value, social value, cognitive value, and hedonic value. It is related to Utilitarian and customer satisfaction. From Fig. 9, the keyword “utilitarian” appeared 6 years earlier than “perceived value” in this field. It can be seen that Utilitarian value is used most frequently as one of the

perceived values connected with impulse purchases. At present, people often combine the terms “hedonic” and “utilitarian” together to study impulse buying. According to a study (Zhang et al., 2018), consumers who are more impulsive place a higher weight on the hedonic value of internet comments than those who are less impulsive do. Yang et al. (2021) investigate how, in the context of mobile commerce (m-commerce), customers’ perceived values (utilitarian and hedonic values) influence their impulse buying behavior (IBB). Furthermore, Liu et al. (2022) discovered that affective impulsive buying is caused by affective information processing while cognitive impulsive buying is dominated by cognitive information processing. Additionally, research has shown that hedonic consumption is dominated by affective information processing while utilitarian consumption is dominated by cognitive. Not only that, “customer satisfaction” is often researched together with perceived value, especially from the perspective of hedonic value. For instance, Madhu et al. (2023) empirically investigate the intercorrelation between online impulse buying tendencies, online promotions, hedonic motivations, impulse purchase decisions, and customer satisfaction. Besides, Widagdo and Roz (2021) examine how customers’ satisfaction with online purchasing in Indonesia is influenced by website quality, hedonic shopping motivation, and impulse buying. Generally, if current research can expand beyond the perspectives of utilitarianism and hedonic value, adopt a comparative approach from other dimensions of perceived value, and conduct further studies in this field, there will likely be breakthroughs. At the level of interpersonal interaction, “word of mouth” and “trust” have also been explored together by scholars in this domain. Zhao et al. (2020) researched from the perspective of word-of-mouth information quality and added consumers’ social psychological distance to study the impact of word-of-mouth on trust. Finally, it was discovered that the relationship between information quality and trust is mediated by social psychological distance. Furthermore, Hidayanto et al. (2017) examined the factors influencing consumers’ intention to participate in online group buying. Their research found that electronic word-of-mouth significantly affects information search and trust. So far, the research on these two keywords is still in the development stage in this area, and future research is suitable for adding more social psychology theories to support it.

Then, regarding the keyword “technology”, in 2012, it became a popular word related to impulse buying, as Fig. 9 presented. The technology mentioned here consists of three components: first, the continuous change of the website has brought about technology upgrades. Second, technology products, such as apps and virtual reality, are prominent in the new era. Third, research on interdisciplinary new technology combined with Impulse Buying. The following chapters will elaborate on the literature review from these three aspects. The first is about website technology. Based on the research of Wu et al. (2016), the results reveal that two critical factors, technology use, and trust beliefs, are necessary for online impulse buying. Similarly, Kimiagari and Asadi Malafe, (2021) integrated the Technology Acceptance Model (TAM) into the SOR model and looked into the connection between cognitive and affective reactions to internal and external stimuli and impulse buying behavior based on social media. The second is for technological products. Chang and Tseng (2014) think that modern technological advancements (such as apps) allow e-retailers to provide clients with more practical and user-friendly online locations, giving consumers more choices and increasing their likelihood of impulse purchasing online. Safari et al. (2023) took metaverse shopping as the background, then applied the role of emotion and cognition to the dual process, discussed through the electroencephalography method, and the distinction between planned

shopping and unplanned shopping is made. Furthermore, the empirical findings of Chen et al. (2022), which were applied to the virtual reality (VR) environment retail industry, demonstrate that interaction and vitality have a beneficial impact on telepresence, perceived diagnostic, and fun, which incite consumers to make impulsive purchases. The third is about multidisciplinary analysis techniques. Bak et al. (2022) present data as a potential biomarker for identifying impulse purchase behavior through a brain-computer interface-based method for processing brain signals. Their study explores the hypothesis that duty-free shopping enhances impulsive buying behavior. In summary, there is still significant potential in the intersection of technology and impulse buying, particularly in the context of the latest Internet technology, new-era technology applications combined with the metaverse, and interdisciplinary research methods. Furthermore, existing research on the behavioral mechanisms underlying impulsive buying behavior remains unclear (Liu et al., 2022). Therefore, future research could delve deeper into the factors influencing impulse buying from psychological and technical perspectives.

### Conclusions

Impulsive buying behavior has received considerable attention in consumer research (Iyer et al., 2020). With the advance of the times, impulse buying has continuously extended from the business and management field to computer science information systems, psychology multidisciplinary, economics, and hospitality leisure sport tourism. Moreover, the number of publications on impulse buying in 2022 is 2.42 times higher than in 2018, highlighting significant research potential in this field. The current impulsive buying behavior literature review focuses on online impulse buying (Abdelsalam et al., 2020; Bashar et al., 2022; Chan et al., 2017). Besides, a limited number of studies on impulsive buying behavior have employed meta-analysis (Iyer et al., 2020; Zhao et al., 2022).

Nevertheless, current research overlooks a comprehensive exploration of traditional impulse buying from a temporal perspective and lacks a visual analysis perspective. Therefore, more investigations are necessary in this field. This study provides an objective and comprehensive review of this knowledge area by exploring the history and future trends of the impulse buying topic using CiteSpace software. The data, derived from the WoS Core Collection, spans the period from 1967 to September 30, 2023.

**Discussion.** Based on our country’s collaboration network, China’s publication volume (including Taiwan) is 1.38 times that of the United States. However, one literature article shows that the number of articles published in China is 2.88 times that of the United States (Bashar et al., 2022). The conclusions drawn in this article are approximately twice those of this study.

Likewise, the country distribution pie chart shown in another article (Kathuria and Bakshi, 2024) reveals that the number of articles published by China is over twice that of the United States. The difference in the proportion of quantities is because these two articles focus on online impulse buying and the setting year after 2000. Thus, we deduce the following conclusion from the previously mentioned points: Over the past twenty years, China has experienced faster development in online impulse purchase research than the United States.

However, the United States has a longer history of offline impulse buying, which has provided a solid foundation for early research in this area. Furthermore, the population base is an essential factor driving impulse buying research. India and China, the two most populous countries in the world, have seen rapid development in this field. In the author collaboration network,

the top-ranked author, Umair Akram, is consistent with the author's ranking in the online impulse buying literature review research (Bashar et al., 2022).

Conversely, most of the top 10 authors in this study are from China. Umair Akram mainly studies impulse buying in China. He classified traditional impulse buying behavior and online impulse buying behavior. Bharadhwaj Sivakumaran mainly studies impulse buying in India. He thinks outside the box and explores impulse buying from the service and store environment perspective. Notably, the authors ranked 4-7 are also from Indian institutions. According to the institution collaboration network, the United States, China, and India are the top three countries. As for cooperation between institutions, two groups of institutions have more connections. One group is the Hong Kong Polytechnic University, the Great Lakes School of Management, and the Beijing Institute of Technology. The other group is Florida State University and Kyung Hee University. Other institutions' relationships are relatively scattered, consistent with the country's collaboration network's top three ranks, which include the United States, China, and India, which are also more prominent in terms of authors and institutions involved in impulse-buying research.

Therefore, future scholars should explore the similarities and differences in impulse-buying behavior between China and India due to their similar population sizes. Additionally, comparing the differences in impulse-buying behavior between the United States and these developing countries would also be valuable. Thus, this study recommends stronger international collaboration to establish a more extensive research network in this area.

Next, this study conducted an in-depth analysis based on co-citations from the perspectives of clusters, authors, and journals. First, clusters based on the co-citation articles are special content that distinguishes the current study from other literature reviews in this field. These clusters reflect the times' changes (e.g., COVID-19), social platforms and their extensions (social platforms, live shopping), and consumer impulse buying factors, such as subjective well-being, brand attachment, and flow experience, which add more cause variables for online impulse buying (Zhao et al., 2022). Second, the author co-citation network allows readers to find relevant theories and research foundations from the works of different authors. For instance, STERN H is the founder of impulse buying theory, and he divided impulse buying into four types. KACEN JJ researched how cultural differences affect impulsive purchases. Third, regarding journal co-citations, according to the journals in the research of Bashar et al. (2022), our research added high-quality journals, such as the Journal of Consumer Research, Journal of Retailing, Journal of Marketing, Journal of Consumer Psychology, Psychology & Marketing, and Journal of the Academy of Marketing Science, which recommended to readers. Some of these journals are based on the integration of psychology and marketing disciplines.

Concisely, this research expands the content on the latest social platforms and buying causes factors in this field by summarizing and categorizing ways. Meanwhile, the current study encourages scholars to start from classic theories and provide new research angles for researchers to explore impulse buying behavior deeply. For instance, scholars can apply categorical and comparative thinking, such as classifying impulse buying into four different types or classifying cultures to create more innovation on the background of social platforms in this field.

Finally, regarding the emerging trends of impulsive buying behavior, this paper includes articles with the highest number of citations and trends in keywords over time zones. First, it is about the highest number of citation articles; it not only supplements the latest and high-quality reference articles to the existing review literature research (Bashar et al., 2022) but also provides classic articles covering the precursor model of impulse buying (Beatty

and Ferrell, 1998). The top three articles with the latest literature strength are centered around impulse buying behavior on social platforms. Among the two articles published in the latest outbreak year, one starts from the perspective of trust belief and technology use to create a new model to examine the impulse buying behavior of the whole population (Wu et al., 2016). The other article is a comparative study of impulse buying through online and offline channels (Aragoncillo and Orus, 2018). Second, the time-zone keyword figure helps researchers understand the latest factors that trigger impulsive buying behavior, related theories, models, and cutting-edge trends. For example, the dual-system theory can examine impulsive purchasing from two angles: promotion and inhibition. Consumer need is the facilitator and self-control is the inhibitory factor. Furthermore, needs can be divided into value level and interpersonal interaction level. On the one hand, value-level needs can be explored in conjunction with the theory of consumption values.

On the other hand, interpersonal interaction level can be combined with social psychology theory and the five-factor model of personality. This is similar to the article about a systematic literature review of impulse buying, which also highlights the Big Five model and flow theory (Redine et al., 2023), like our research. However, our article suggests that personality traits can be divided into different levels—lower-order, mid-order, and higher-order traits—for further research. In addition, the emerging part of the future is centered on “technique,” which can start from three levels of direction. In addition, the future emerging part centers on “technique,” which can start from three levels of direction. The first level is the technical upgrade brought about by continuous website changes, which indicates that the variables related to the website should be considered. This point is also partially consistent with the perspective of an article doing a meta-analysis on online impulsive buying (Zhao et al., 2022). Readers can glean insights from this article's examination of website-related variables for expansion. Another level of exploration pertains to technology products such as virtual reality and other technological advancements. Scholars are encouraged to integrate new-era technological products, like the metaverse, with impulse purchases in novel scenarios. Additionally, there's a call for research on interdisciplinary approaches that combine new technology with impulse buying. For instance, an article by Xiao and Nicholson (2013) conducts a systematic review of a multidisciplinary cognitive-behavioral framework of impulse buying, synthesizing insights from multiple disciplines to explore the antecedents of impulse buying. However, it's suggested that researchers incorporate techniques from other disciplines to enhance their exploration of impulse buying.

Moreover, this study enhances readers' comprehension of the current landscape of impulse buying research. By integrating current literature and keyword trend figures over time zones with theoretical models, the study offers a roadmap for future research directions. Furthermore, it provides effective strategies tailored to the perspectives of market managers, consumers, industry stakeholders, and researchers—covering management policies, impulse control, marketing strategies, and research methodologies. These insights empower market managers and consumers to mitigate impulsive buying tendencies. Consumers can reflect on factors contributing to impulsive purchases and the influence of popular social platforms to avoid excessive buying. For marketing planners, understanding the psychological theories and models behind impulsive consumer behavior can inform strategies to boost sales legally and ethically. Finally, researchers can draw inspiration from this study to explore various perspectives, linking offline impulsive buying behaviors to theoretical foundations and conducting innovative research based on current trends.

Hence, this study significantly contributes to the analysis of impulse buying behavior. By systematically analyzing 704 articles

published on WoS, it provides a clear overview of the current research status of impulse buying, presented chronologically from a visual perspective. The research expands beyond the study of online impulse buying, addressing offline impulse buying and filling gaps in existing literature. Specifically, it offers an in-depth analysis and summary of the latest publication trends and country distribution, highlighting impulse buying as a thriving area of research. Additionally, the study elaborates on the most productive authors, institutions, and countries according to collaboration networks, drawing new conclusions through comparative analysis. Through keyword time zone analysis, the study further explores impulse buying behavior by integrating impulse buying factors and theoretical foundations, offering innovative insights across three technical levels.

**Limitations and future scope.** Although this work uses CiteSpace software to yield a thorough and unbiased analysis of publications on impulsive buying behavior, it cannot replace a total literature review. As a result, this study could provide researchers and academics with a thorough picture of impulsive buying behavior. In addition to bibliometric analysis, future studies may also use content analyses of papers addressing techniques and conceptual issues. Additionally, because this study relies solely on Web of Science data, its descriptive analysis is constrained to the correctness of that database. Consequently, this research shows that impulsive buying behavior is a prospective academic topic that is valuable to explore. Since the research in this field exceeded three digits for the first time in 2021, global research on impulse buying has continued to grow rapidly and develop into multiple disciplines. Currently, the research background on impulse buying mainly focuses on online shopping. Over the next five years, the United States, China, and India will continue to be the top three countries in this subject regarding institutional rankings and publication volume. In the future, many related areas will be related to impulsive buying behavior. Through the clusters by co-citation network, high quantity articles of citation, and time zone view of keywords by this research, the future hotspots will continue to extend in social platforms, live-streaming, luxury goods, and food waste.

Moreover, researchers can combine online experience, consumer value, and psychological theories to think deeply about the mechanism behind impulsive buying behavior. Furthermore, technology and impulse buying still have huge potential, especially in the latest Internet technology themes, metaverse background, and interdisciplinary research methods. Besides, future studies can expand the research scope by adding more keywords, such as technique impulsive buying behavior and tourism impulsive buying behavior. Meanwhile, exploration in this domain can continue across different academic databases.

### Data availability

The Web of Science database was used to retrieve the necessary data for this research. Hence, the data may be accessed using the same search query and filters that were used in this study. However, the data can also be made available upon reasonable request to the corresponding author.

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### Author contributions

In this collaborative effort, Xiyun Gong, Yee Choy Leong, and Ethan Yi Cao contributed to the conception and design. Xiyun Gong and Lee Shin Yiing articulated the research methods and analyzed the data. Abu Naser Mohammad Saif updated the entire discussion and conclusion sections. Moreover, he reviewed the overall grammatical structure of the paper and made necessary adjustments. All authors drafted and revised the manuscript together and approved its final publication.

### Competing interests

The authors declare no competing interests.

### Ethical approval

The study does not require ethical approval. It is based on an academic research database and does not involve questionnaire surveys or human participants; therefore, no ethical procedures are necessary.

### Informed consent

This research does not involve issues of human privacy or risk. Hence, informed consent is not applicable.

### Additional information

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